

2005 Environmental Sustainability Index

Benchmarking National Environmental Stewardship

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Yale University

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Disclaimers

The word “country” is used loosely in this report to refer to both actual countries and other administrative or economic entities. Similarly, the maps presented are for illustrative purposes and do not imply any preference in cases where territory is under dispute.

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Executive Summary

The Environmental Sustainability Index (ESI) benchmarks the ability of nations to protect the environment over the next several decades. It does so by integrating 76 data sets – tracking natural resource endowments, past and present pollution levels, environmental management efforts, and the capacity of a society to improve its environmental performance – into 21 indicators of environmental sustainability. These indicators permit comparison across a range of issues that fall into the following five broad categories:

- Environmental Systems
- Reducing Environmental Stresses
- Reducing Human Vulnerability to Environmental Stresses
- Societal and Institutional Capacity to Respond to Environmental Challenges
- Global Stewardship

The indicators and variables on which they are constructed build on the well-established “Pressure-State-Response” environmental policy model. The issues incorporated and variables used were chosen through an extensive review of the environmental literature, assessment of available data, rigorous analysis, and broad-based consultation with policymakers, scientists, and indicator experts. While they do not provide a definitive vision of sustainability, the collection of indicators and variables that form the 2005 ESI provide: (1) a powerful tool for putting environmental decisionmaking on firmer analytical footing (2) an alternative to GDP and the Human Development Index for gauging country progress, and (3) a useful mechanism for benchmarking environmental performance.

The higher a country’s ESI score, the better positioned it is to maintain favorable environmental conditions into the future. The five highest-ranking countries are Finland, Norway, Uruguay, Sweden, and Iceland – all countries that have substantial natural resource endowments and low population density.

Each has managed the challenges of development with some success.

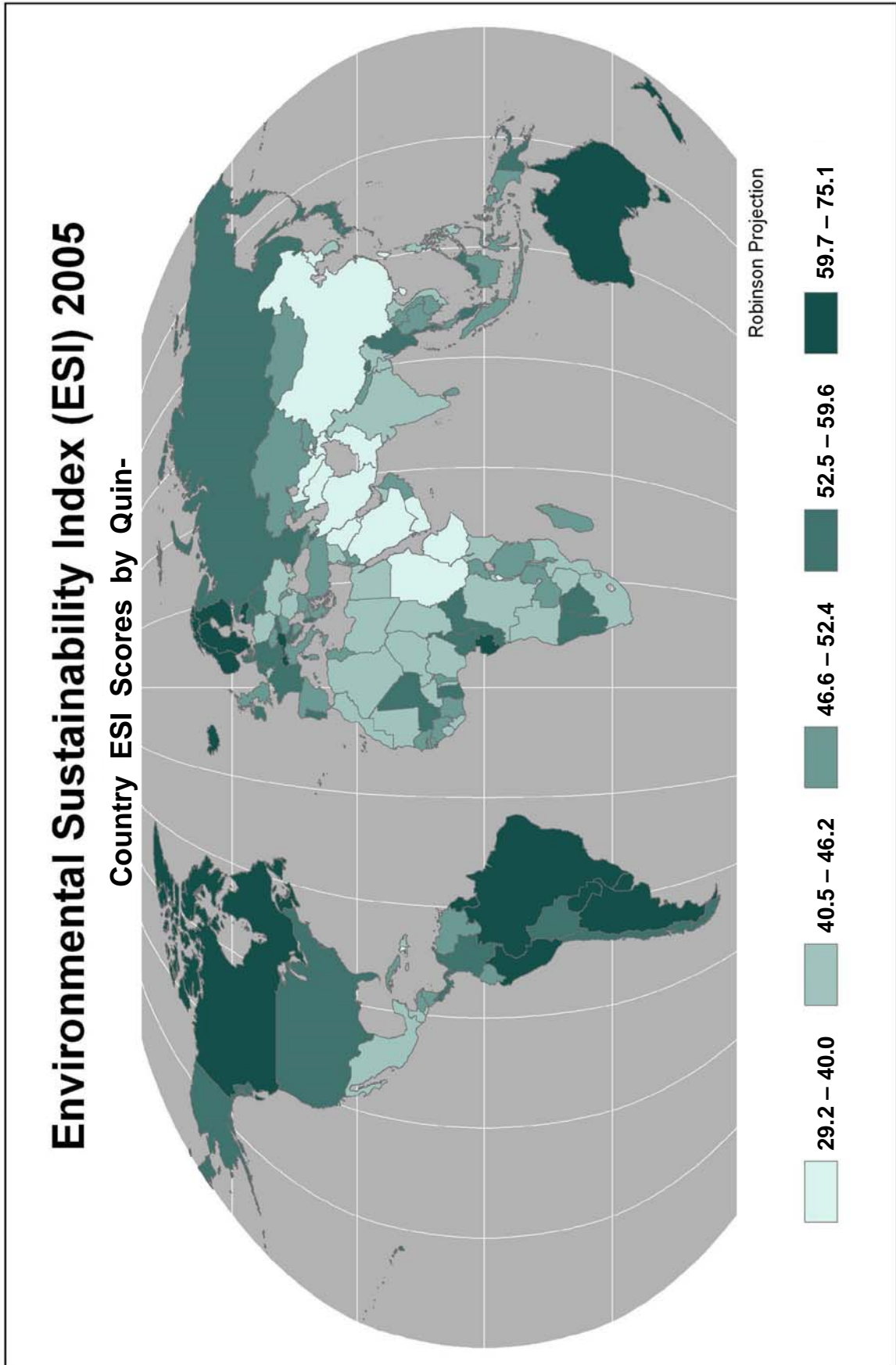
The lowest ranking countries are North Korea, Iraq, Taiwan, Turkmenistan, and Uzbekistan. These countries face numerous issues, both natural and manmade, and have not managed their policy choices well.

While absolute measures of sustainability remain elusive, many aspects of environmental sustainability can be measured at least in relative terms. National positions on various important elements of environmental stewardship can therefore be determined and are instructive.

The key results and conclusions that emerge from the 2005 ESI can be summarized as follows:

- The ESI has proven to be a useful gauge of national environmental stewardship. It provides a valuable summary measure of environmental performance and a counterpart to yardsticks of human development and economic wellbeing. Any measure of sustainability will have shortcomings given the significant gaps in critical data sets, divergent views about what comprises sustainability, and differing opinions about how best to address underlying uncertainties.
- Environmental sustainability is a fundamentally multi-dimensional concept. Some environmental challenges arise from development and industrialization – natural resource depletion (especially of non-renewable resources), pollution, and ecosystem destruction. Other challenges are a function of underdevelopment and poverty-induced short-term thinking – resource depletion (especially of potentially renewable resources such as forests and water) and lack of investment in capacity and infrastructure committed to pollution control and ecosystem protection.

- There are significant differences across countries in both current environmental results and probable longer-term trends. By assembling a broad array of data that make cross-country comparisons possible, the ESI provides a powerful tool for tracking environmental performance, identifying leaders and laggards on an issue-by-issue basis, and designing policy responses.
- Most countries do well on some issues and much less well on others. Virtually no nation scores very high or very low on all 21 indicators. Thus, every society has something to learn from benchmarking its environmental performance against relevant peer countries.
- Environmental sustainability entails issues that are local as well as national and global in scale, all of which should figure in international comparisons (as they do in the ESI).
- The ESI and its elements provide a foundation for more data-driven environmental analysis and decisionmaking. In doing so, it sheds light on a number of critical issues. The ESI demonstrates, for example, that income contributes to the potential for strong environmental stewardship, but does not guarantee it. Indeed, it is striking how many of the bottom rungs of ESI are occupied by countries that are relatively wealthy.
- The relationship between environmental sustainability and economic development is complex. At every level of income, countries face environmental challenges. Some countries manage their pollution control and natural resource management challenges relatively well while others do not. Development status is therefore not environmental destiny.
- The ESI suggests that a more quantitative and systematic approach to environmental policymaking – where: (a) problems are tracked through a carefully constructed set of metrics and indicators (b) policy progress is evaluated empirically, and (c) governments benchmark their results against a relevant peer group – can help to highlight superior environmental programs, technologies, strategies, and approaches.
- ESI-based analysis reveals some of the critical determinants of environmental performance: low population density, economic vitality, and quality of governance. Some of these variables have long been identified as theoretically important. The ESI provides empirical support for these theories.
- Serious and persistent data gaps plague the ESI and other efforts to shift pollution control and natural resource management onto more analytically rigorous underpinnings. Investment at the local, national, and global scales in a more complete set of key indicators should be seen as a fundamental policy priority. The ESI does not cover a number of important issues – e.g., quality of waste management, wetlands destruction, and exposure to heavy metals such as lead and mercury – because the requisite data are not collected or are not reported on a basis that permits cross-country comparisons.
- The need for improved data to undergird better environmental policymaking emerges especially strongly in the developing world in the context of worldwide efforts to achieve the large-scale environmental aims of the Millennium Development Goals.



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Table 1: 2005 Environmental Sustainability Index – Scores and Rankings

ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	Components	ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	Components
1	Finland	75.1	1			38	Malaysia	54.0		23	
2	Norway	73.4	2			39	Congo	53.8		24	
3	Uruguay	71.8		1		40	Netherlands	53.7	16		
4	Sweden	71.7	3			41	Mali	53.7		25	
5	Iceland	70.8	4			42	Chile	53.6		26	
6	Canada	64.4	5			43	Bhutan	53.5		27	
7	Switzerland	63.7	6			44	Armenia	53.2		28	
8	Guyana	62.9		2		45	United States	52.9	17		
9	Argentina	62.7		3		46	Myanmar	52.8		29	
10	Austria	62.7	7			47	Belarus	52.8		30	
11	Brazil	62.2		4		48	Slovakia	52.8	18		
12	Gabon	61.7		5		49	Ghana	52.8		31	
13	Australia	61.0	8			50	Cameroon	52.5		32	
14	New Zealand	60.9	9			51	Ecuador	52.4		33	
15	Latvia	60.4		6		52	Laos	52.4		34	
16	Peru	60.4		7		53	Cuba	52.3		35	
17	Paraguay	59.7		8		54	Hungary	52.0	19		
18	Costa Rica	59.6		9		55	Tunisia	51.8		36	
19	Croatia	59.5		10		56	Georgia	51.5		37	
20	Bolivia	59.5		11		57	Uganda	51.3		38	
21	Ireland	59.2	10			58	Moldova	51.2		39	
22	Lithuania	58.9		12		59	Senegal	51.1		40	
23	Colombia	58.9		13		60	Zambia	51.1		41	
24	Albania	58.8		14		61	Bosnia & Herze.	51.0		42	
25	Central Afr. Rep.	58.7		15		62	Israel	50.9		43	
26	Denmark	58.2	11			63	Tanzania	50.3		44	
27	Estonia	58.2		16		64	Madagascar	50.2		45	
28	Panama	57.7		17		65	United Kingdom	50.2	20		
29	Slovenia	57.5		18		66	Nicaragua	50.2		46	
30	Japan	57.3	12			67	Greece	50.1	21		
31	Germany	56.9	13			68	Cambodia	50.1		47	
32	Namibia	56.7		19		69	Italy	50.1	22		
33	Russia	56.1		20		70	Bulgaria	50.0		48	
34	Botswana	55.9		21		71	Mongolia	50.0		49	
35	P. N. Guinea	55.2		22		72	Gambia	50.0		50	
36	France	55.2	14			73	Thailand	49.7		51	
37	Portugal	54.2	15			74	Malawi	49.3		52	

The column labeled "components" contains bar charts for the five ESI core components – Systems, Stresses, Vulnerability, Capacity, and Global Stewardship – that shows the relative strengths and weaknesses for each country. Higher bars correspond to higher levels of sustainability. The relative heights are comparable across components and across countries.

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ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	Comp-onents	ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	Comp-onents
75	Indonesia	48.8		53		111	Togo	44.5		84	
76	Spain	48.8	23			112	Belgium	44.4	28		
77	Guinea-Bissau	48.6		54		113	Dem. Rep. Congo	44.1		85	
78	Kazakhstan	48.6		55		114	Bangladesh	44.1		86	
79	Sri Lanka	48.5		56		115	Egypt	44.0		87	
80	Kyrgyzstan	48.4		57		116	Guatemala	44.0		88	
81	Guinea	48.1		58		117	Syria	43.8		89	
82	Venezuela	48.1		59		118	El Salvador	43.8		90	
83	Oman	47.9		60		119	Dominican Rep.	43.7		91	
84	Jordan	47.8		61		120	Sierra Leone	43.4		92	
85	Nepal	47.7		62		121	Liberia	43.4		93	
86	Benin	47.5		63		122	South Korea	43.0	29		
87	Honduras	47.4		64		123	Angola	42.9		94	
88	Côte d'Ivoire	47.3		65		124	Mauritania	42.6		95	
89	Serbia & Monteneg.	47.3		66		125	Philippines	42.3		96	
90	Macedonia	47.2		67		126	Libya	42.3		97	
91	Turkey	46.6	24			127	Viet Nam	42.3		98	
92	Czech Rep.	46.6	25			128	Zimbabwe	41.2		99	
93	South Africa	46.2		68		129	Lebanon	40.5		100	
94	Romania	46.2		69		130	Burundi	40.0		101	
95	Mexico	46.2	26			131	Pakistan	39.9		102	
96	Algeria	46.0		70		132	Iran	39.8		103	
97	Burkina Faso	45.7		71		133	China	38.6		104	
98	Nigeria	45.4		72		134	Tajikistan	38.6		105	
99	Azerbaijan	45.4		73		135	Ethiopia	37.9		106	
100	Kenya	45.3		74		136	Saudi Arabia	37.8		107	
101	India	45.2		75		137	Yemen	37.3		108	
102	Poland	45.0	27			138	Kuwait	36.6		109	
103	Niger	45.0		76		139	Trinidad & Tobago	36.3		110	
104	Chad	45.0		77		140	Sudan	35.9		111	
105	Morocco	44.8		78		141	Haiti	34.8		112	
106	Rwanda	44.8		79		142	Uzbekistan	34.4		113	
107	Mozambique	44.8		80		143	Iraq	33.6		114	
108	Ukraine	44.7		81		144	Turkmenistan	33.1		115	
109	Jamaica	44.7		82		145	Taiwan	32.7		116	
110	United Arab Em.	44.6		83		146	North Korea	29.2		117	

Note: The 2005 ESI scores are not directly comparable to the 2002 ESI Scores. See Appendix A for details on the methodology.

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Chapter 1 – The Need for an Environmental Sustainability Index

We live in an era of numbers. In many realms, decisionmaking has become increasingly data-driven. But the environmental domain has curiously lagged in this regard. Plagued by widespread information gaps and uncertainties, environmental policymaking has often been based on generalized observations, best guesses, and “expert opinion” – or, worse yet, rhetoric and emotion (Esty 2002).

This report presents the 2005 Environmental Sustainability Index (ESI), which provides a composite profile of national environmental stewardship based on a compilation of 21 indicators that derive from 76 underlying data sets. The ESI offers a tool for shifting pollution control and natural resource management onto firmer analytic underpinnings. In this regard, the heart of the ESI is not the rankings but rather the underlying indicators and variables. By facilitating comparative analysis across national jurisdictions, these metrics provide a mechanism for making environmental management more quantitative, empirically grounded, and systematic.

This report demonstrates how a commitment to environmental indicators and greater emphasis on statistical analysis might strengthen environmental problem solving at the national policy level. The ESI, though still under development and impaired by persistent data gaps in both basic environmental monitoring data and more advanced metrics, illustrates the potential of such a policy tool. The same approach could enhance decision-making at the global scale, the local level, in corporations, and even within households. The lack of information on many critical issues, limited data coverage, and the non-comparability of data across countries all render the design of indices more difficult and implicitly influence what gets measured.

The selection of the 21 indicators and their underlying variables is the result of careful screening of available data sources combined with innovative approaches to designing alternative measures and “proxies” for important

issues where routine monitoring does not exist and metrics are not available. Although imperfect, the ESI helps to fill a long-existing gap in environmental performance evaluation. It offers a small step toward a more vigorous and quantitative approach to environmental decisionmaking.

Just as companies have long benchmarked their performance against industry peers, national governments are finding it useful to compare their performance against others who are similarly situated, and the ESI makes such “peer group” comparisons relatively easy to do. The overall rankings must be taken for what they are – a relative and approximate indication of how close a country is to being on a sustainable environmental trajectory based on a “snapshot” view of a range of widely recognized issues including pollution control, natural resource management, and societal problem solving capacities. The real value of the ESI therefore emerges from looking at the relative position of each country on the 21 underlying indicators. In fact, given the “noise” in the analysis, we cannot really be sure that Finland outranks Norway overall. But we can say with some confidence that both of these countries are outperforming the United States and France in important aspects of environmental policy.

The most important function of the Environmental Sustainability Index is as a policy tool for identifying issues that deserve greater attention within national environmental protection programs and across societies more generally. The Environmental Sustainability Index also provides a way of identifying those governments that are at the leading edge with regard to any particular issue. This information is useful in identifying “best practices” and may help to guide thinking on what it will take to make policy progress.

The analysis of best practices and successful environmental policy does not imply that only one way towards sustainability exists. Countries face an array of issues and policy

questions when trying to improve their environmental performance. The answers that make sense will depend on the nation's specific environmental, economic, and social circumstances, internal factors such as the priority given to environmental issues as well as a multitude of external factors including the environmental policies of neighboring countries. Each policy choice must be formulated and evaluated within this context. The ESI can assist in this analytical process by identifying (a) the most significant issues a country faces (b) similar countries that have successfully addressed those issues, and (c) the trade-offs that can be expected as a result of suboptimal environmental choices.

The ESI provides a useful national policymaker's guide to pollution control and natural resource management challenges, highlighting where each particular country might find that marginal investments of funding and political attention could best be deployed. Objective measures of policy performance are an important mechanism for budget rationalization and priority setting.

The ESI takes seriously the need to track a full range of pollution and natural resource management issues that are critical to a human-centered measure of environmental wellbeing. It incorporates issues that are local in scope as well as those that are global in scale. While countries at different levels of development and with diverse national priorities may choose to focus on different elements of environmental sustainability, all of the issues included in the ESI are of relevance to all countries. The broad scope of the ESI with its strong emphasis on fundamental issues – such as air pollution, water quality, and human alterations of terrestrial ecosystems – has won praise in the developing world because it features basic environmental needs and not just those of concern to developed countries.

The overall ESI scores and rankings also help to ensure that countries are graded not only on their economic results (e.g., GDP growth or competitiveness rankings) but also on other policy goals including environmental performance. In this regard, it is striking how

many of the bottom rungs on the ESI are occupied by countries that are relatively wealthy.

The ESI also provides a tool for achieving global-scale policy goals. The Millennium Declaration and the related Millennium Development Goals (MDGs) explicitly commit the world community to making progress in achieving environmental sustainability within the context of a broader global agenda aimed at reducing poverty, malnutrition, and expanding education and health care (UN 2000). Moreover, donor countries supporting the MDG process increasingly insist upon accountability and transparency in how their money is spent – and the evaluation of which investments are paying off and which are not.

Some MDGs have well-established metrics that allow progress on these goals to be tracked. Goal 7 of the MDGs aims at “Ensuring Environmental Sustainability” but lacks the breadth of indicators needed to adequately gauge progress toward this ambitious goal because no such set of appropriate metrics is readily available. The ESI offers a starting point for developing such a set of metrics.

In all these regards, context matters. The ESI, with its emphasis on relative rankings, provides a mechanism for establishing context and for understanding what is possible in terms of policy progress. Indeed, it turns out the comparisons to relevant peer countries are particularly important in goal setting, identifying best practices in both policymaking and technology adoption, and spurring competitive pressure for improved performance.

Decisionmakers are eager for tools that will help them to identify problems, track trends, set priorities, understand policy tradeoffs and synergies, target environmental investments, evaluate programs, and focus limited political attention. The ESI is such a tool.

Countries want to be seen as doing well in comparison to those similarly situated. Establishing the right peer groups is thus a critical element of any benchmarking exercise. In support of this quest, we offer a series of potentially relevant groupings in Tables 2 through 8.

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Table 2: High Population Density Countries – Countries and territories in which more than half the land area has a population density above 100 persons per square kilometer

RANK	Country	ESI	RANK	Country	ESI	RANK	Country	ESI
1	Japan	57.3	8	Poland	45.0	15	Philippines	42.3
2	Germany	56.9	9	Rwanda	44.8	16	Lebanon	40.5
3	Netherlands	53.7	10	Jamaica	44.7	17	Burundi	40.0
4	Italy	50.1	11	Belgium	44.4	18	Trinidad & Tobago	36.3
5	Sri Lanka	48.5	12	Bangladesh	44.1	19	Haiti	34.8
6	Nepal	47.7	13	El Salvador	43.8	20	Taiwan	32.7
7	India	45.2	14	South Korea	43.0	21	North Korea	29.2

Note: Countries identified using CIESIN's PLACE data set (CIESIN 2003)

Table 3: Desert Countries – Countries that are more than 50% desert (WWF Biome Classification)

RANK	Country	ESI	RANK	Country	ESI	RANK	Country	ESI
1	Namibia	56.7	8	Niger	45.0	15	Iran	39.8
2	Israel	50.9	9	Morocco	44.8	16	Saudi Arabia	37.8
3	Kazakhstan	48.6	10	United Arab Em.	44.6	17	Yemen	37.3
4	Oman	47.9	11	Egypt	44.0	18	Kuwait	36.6
5	Jordan	47.8	12	Mauritania	42.6	19	Uzbekistan	34.4
6	Algeria	46.0	13	Libya	42.3	20	Iraq	33.6
7	Azerbaijan	45.4	14	Pakistan	39.9	21	Turkmenistan	33.1

Note: Countries identified using CIESIN's PLACE data set (CIESIN 2003)

Table 4: OAS Member Countries – Organization of American States member countries

RANK	Country	ESI	RANK	Country	ESI	RANK	Country	ESI
1	Uruguay	71.8	9	Bolivia	59.5	17	Honduras	47.4
2	Canada	64.4	10	Colombia	58.9	18	Mexico	46.2
3	Guyana	62.9	11	Panama	57.7	19	Jamaica	44.7
4	Argentina	62.7	12	Chile	53.6	20	Guatemala	44.0
5	Brazil	62.2	13	United States	52.9	21	El Salvador	43.8
6	Peru	60.4	14	Cuba	52.3	22	Dominican Rep.	43.7
7	Paraguay	59.7	15	Nicaragua	50.2	23	Trinidad & Tobago	36.3
8	Costa Rica	59.6	16	Venezuela	48.1	24	Haiti	34.8

Table 5: ASEAN Member Countries – Association of Southeast Asian Nations member countries

RANK	Country	ESI	RANK	Country	ESI	RANK	Country	ESI
1	Malaysia	54.0	4	Cambodia	50.1	7	Philippines	42.3
2	Myanmar	52.8	5	Thailand	49.7	8	Viet Nam	42.3
3	Laos	52.4	6	Indonesia	48.8			

Table 6: NEPAD Member Countries – New Partnership for Africa’s Development member countries

RANK	Country	ESI	RANK	Country	ESI	RANK	Country	ESI
1	Gabon	61.7	15	Malawi	49.3	29	Togo	44.5
2	Central Afr. Rep.	58.7	16	Guinea-Bissau	48.6	30	Dem. Rep. Congo	44.1
3	Namibia	56.7	17	Guinea	48.1	31	Egypt	44.0
4	Botswana	55.9	18	Benin	47.5	32	Sierra Leone	43.4
5	Mali	53.7	19	Côte d'Ivoire	47.3	33	Liberia	43.4
6	Ghana	52.8	20	South Africa	46.2	34	Angola	42.9
7	Cameroon	52.5	21	Algeria	46.0	35	Mauritania	42.6
8	Tunisia	51.8	22	Burkina Faso	45.7	36	Libya	42.3
9	Uganda	51.3	23	Nigeria	45.4	37	Zimbabwe	41.2
10	Senegal	51.1	24	Kenya	45.3	38	Burundi	40.0
11	Zambia	51.1	25	Niger	45.0	39	Ethiopia	37.9
12	Tanzania	50.3	26	Chad	45.0	40	Sudan	35.9
13	Madagascar	50.2	27	Rwanda	44.8			
14	Gambia	50.0	28	Mozambique	44.8			

Table 7: EU Member Countries – European Union member countries

RANK	Country	ESI	RANK	Country	ESI	RANK	Country	ESI
1	Finland	75.1	9	Slovenia	57.5	17	Greece	50.1
2	Sweden	71.7	10	Germany	56.9	18	Italy	50.1
3	Austria	62.7	11	France	55.2	19	Spain	48.8
4	Latvia	60.4	12	Portugal	54.2	20	Czech Rep.	46.6
5	Ireland	59.2	13	Netherlands	53.7	21	Poland	45.0
6	Lithuania	58.9	14	Slovakia	52.8	22	Belgium	44.4
7	Denmark	58.2	15	Hungary	52.0			
8	Estonia	58.2	16	United Kingdom	50.2			

Table 8: NIS Countries – Russia and newly independent states that were former republics of the Soviet Union

RANK	Country	ESI	RANK	Country	ESI	RANK	Country	ESI
1	Latvia	60.4	6	Belarus	52.8	11	Azerbaijan	45.4
2	Lithuania	58.9	7	Georgia	51.5	12	Ukraine	44.7
3	Estonia	58.2	8	Moldova	51.2	13	Tajikistan	38.6
4	Russia	56.1	9	Kazakhstan	48.6	14	Uzbekistan	34.4
5	Armenia	53.2	10	Kyrgyzstan	48.4	15	Turkmenistan	33.1

Chapter 2 – Our Approach

Measuring Sustainability

Sustainability is a characteristic of dynamic systems that maintain themselves over time; it is not a fixed endpoint that can be defined. Environmental sustainability refers to the long-term maintenance of valued environmental resources in an evolving human context.

The best way to define and measure sustainability is contested. Economists often emphasize an accounting approach that focuses on the maintenance of capital stocks. Some in the environmental realm focus on natural resource depletion and whether the current rates of resource use can be sustained into the distant future.

Our emphasis is broader, more policy-oriented, and shorter term. The Environmental Sustainability Index (ESI) provides a gauge of a society's natural resource endowments and environmental history, pollution stocks and flows, and resource extraction rates as well as institutional mechanisms and abilities to change future pollution and resource use trajectories.

The ESI Framework

In seeking to provide a policy-relevant gauge of national environmental conditions and their likely trajectory over the next several decades, the ESI centers on the state of environmental systems, both natural and managed. It also measures stresses on those systems, including natural resource depletion and pollution rates, because the magnitude of such stresses serve as a useful indicator of the pressure on the underlying systems. The ESI further measures impacts and responses and human vulnerability to environmental change. In addition, the ESI tracks a society's capacity to cope with environmental stresses and each country's contribution to global stewardship.

These five core components and the logic for their inclusion in the ESI are laid out in Table 9.

This basic model builds on a broad base of theory in the ecological sciences and environmental policy. The core components of the ESI have a great deal of overlap with the widely used Pressure-State-Response (PSR) indicator model, and especially its more recent

Table 9: 2005 Environmental Sustainability Index Building Blocks – Components

Component	Logic
Environmental Systems	A country is more likely to be environmentally sustainable to the extent that its vital environmental systems are maintained at healthy levels, and to the extent to which levels are improving rather than deteriorating.
Reducing Environmental Stresses	A country is more likely to be environmentally sustainable if the levels of anthropogenic stress are low enough to engender no demonstrable harm to its environmental systems.
Reducing Human Vulnerability	A country is more likely to be environmentally sustainable to the extent that people and social systems are not vulnerable to environmental disturbances that affect basic human wellbeing; becoming less vulnerable is a sign that a society is on a track to greater sustainability.
Social and Institutional Capacity	A country is more likely to be environmentally sustainable to the extent that it has in place institutions and underlying social patterns of skills, attitudes, and networks that foster effective responses to environmental challenges.
Global Stewardship	A country is more likely to be environmentally sustainable if it cooperates with other countries to manage common environmental problems, and if it reduces negative transboundary environmental impacts on other countries to levels that cause no serious harm.

Box 1: “Sustainability” in the Broader Sense

The ESI does not track sustainability in the overarching “triple bottom line” (economic-environmental-social) sense that is now often used. Sustainability in this broader sense is the dynamic condition of society that depends on more than the protection and management of environmental resources and stresses as measured with the ESI. It is also necessary to have economic sustainability, with wealth distributed so that extreme poverty is eliminated, capital accounts are in balance, and investments in wealth-generating assets are at least equivalent to their depreciation. In addition, no society can be considered sustainable without attention to the social dimension, including effective governance, social justice, and respect for diverse cultural, ethical, and spiritual needs. The ultimate sustainability of human society also depends on education, through which knowledge, science, culture, values and the accumulated experience that we call civilization are transmitted from one generation to the next. For a complete measure of sustainability, the ESI needs to be coupled with equivalent economic and social sustainability indices to give an integrated set of measures of the efforts of countries to move towards full sustainability. With such measures, it will be easier to explore and understand the interactions between the economic, social, and environmental dimensions of the human system.

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DPSIR variant that additionally breaks out Driving Forces and Impacts¹. The cumulative picture created by these five components does not in any authoritative way define sustainability, but instead represents a comprehensive gauge of a country’s present environmental quality and capacity to maintain or enhance conditions in the years ahead.

Indicators and Variables

While we separate the ESI into five components for analytic purposes, each of these components, in turn, encompasses between three and six “indicators” of environmental sustainability. We consider the 21 indicators to be the fundamental building blocks of environmental sustainability – and it is these 21 indicators that are aggregated to create the ESI.

Each indicator builds on a logic developed by a careful review of the science and the literature in the environmental field, as well as thorough consultation with many experts from across the environmental sciences, government, business, non-governmental groups, research centers, and the academic sector.

Ideally, these indicators would include all relevant aspects of functioning environmental systems, be distinct in their cause-effect relationships, permit aggregation, reflect the diversity of circumstances across political jurisdictions (including disaggregated data for large countries), be easily quantifiable, and be scale-neutral.

Due to significant data gaps and conceptual limitations (such as how to measure and attribute the vitality of the oceans on a national basis), the actual indicator set falls short of the ideal. For example, a number of important issues including wetlands protection, the quality of solid and hazardous waste management, exposure to heavy metals and toxics, and ecosystem functionality were omitted because we lack adequate data to measure them across a significant number of countries. Other issues such as biodiversity loss, private sector contributions to sustainability, and progress towards more sustainable fisheries, forestry, and agricultural management practices are covered only to the extent available data permit. We discuss these data limitations and our vision of the “ideal” indicator set in Appendix G.

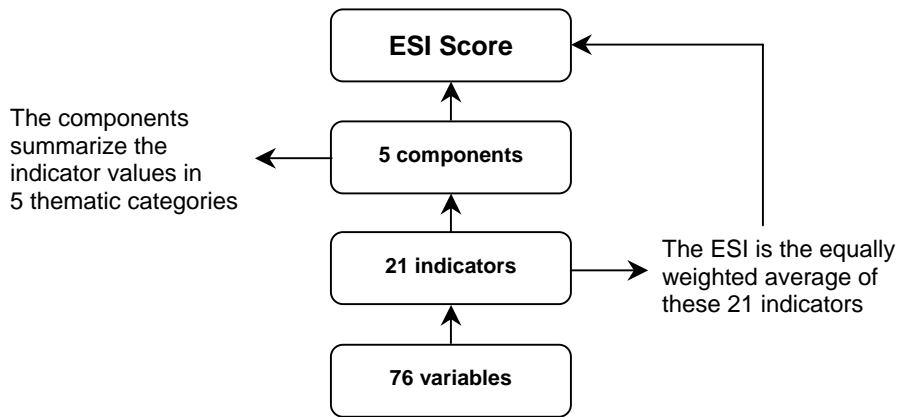


Figure 1: Constructing the ESI Score

The ESI score represents an equally weighted average of the 21 indicator scores. Each indicator builds on between 2 and 12 data sets for a total of 76 underlying variables. Air quality, for example, is a composite indicator that includes variables tracking the concentration of nitrogen oxides, sulfur dioxide, and particulates. Given the diversity of national priorities and circumstances, there will never be full agreement on a universally applicable set of weights for the aggregation of the 21 ESI indicators. Indeed, in some countries, water issues will be most pressing; in others, air pollution may be the priority. Developed countries are likely to put more emphasis on longer-term challenges such as climate change, waste treatment and disposal, clean and sustainable energy supply, and the protection of biodiversity. Developing nations will stress more urgent and short-term issues such as access to drinking water and sanitation, environmental health problems, and indoor air pollution.

We settled on uniform weighting of the 21 indicators because simple aggregation is transparent and easy to understand. Moreover, when we asked leading experts from the governmental, business, and non-governmental sectors to rank the indicators, none stood out as being of substantially higher or lower importance than the others. Similarly, when we tried to use statistical methods (including principal component analysis) to identify appropriate weights, nearly equal values were suggested across all 21 indicators.

Thus, although on an individual country basis, different prioritizations are likely to exist, on average these differences in weighting are less pronounced. The details of this effort are discussed in Appendix A.

The sensitivity analysis in Chapter 4 furthermore shows that the choice of aggregation strategies (and the implicit weighting that results) does not matter for most countries. Aggregating at the level of the five components (which we do *not* do for the reason stated above) substantially changes the ranks for only a few countries – particularly those with high levels of pollution and high capacity as well as low environmental vulnerability. Belgium and South Korea, in particular, move up dramatically as their institutional strengths are given much more weight under component-based aggregation.

To improve the policy utility of the ESI and to respect the diversity of judgments about how to weight the indicators, we plan to introduce an interactive version of the ESI which will allow the user to adjust the indicator (or component) weights however he or she wishes, and then to calculate a new score.

By giving each variable within an indicator the same weight and weighting each of the 21 indicators equally, we provide an imperfect but clear starting point for analysis. Table 10 shows in summary the nesting of variables within indicators and indicators within components.

Table 10: 2005 Environmental Sustainability Index Building Blocks – Indicators and Variables

Component	Indicator Number	Indicator	Variable Number	Variable Code	Variable
Environmental Systems	1	Air Quality	1	NO2	Urban population weighted NO ₂ concentration
			2	SO2	Urban population weighted SO ₂ concentration
			3	TSP	Urban population weighted TSP concentration
			4	INDOOR	Indoor air pollution from solid fuel use
	2	Biodiversity	5	ECORISK	Percentage of country's territory in threatened ecoregions
			6	PRTBRD	Threatened bird species as percentage of known breeding bird species in each country
			7	PRTMAM	Threatened mammal species as percentage of known mammal species in each country
			8	PRTAMPH	Threatened amphibian species as percentage of known amphibian species in each country
			9	NBI	National Biodiversity Index
	3	Land	10	ANTH10	Percentage of total land area (including inland waters) having very low anthropogenic impact
			11	ANTH40	Percentage of total land area (including inland waters) having very high anthropogenic impact
	4	Water Quality	12	WQ_DO	Dissolved oxygen concentration
			13	WQ_EC	Electrical conductivity
			14	WQ_PH	Phosphorus concentration
			15	WQ_SS	Suspended solids
	5	Water Quantity	16	WATAVL	Freshwater availability per capita
			17	GRDAVL	Internal groundwater availability per capita
Reducing Environmental Stresses	6	Reducing Air Pollution	18	COALKM	Coal consumption per populated land area
			19	NOXKM	Anthropogenic NO _x emissions per populated land area
			20	SO2KM	Anthropogenic SO ₂ emissions per populated land area
			21	VOCKM	Anthropogenic VOC emissions per populated land area
			22	CARSKM	Vehicles in use per populated land area
	7	Reducing Ecosystem Stress	23	FOREST	Annual average forest cover change rate from 1990 to 2000
			24	ACEXC	Acidification exceedance from anthropogenic sulfur deposition
	8	Reducing Population Pressure	25	GR2050	Percentage change in projected population 2004-2050
			26	TFR	Total Fertility Rate
	9	Reducing Waste & Consumption Pressures	27	EFPC	Ecological Footprint per capita
			28	RECYCLE	Waste recycling rates
			29	HAZWST	Generation of hazardous waste
	10	Reducing Water Stress	30	BODWAT	Industrial organic water pollutant (BOD) emissions per available freshwater
			31	FERTHA	Fertilizer consumption per hectare of arable land
			32	PESTHA	Pesticide consumption per hectare of arable land
			33	WATSTR	Percentage of country under severe water stress
	11	Natural Resource Management	34	OVRFSH	Productivity overfishing
			35	FORCERT	Percentage of total forest area that is certified for sustainable management
36			WEFSUB	World Economic Forum Survey on subsidies	
37			IRRSAL	Salinized area due to irrigation as percentage of total arable land	
38			AGSUB	Agricultural subsidies	

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Component	Indicator Number	Indicator	Variable Number	Variable Code	Variable
Reducing Human Vulnerability	12	Environmental Health	39	DISINT	Death rate from intestinal infectious diseases
			40	DISRES	Child death rate from respiratory diseases
			41	U5MORT	Children under five mortality rate per 1,000 live births
	13	Basic Human Sustenance	42	UND_NO	Percentage of undernourished in total population
			43	WATSUP	Percentage of population with access to improved drinking water source
	14	Reducing Environment-Related Natural Disaster Vulnerability	44	DISCAS	Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts
45			DISEXP	Environmental Hazard Exposure Index	
Social and Institutional Capacity	15	Environmental Governance	46	GASPR	Ratio of gasoline price to world average
			47	GRAFT	Corruption measure
			48	GOVEFF	Government effectiveness
			49	PRAREA	Percentage of total land area under protected status
			50	WEFGOV	World Economic Forum Survey on environmental governance
			51	LAW	Rule of law
			52	AGENDA21	Local Agenda 21 initiatives per million people
			53	CIVLIB	Civil and Political Liberties
			54	CSDMIS	Percentage of variables missing from the CGSDI "Rio to Joburg Dashboard"
			55	IUCN	IUCN member organizations per million population
			56	KNWLDG	Knowledge creation in environmental science, technology, and policy
	57	POLITY	Democracy measure		
	16	Eco-Efficiency	58	ENEFF	Energy efficiency
			59	RENPC	Hydropower and renewable energy production as a percentage of total energy consumption
	17	Private Sector Responsiveness	60	DJSGI	Dow Jones Sustainability Group Index (DJSGI)
			61	ECOVAL	Average Innovest EcoValue rating of firms headquartered in a country
			62	ISO14	Number of ISO 14001 certified companies per billion dollars GDP (PPP)
			63	WEFPRI	World Economic Forum Survey on private sector environmental innovation
	18	Science and Technology	64	RESCARE	Participation in the Responsible Care Program of the Chemical Manufacturer's Association
			65	INNOV	Innovation Index
66			DAI	Digital Access Index	
67			PECR	Female primary education completion rate	
68			ENROL	Gross tertiary enrollment rate	
Global Stewardship	19	Participation in International Collaborative Efforts	69	RESEARCH	Number of researchers per million inhabitants
			70	EIONUM	Number of memberships in environmental intergovernmental organizations
			71	FUNDING	Contribution to international and bilateral funding of environmental projects and development aid
	20	Greenhouse Gas Emissions	72	PARTICIP	Participation in international environmental agreements
			73	CO2GDP	Carbon emissions per million US dollars GDP
	21	Reducing Transboundary Environmental Pressures	74	CO2PC	Carbon emissions per capita
			75	SO2EXP	SO ₂ Exports
76			POLEXP	Import of polluting goods and raw materials as percentage of total imports of goods and services	

Data Coverage

We sought to include as many countries as we could in the 2005 ESI. For a detailed discussion of the inclusion criteria for countries, see Appendix A. Where countries were missing data points, we attempted to fill the gaps in a variety of ways. We sent out an initial data matrix to the Environment Ministry and the Statistical Office of every country that was close to meeting our data coverage threshold of 60% of the total variables, asking them to check our numbers and to fill gaps or update the data where possible. We accepted the data provided when they could be verified. A full discussion of this “country data review” is provided in Appendix A.

Ultimately, any country with fewer than 45 reported variables out of 76 was excluded from the analysis. We also excluded countries that did not meet baseline thresholds for land area and population because these small countries cannot be compared to others in the ESI. We discuss the complexity of including small countries and report the data for these countries in Appendix E.

A total of 146 countries met the criteria for inclusion in the 2005 ESI. For these countries, we then used Markov Chain Monte Carlo simulation to impute values for the missing variables where a logic for imputation existed.

Not only do data gaps mean that some important issues cannot be incorporated into the ESI, but many of the data sets that we do use are patchy, incomplete, haphazardly constructed, or otherwise deficient in some respect. In order to highlight where improved data is needed, we have undertaken to “grade” the 76 variables that are in the 2005 ESI on eight parameters. The results of this grading exercise are reported in Appendix A.

Data Transformation

To calculate the ESI scores for each country and to facilitate the aggregation of variables into indicators, the raw data were transformed in a variety of ways. A number of variables

require appropriate “denominators” to permit comparisons across countries of different scales, including transformations to improve the imputation model and the symmetry of the data. To avoid having extreme data points skew the results, we “trim the tails” of each data set distribution and construct a “z-score” for each variable that preserves the relative position of each country for each variable while providing a neutral way to aggregate the variable into indicators. The details of this methodology are provided in Appendix A.

Comparing the ESI to Other Indicator Efforts

Despite the urgent need for indicators that allow tracking of environmental performance on a national basis, data on pollution control and natural resource management remain spotty at best. A number of UN agencies and other international bodies collect data, but much of the information is lacking harmonized methodologies, timeliness, and rigorous quality assurance and quality control protocols. Further investments in environmental data and the production of indicators must be made a point of focus for both national and global decisionmakers. Getting the appropriate analytic and empirical underpinnings for good decisionmaking is essential to successful policymaking.

In recent years, important indicator development work has been done on the local and regional scales by groups such as the International Institute for Sustainable Development, which produced the IISD Compendium of Global Indicator Initiatives (IISD 2004). Others have worked at the global scale, including the OECD, those working on the “Dashboard of Sustainability” (ESL 2004), and Robert Prescott Allen’s work on the Well-being of Nations (Prescott-Allen 2001). However there are relatively few comprehensive environmental indicator sets that permit cross-national comparisons in support of sound policymaking.

For a variety of reasons, intergovernmental organizations have been unable or unwilling to produce such indicators, leaving an important void in the international policy realm. The closest the international community came in recent years was when the UN Commission on Sustainable Development adopted a work program on indicators that produced standard methodologies for extensive sets of indicators (UN CSD 1996; UN CSD 2001). The program aimed to help governments measure their own sustainability at the national level with sets of indicators they could adapt to their own requirements rather than a universal set of global indicators. But even here the CSD chose neither to endorse any single set of indicators nor to produce comparable cross-national indicators.

Although UN agencies and other international bodies routinely produce global indicators permitting cross-national comparisons on economics, health, security issues, human rights, and other high priority issues of global concern, efforts focused on the environment remain underfunded and understaffed. Instead, international agencies produce volumes of more broadly dispersed data on the environment. The information collected is often not methodologically consistent from country to country. This non-comparability hinders usefulness from a policy perspective.

In the absence of effective environmental sustainability indicators, it is impossible for environmental decisionmaking to undergo the virtuous circle of diagnosis, target-setting, implementation, and evaluation that is possible in other realms. Instead, environmental decisionmaking suffers from drift, with no clear expression of priorities, no coherent policy targets, and no ability to evaluate performance against objective criteria (Levy and Meier 2004).

Apart from the Ecological Footprint, when the ESI was first produced in 2000, there were no other cross-national environmental performance indices or rankings available. Since that time, a number of global-scale aggregate indicator efforts have emerged. We highlight below some of these other efforts and compare

them to the ESI. A more technically complete discussion, including statistical comparisons, can be found in Appendix F.

Robert Prescott-Allen's *Wellbeing of Nations* (IUCN 2001) has much in common with the ESI. It combines measures of environmental and human wellbeing, using a series of thematic indicators, which are aggregated in an overall indicator of environmental wellbeing and human wellbeing, which in turn can be averaged to produce an overall indicator. It quantifies levels of sustainability in a broad range of environmental areas, including water, air, biodiversity, and landscape. The Wellbeing Index combines environmental outcomes with human outcomes and relies on relative rankings to generate aggregated quantitative indicators (although performance on individual indicators is measured against absolute benchmarks). Unlike the ESI, the *Wellbeing of Nations* does not include measures of social capacity and it is not updated. The Wellbeing Index has also been criticized for its lack of transparency in the determination of the underlying weighting scheme. While the ESI is also based on a weighted aggregation, its choice and justification of the weights is straightforward and transparent.

The Consultative Group on Sustainable Development Indicators (CGSDI) has produced a set of indicators spanning economic, environmental, and social development objectives, in a framework designed to be consistent with the UN Commission on Sustainable Development Indicator Initiative. The CGSDI collection covers a wider range of outcomes than the ESI, because its focus is sustainable development broadly defined, as opposed to environmental sustainability. It does not explicitly publish an aggregated overall index of sustainable development, although such an index is straightforward to calculate with the data produced. The CGSDI indicators, in spite of their explicit connection to the UN process, is weakly institutionalized, with no clear ongoing mechanism for data collection, evaluation, aggregation, analysis and dissemination.

The Ecological Footprint, developed by Mathis Wackernagel and his colleagues,

measures the degree to which a given country is living within its ecological means. It aggregates the consumption of natural resources within a country in terms of the land area that is estimated to require the support of such consumption. This land area is then divided by the actual land area of the country – countries whose footprints are larger than their actual area are said to be consuming beyond a sustainable level. The Ecological Footprint has an intuitive appeal insofar as natural resource depletion is a central element of sustainability. It differs from the ESI in that it focuses on a single dynamic rather than a broader measure of environmental conditions. The ESI includes resource consumption and uses the Ecological Footprint as a variable because of its obvious relevance to sustainability. But the ESI also tracks many other aspects of environmental stewardship, particularly those associated with pollution and environmental public health.

Uncertainties and Conclusions

The validity, interpretability, and explanatory power of the Environmental Sustainability Index depend on the quality and completeness of the input data. Without sufficient data coverage at the national or sub-national scale, we would be unable to build the data matrix which underlies the Index, and we would have to rely more extensively on modeling techniques to fill the matrix gaps.

Data quality is also instrumental for the calculation of the indicators and Index. We are aware that there are many sources of uncertainty including measurement error, systematic and human error as well missing data. Despite

our goal of minimizing these errors, the ESI must be understood as an emergent product, prone to some imprecision where these data difficulties persist.

We aimed for the highest possible quality of both the 2005 ESI data and the Index construction methodology by engaging in extensive peer- and country-reviews. The many responses received to our country “data review” requests are a testimony to the recognition of many environmental officials of the importance of accurate, current, and informative environmental data and indicators. Dozens of experts helped to update, refine, and critique the 2005 ESI. They contributed individually and collectively to ensuring that the 2005 ESI stands at the forefront of currently available environmental indices and indicator projects.

We recognize that several methodological issues, including issue/indicator selection and the equal weighting of our 21 indicators, are open to dispute. We have continuously reviewed and improved the ESI methodology – and we expect to continue to do so as more data become available and statistical techniques are refined. As noted above, our vision of what an ideal ESI ought to include – if the data were available – can be found in Appendix G.

Although the ESI as it stands is partial and constrained by data limitations, we see enormous value in having a comparative tool that helps to identify the leaders and laggards with regard to a broad range of environmental issues. It is in the spirit of providing a starting point for data-driven and empirically grounded policymaking that the Environmental Sustainability Index is put forward.

Box 2: Can Environmental Sustainability Be Measured?

Although we acknowledge that “measuring” environmental sustainability is challenging, there are some common misconceptions about how difficult it is. We address these misunderstandings below:

Argument: the concept is too abstract. It is true that environmental sustainability is an abstract concept, however it does not follow that it cannot be measured with concrete indicators. “Health” is an equally abstract concept, yet the World Health Organization has made great progress constructing useful cross-national indicators of aggregated health outcomes. “Poverty” is very abstract as well, but a number of useful indicators have been produced to permit target setting and evaluation. Many other examples can be cited in which abstractness is not an obstacle to measurement, for example, in the cases of corruption, democracy, or human rights. There is no reason to suspect that the environment is any different from other abstract concepts.

Argument: the concept is too multi-faceted. Some argue the measures proposed as constituents of environmental sustainability are causally connected in multiple ways, diminishing their ability to serve as indicators. It is true that the many indicators proposed in the ESI are connected through complicated pathways of causality. Levels of environmental pollution, for example, can diminish the state of environmental systems, and also affect people and organisms adversely, while social and institutional capacity can intervene either in directly altering any of these phenomena or in changing the nature of the causal connections among them. We agree that this reality makes indicator creation challenging. However, complex causal structures are not a reason for inaction; in fact, we argue that indicators can help make it possible to resolve disputes on causality by strengthening the empirical nature of policy debates.

Argument: the term “environment” covers too wide a range of issues. Environmental sustainability encompasses a wide range of issues from pollution to natural resource management challenges and institutional capacity. It requires attention to the past, the present, and the future. Underlying natural resource endowments and past pollution as well as resource consumption define the environmental starting point for any society. Current pollution flows and resource use clearly are important determinants of sustainability. And the ability to change trajectories – including the societal and institutional capacity to fix problems and improve results over time – is also a key driver of sustainability. In response, the issues reflected in the ESI do range widely. But this fact does not invalidate the ESI. To the contrary, the diversity of issues embedded in the concept of environmental sustainability makes the need for a broad-gauge ESI more clear.

Argument: there is no common unit of measurement. We agree that the availability of a common unit of measurement, in terms of monetary value, land area, population, or risk, would greatly facilitate the definition of environmental sustainability. However, the multi-dimensional framework of the ESI cannot readily be reduced to a common scale. Transforming the ESI’s 21 indicators and underlying 76 variables to a common measurement metric would imply large-scale assumptions and generalizations that would bias the results and mask much of the analytic fraction of the index. Instead, making variables comparable on a cross-national level using GDP, people, or populated land area as denominators allows the aggregation of information that originally had different units of measurement and is the best option with the variety of the data included in the ESI.

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Chapter 3 – Main Findings

ESI Scores and Ranks

The ESI ranking provides a relative gauge of environmental stewardship in 146 countries. The Nordic countries, Uruguay, and Canada occupy the top ranks and have consistently done so in previous ESI rankings (ESI 2001; ESI 2002). Other than Uruguay, these nations are highly developed countries endowed with natural resources, strong economies, and low population densities. As industrialized countries, they have substantial pollution stresses, but generally manage their environmental challenges well. Uruguay stands in the top tier for a slightly different reason. It is not very industrialized and thus faces relatively low environmental stresses. It does, however have some economic strengths and reasonably good political and social institutions and capacity. So while it does not score very high on any aspect of the ESI, it has no real weaknesses and thus lands in the top quintile across all the components.

At the bottom of the table, North Korea, Taiwan, Turkmenistan, Iraq, Uzbekistan, and Haiti are all countries with serious environmental stresses, poor policy responses, and (with the exception of Taiwan) limited institutional capacity. Among the next lowest five countries are both Kuwait and Saudi Arabia. Their presence at the bottom of the rankings, along with relatively rich Taiwan, suggests that a country's level of economic development does not exclusively determine its environmental performance. Most of the countries near the bottom of the rankings, however, suffer from the challenges of poverty and weak governance. It appears that poor environmental planning and limited investment in environmental protection and infrastructure as compared to the leading countries translate into markedly lower results (Esty, Levy et al. 2003).

While it is clearly possible to identify leaders and laggards and to pose hypotheses on the reasons for their positions at the high and low ends of the rankings, it is more difficult to analyze the middle ranks. In part, the volatility of the mid-ranking countries is a normal statistical result. Since the majority of countries have ESI scores located closely around the center of the ESI distribution, small movements result in larger changes in ranks compared to countries in the top and bottom positions.

Countries at various stages of economic development, human development status, and geographical size and location have ESI values in the mid-range of 40 to 60. This fact seems to indicate that environmental sustainability challenges come in multiple forms and combinations. The diversity of underlying institutions – including economic systems, legal regimes, and regulatory systems – adds to the complexity of the picture.

While definitive statements are hard to make using the existing data, it does not appear that any country has yet achieved sustainability. Nevertheless, the ESI can be useful in the search for role models and best practices. Lagging countries might look to the leaders, as shown in the relevant peer group charts, and adopt the policy instruments, technologies, and approaches of these leading-edge nations. Because the ESI is an aggregate index, the search for policy models is best conducted at the indicator or variable level rather than at the level of components or total ESI score. For example, if the United States wanted to improve its environmental performance (and its ESI score), it should focus on its lagging indicators, such as its high levels of waste and greenhouse gas emissions.

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Table 11: 2005 Environmental Sustainability Index – Scores and Rankings (alphabetical order)

ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank	ESI Rank	Country Name	ESI Score	OECD Rank	Non-OECD Rank
24	Albania	58.8		14	67	Greece	50.1	21		2	Norway	73.4	2	
96	Algeria	46.0		70	116	Guatemala	44.0		88	83	Oman	47.9		60
123	Angola	42.9		94	81	Guinea	48.1		58	35	P. N. Guinea	55.2		22
9	Argentina	62.7		3	77	Guinea-Bissau	48.6		54	131	Pakistan	39.9		102
44	Armenia	53.2		28	8	Guyana	62.9		2	28	Panama	57.7		17
13	Australia	61.0	8		141	Haiti	34.8		112	17	Paraguay	59.7		8
10	Austria	62.7	7		87	Honduras	47.4		64	16	Peru	60.4		7
99	Azerbaijan	45.4		73	54	Hungary	52.0	19		125	Philippines	42.3		97
114	Bangladesh	44.1		86	5	Iceland	70.8	4		102	Poland	45.0	27	
47	Belarus	52.8		30	101	India	45.2		75	37	Portugal	54.2	15	
112	Belgium	44.4	28		75	Indonesia	48.8		53	94	Romania	46.2		69
86	Benin	47.5		63	132	Iran	39.8		103	33	Russia	56.1		20
43	Bhutan	53.5		27	143	Iraq	33.6		114	106	Rwanda	44.8		79
20	Bolivia	59.5		11	21	Ireland	59.2	10		136	Saudi Arabia	37.8		107
61	Bosnia & Herze.	51.0		42	62	Israel	50.9		43	59	Senegal	51.1		40
34	Botswana	55.9		21	69	Italy	50.1	22		89	Serbia & Mont.	47.3		66
11	Brazil	62.2		4	109	Jamaica	44.7		82	120	Sierra Leone	43.4		92
70	Bulgaria	50.0		48	30	Japan	57.3	12		48	Slovakia	52.8	18	
97	Burkina Faso	45.7		71	84	Jordan	47.8		61	29	Slovenia	57.5		18
130	Burundi	40.0		101	78	Kazakhstan	48.6		55	93	South Africa	46.2		68
68	Cambodia	50.1		47	100	Kenya	45.3		74	122	South Korea	43.0	29	
50	Cameroon	52.5		32	138	Kuwait	36.6		109	76	Spain	48.8	23	
6	Canada	64.4	5		80	Kyrgyzstan	48.4		57	79	Sri Lanka	48.5		56
25	Central Afr. Rep.	58.7		15	52	Laos	52.4		34	140	Sudan	35.9		111
104	Chad	45.0		77	15	Latvia	60.4		6	4	Sweden	71.7	3	
42	Chile	53.6		26	129	Lebanon	40.5		100	7	Switzerland	63.7	6	
133	China	38.6		104	121	Liberia	43.4		93	117	Syria	43.8		89
23	Colombia	58.9		13	126	Libya	42.3		96	145	Taiwan	32.7		116
39	Congo	53.8		24	22	Lithuania	58.9		12	134	Tajikistan	38.6		105
18	Costa Rica	59.6		9	90	Macedonia	47.2		67	63	Tanzania	50.3		44
88	Côte d'Ivoire	47.3		65	64	Madagascar	50.2		45	73	Thailand	49.7		51
19	Croatia	59.5		10	74	Malawi	49.3		52	111	Togo	44.5		84
53	Cuba	52.3		35	38	Malaysia	54.0		23	139	Trinidad & Tob.	36.3		110
92	Czech Rep.	46.6	25		41	Mali	53.7		25	55	Tunisia	51.8		36
113	Dem. Rep. Congo	44.1		85	124	Mauritania	42.6		95	91	Turkey	46.6	24	
26	Denmark	58.2	11		95	Mexico	46.2	26		144	Turkmenistan	33.1		115
119	Dominican Rep.	43.7		91	58	Moldova	51.2		39	57	Uganda	51.3		38
51	Ecuador	52.4		33	71	Mongolia	50.0		49	108	Ukraine	44.7		81
115	Egypt	44.0		87	105	Morocco	44.8		78	110	United Arab Em.	44.6		83
118	El Salvador	43.8		90	107	Mozambique	44.8		80	65	United Kingdom	50.2	20	
27	Estonia	58.2		16	46	Myanmar	52.8		29	45	United States	52.9	17	
135	Ethiopia	37.9		106	32	Namibia	56.7		19	3	Uruguay	71.8		1
1	Finland	75.1	1		85	Nepal	47.7		62	142	Uzbekistan	34.4		113
36	France	55.2	14		40	Netherlands	53.7	16		82	Venezuela	48.1		59
12	Gabon	61.7		5	14	New Zealand	60.9	9		127	Viet Nam	42.3		98
72	Gambia	50.0		50	66	Nicaragua	50.2		46	137	Yemen	37.3		108
56	Georgia	51.5		37	103	Niger	45.0		76	60	Zambia	51.1		41
31	Germany	56.9	13		98	Nigeria	45.4		72	128	Zimbabwe	41.2		99
49	Ghana	52.8		31	146	North Korea	29.2		117					

Note: The 2005 ESI scores are not directly comparable to the 2002 ESI Scores. See Appendix A for details on the methodology.

Box 3: How to Interpret an ESI Score

The ESI score quantifies the likelihood that a country will be able to preserve valuable environmental resources effectively over the period of several decades. Put another way, it evaluates a country's potential to avoid major environmental deterioration. The top-ranked country, Finland, has high scores across all the ESI's five components. Because it is doing relatively well across such a broad range of environmental sustainability dynamics, we expect it to be more likely to provide its citizens with high levels of environmental quality and services into the foreseeable future. The bottom-ranked country, North Korea, scores low in many dimensions, but not in all. It is the weak performance in a large number of indicators that generates the low overall score, which supports a conclusion that North Korea's medium-term environmental prospects are not good.

Because the different dimensions of environmental sustainability do not always correlate with one another, the ESI score taken by itself does not identify the relative contribution of the different indicators to the overall assessment of a country's medium-term prospects, nor what particular types of challenges are most likely to pose acute problems. Although North Korea has the lowest ESI score, for example, its Environmental Stress score is closer to the world median. The United States, by contrast, has a far higher ESI score (45th) than North Korea, but has a worse Environmental Stress score. Therefore, although we would conclude that the United States is more likely to be able to preserve its valuable environmental resources effectively than North Korea, it is probably more likely to encounter problems that stem from high levels of pollution or high rates of conversion of natural land. In some areas the U.S. has extremely poor scores (greenhouse gas emissions are a notable example). However, these are balanced by above average scores in many others areas, especially preservation of wilderness and investment in capacity.

Gabon is the highest-ranked country in Africa, which means that our analysis concludes that it is the African country least likely to experience major environmental deterioration in the short and medium-term future. It does not mean that Gabon is without problems. Contributing significantly to its high ESI score are its very high ranks on a number of natural resource measures, which account for it having the third highest overall score for environmental systems. As a developing country it has below-average scores on capacity, and this fact is likely to pose significant challenges to the country as it faces the future. Its ability to move forward effectively, though, is enhanced by its relatively good scores on human vulnerability and global stewardship.

Several countries in Latin America are in the top 20, including Uruguay which is ranked 3rd overall. This outcome reflects a few facets of these countries' development paths. Although some South American countries have acquired negative reputations for abuses of natural resources, such as the rapid Amazonian deforestation in the 1980s, for the most part the region remains rich in wilderness and managed natural resources. In some cases, policy innovation has contributed to dramatic improvements in controlling resource losses, such as the programs to combat illegal logging in Brazil. In addition, many of these countries have a large share of their economies devoted to agriculture, as opposed to heavy industry, which shifts the pollution to non-point sources for which data sources are not readily available. Their prominence in the top-20 list of ESI scores is also a function of the fact that they are more wealthy than most of Africa, and therefore can invest in significant capacity and vulnerability reduction; that they are less industrialized than North America, Europe, and much of Asia; and that they have retained greater wilderness than most world regions. While these facts do not guarantee that these countries will avoid environmental problems, they do suggest that their overall likelihood of major problems is lower than elsewhere.

Developed v. Developing Country Environmental Sustainability

While environmental sustainability is complex and hard to define, the ESI suggests that sustainability has multiple dimensions – and distinct challenges for developed versus developing countries. Developed countries must find ways to manage the environmental stresses of industrialization and consumption of natural resources, particularly those that are non-renewable. Developing countries face the risk of depleting renewable resources such as water and forests as well as the challenges of funding investments in environmental protection and creating functioning institutions that permit economic growth and support appropriate regulation.

While the core environmental challenges vary across countries, the ESI facilitates the process of finding relevant peer groups and benchmarking performance. Because of the range and complexity of issues that fall under the environmental rubric, policymaking needs to be made more data-driven and empirical. The ESI supports this goal.

As in previous ESI rankings, no country (except Uruguay) scored in the top quintile in all five components. This fact suggests that countries tend to experience sustainability as a multidimensional challenge where each country has strengths and weaknesses and a unique profile (see Appendix B for the complete set of country profiles). Every country thus has something to learn from its peers and multiple areas for environmental improvement.

Relationship to Economic Development

Economic conditions affect environmental outcomes, but a country's level of development is by no means the only driver of its performance and ESI score. Richer countries tend to score high in human vulnerability and

social and institutional capacity, and poorer countries tend to score higher in reducing environmental stresses and environmental systems. The global stewardship component has no clear relationship to income.

An individual country's performance is, therefore, best understood by looking not only at its overall ESI score or ranking but by examining its results with respect to the 21 key indicators of environmental sustainability. Because the 21 indicators span many distinct dimensions of environmental sustainability, it is possible for countries to have similar ESI scores but very different environmental profiles. The component-based bar chart in Table 1 highlights in summary form these differences. The "cluster analysis" discussed below further illuminates the range of sustainability challenges. Take, for example, the difference between Spain and Indonesia in Figure 2.

The analysis of the relative performance of countries with similar ESI scores but different indicators profiles helps to illuminate the range that exists across the most pressing environmental challenges countries face. The analysis of the differences and similarities among countries within the same peer group offers insights into the relative efficacy of their environmental policies – such as air pollution controls, biodiversity initiatives, and innovation in science and technology.

Spain, with an ESI score of 48.8 must deal with burdened ecological systems and quite high levels of environmental stress, as the "spider" graph on the next page suggests. Like other developed countries, Spain has reasonably strong capacity to handle the harms it faces. Indonesia, on the other hand, has a similar ESI score of 48.8, but faces a very different set of challenges. It has stronger underlying systems and less present stress in several regards, but much less developed institutional capacity to manage the challenges it must address, including severe water quality issues.

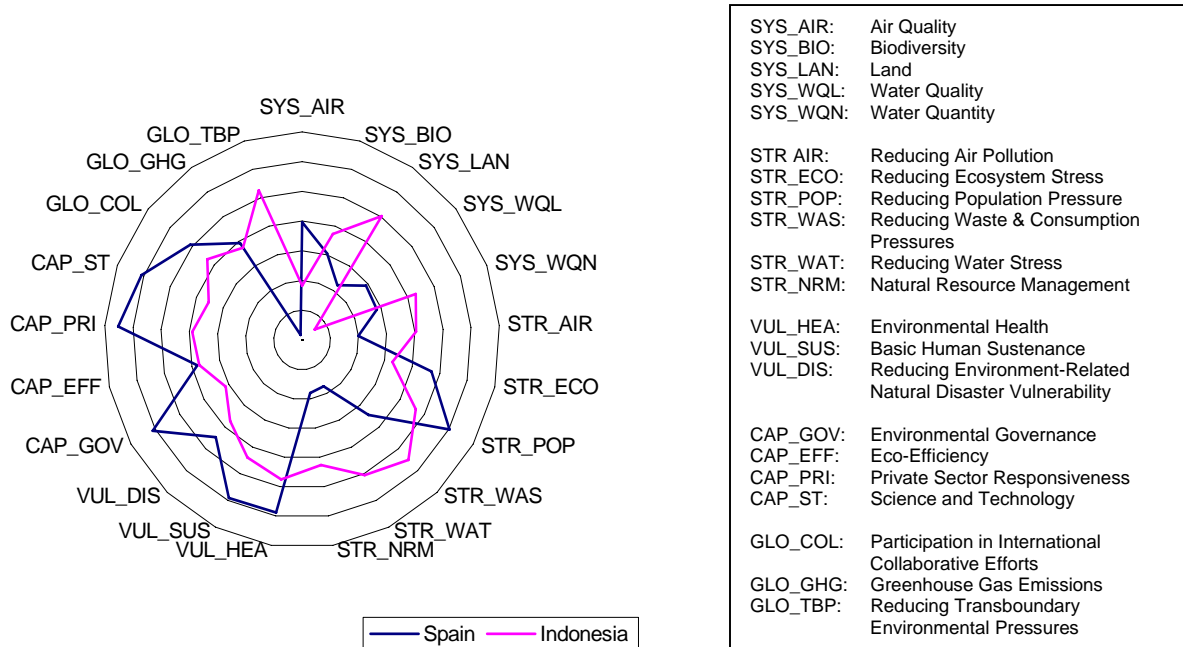


Figure 2: Comparison of Indicator Scores for Spain and Indonesia
 Note: the greater the distance from the center, the better the indicator result

At every level of development, there exists a large range of ESI scores. This fact suggests that countries in similar circumstances have available a variety of environmental management strategies, some of which are much more effective than others. Whatever a country’s development status, the ESI offers a useful tool for isolating appropriate policy interventions and environmental approaches.

Relationship between Environmental & Economic Performance

Traditional economic theory posits a tradeoff between economic progress and environmental

quality. More recently, it has been suggested that increased wealth is a prerequisite for environmental improvements (Grossman and Krueger 1995). Several empirical studies have likewise shown that wealth is an important factor in explaining environmental policy results, but not alone determinative of environmental policy (Esty and Porter 2005). The low rankings of Kuwait, Saudi Arabia, and the United Arab Emirates suggest that there is no necessary connection between income and environmental success. Similarly, some developing countries, such as Costa Rica, place significant emphasis on the protection of their environmental assets. They have, as a result, environmental outcomes that are far better than would be predicted by their level of development.

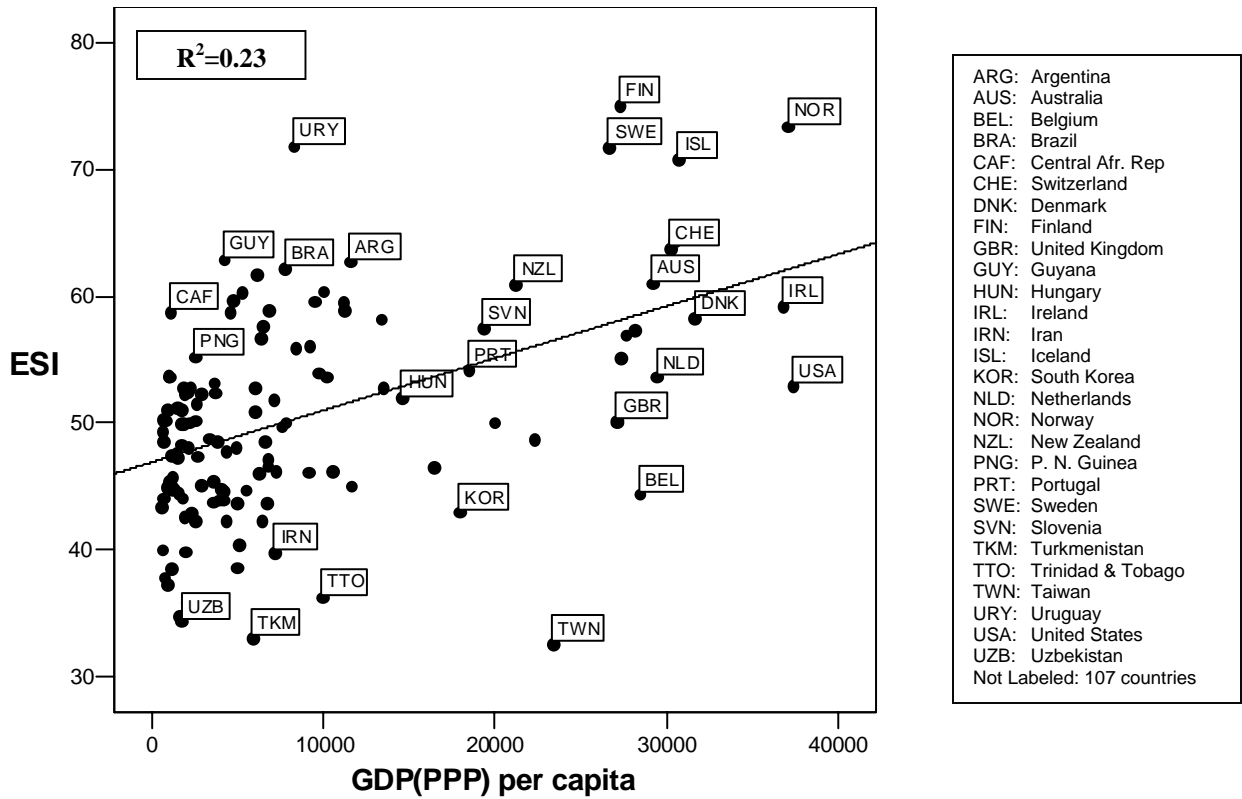


Figure 3: Regression of 2005 ESI on GDP (PPP) Per Capita

ESI versus Per Capita Gross Domestic Product (GDP)

In statistical terms, about 23% of the variance in the ESI is accounted for by per capita GDP. This result suggests that richer countries can – and do – invest in pollution control and other environmental amenities. Examining Figure 3 above, which provides the regression results of the ESI on GDP per capita, helps to illuminate the relationship between wealth and environmental results.

As indicated by their position above the regression line, the Nordic countries have high GDP per capita but even higher ESI scores than their wealth might forecast. The United Kingdom, Belgium, and the United States fall well below the regression line – indicating

sub-par performance given their level of wealth.

Likewise, Trinidad and Tobago falls below Argentina and Brazil among medium-income level countries. And Tajikistan and Uzbekistan lag behind Guyana among low-income countries.

If we examine the ESI’s components, we can get a more precise picture of the relationship to per capita income. The highest positive correlations are between GDP per capita and the ESI’s Human Vulnerability and Social and Institutional Capacity Components. The correlation is negative for environmental stresses, meaning that high-income countries put significantly more stress on their environments than low-income ones.

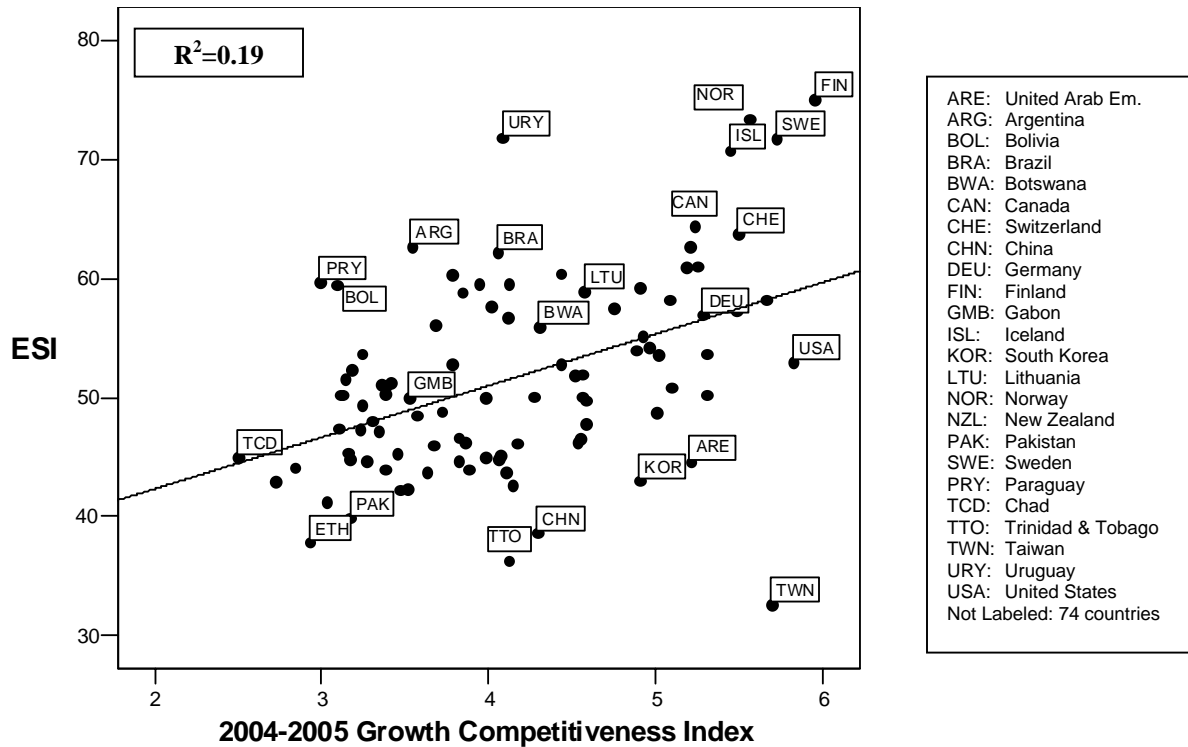


Figure 4: Regression of 2005 ESI on 2004-2005 Growth Competitiveness Index

ESI versus Growth Competitiveness Index

Classic economic theory suggests that a commitment to high levels of environmental performance might well negatively affect competitiveness. Michael Porter (Porter 1991) and others (Porter and C. van der Linde 1995) have suggested, however, that this presumption might be wrong under dynamic conditions. Regressing the ESI on the World Economic Forum’s Growth Competitiveness Index scores provides a starting point for testing these competing hypotheses.

The Competitiveness Index explains approximately 19% of the variation in the ESI. As Figure 4 shows, competitiveness correlates positively with environmental sustainability. We cannot say whether this correlation implies any statistically significant causal relationship. The cautious conclusion is that a commitment to sustainability is compatible with national economic competitiveness.

As with wealth, countries with the same Growth Competitiveness Index (GCI) value often perform very differently in the environmental sphere. These results suggest that some countries handle environmental challenges without seeming to harm their competitiveness.

Finland and the United States have similar GCI scores, but Finland has a much higher ESI score. Similarly, Sweden, Iceland, and Norway are well above the regression line, while China, Trinidad and Tobago, and South Korea fall far below the line. To better understand these relationships, it may be useful to look at the correlations not just with the ESI as a whole but with the core components and underlying indicators. Table 12 below provides, in summary form, the most significant relationships. These results suggest that economic strength is a critical factor in addressing environmental challenges.

Table 12: ESI Components and Indicators with Statistically Significant Correlation to GDP and the Growth Competitiveness Index

		2004 GCI	Significance	GDP/cap	Significance
2005 Environmental Sustainability Index		0.45	***	0.48	***
Component					
SYSTEM	Environmental Systems	0.05		0.11	
STRESS	Reducing Environmental Stresses	-0.63	***	-0.60	***
VULNER	Reducing Human Vulnerability	0.69	***	0.54	***
CAP	Social and Institutional Capacity	0.85	***	0.82	***
GLOBAL	Global Stewardship	-0.04		0.14	
Indicator					
SYS_AIR	Air Quality	0.48	***	0.45	***
SYS_BIO	Biodiversity	-0.22	*	-0.16	
SYS_LAN	Land	-0.32	***	-0.35	***
SYS_WQL	Water Quality	0.42	***	0.52	***
SYS_WQN	Water Quantity	-0.08		0.01	
STR_AIR	Reducing Air Pollution	-0.73	***	-0.63	***
STR_ECO	Reducing Ecosystem Stresses	-0.07		-0.22	*
STR_POP	Reducing Population Growth	0.59	***	0.43	***
STR_WAS	Reducing Waste & Consumption Pressures	-0.47	***	-0.28	***
STR_WAT	Reducing Water Stress	-0.54	***	-0.39	***
STR_NRM	Natural Resource Management	-0.60	***	-0.57	***
VUL_HEA	Environmental Health	0.67	***	0.53	***
VUL_SUS	Basic Human Sustenance	0.73	***	0.55	***
VUL_DIS	Reducing Environment-Related Natural Disaster Vulnerability	0.26	***	0.20	
CAP_GOV	Environmental Governance	0.80	***	0.78	***
CAP_EFF	Eco-Efficiency	-0.23	*	-0.08	
CAP_PRI	Private Sector Responsiveness	0.83	***	0.76	***
CAP_ST	Science & Technology	0.87	***	0.83	***
GLO_COL	Participation in International Collaborative Efforts	0.87	***	0.83	***
GLO_GHG	Greenhouse Gas Emissions	0.43	***	0.49	***
GLO_TBP	Reducing Transboundary Environmental Pressures	-0.27	***	-0.03	

* statistically significant at 0.05 level

** statistically significant at 0.01 level

*** statistically significant at <0.01 level

Central Role of Governance

In recent years, a growing emphasis has been placed on “governance” as a critical underpinning of policy success generally and environmental progress more specifically. The ESI provides some support for the focus on governance. In fact, if one looks at the correlations between the ESI and the 76 underlying variables, the strongest bivariate correlations all include elements related to governance as Table 13 on the next page shows.

The highest bivariate correlation is with civil and political liberties, suggesting that countries where robust political debate takes place

– facilitated by fair elections, free speech, engaged press, active NGOs, vibrant legislatures, etc. – are more likely to focus on environmental challenges. The second highest correlation is with survey data on environmental governance. This result suggests that countries that pay attention to environmental policy and regulate effectively are more likely to produce successful environmental outcomes. The third, fourth, and fifth highest correlations are similar variables, including World Bank gauges of governmental effectiveness and rule of law as well as a University of Maryland measure of the democratic character of political institutions.

Table 13: Variables with Statistically Significant Correlation to the ESI

Variable Code	Variable with Statistically Significant Correlation with ESI	Correlation Coefficient	Significance
CIVLIB	Civil and Political Liberties	0.59	***
WEFGOV	World Economic Forum Survey on environmental governance	0.54	***
GOVEFF	Government effectiveness	0.51	***
POLITY	Democratic institutions	0.50	***
LAW	Rule of law	0.50	***
PARTICIP	Participation in international environmental agreements	0.49	***

*** statistically significant at <0.01 level

The variable tracking participation in international environmental agreements is the sixth most highly correlated with the ESI, suggesting a relationship between engagement in global governance and environmental policy success. While none of these correlations necessarily imply a causal connection, the coincidence of strong governance with high ESI scores is striking.

Finding Peer Countries – Cluster Analysis

As noted earlier, one of the most valuable uses of the ESI is as a mechanism for comparative policy analysis. In the quest for improved performance, it is very helpful to identify appropriate peer countries against whom one can benchmark environmental outcomes and policies. In addition, those at the leading edge of the peer group might also be looked to for best practices in the policy or technology domains.

Not only do peer countries provide a relevant context for judging one's own performance and perhaps a source of policy guidance, but the compilation of rankings within a peer group also spurs competition. One of the most powerful lessons of the earlier versions of the ESI is that national political leaders care a

great deal about how their countries stack up against those who they consider to be similarly situated. When the Norwegian prime minister met with the ESI team, he was not satisfied with Norway's second place rank in the 2002 ESI. Instead, he wanted to discuss what his country would need to do to overtake Finland for first place.

As noted in Chapter 1, one way to identify peer countries is through existing political institutions such as the European Union or ASEAN. But another way to identify relevant points of comparison is through statistical means. We therefore conducted a cluster analysis, which identifies statistically related groups of countries based on the similarity of indicator scores. While we can force the statistical tools to generate any number of clusters, we find that the seven groupings identified in Table 14 on the next page represent a particularly interesting set of peer groups. We see these clusters as having observable similarities and thus representing a useful point of departure for policy comparisons.

The fact that the clusters include many geographically connected countries, suggesting that they have similar underlying environmental characteristics, provides a logic for regional benchmarking.

Table 14: Cluster Analysis Results

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Low system & stress scores; low vulnerability & high capacity; moderate stewardship	Moderate system & stress scores; high vulnerability & low capacity; above average stewardship	Above average system score; low vulnerability; high capacity; moderate stress & stewardship	Moderate system, stress, & capacity scores; low vulnerability & stewardship	Above average system score, moderate stress, vulnerability, capacity, & stewardship	Moderate system, stress, & vulnerability scores; low capacity & stewardship	Low system score; moderate stress, vulnerability, capacity, & stewardship
Austria Belgium Denmark France Germany Ireland Israel Italy Japan Netherlands Portugal Slovenia South Korea Spain Switzerland Taiwan United Kingdom	Angola Benin Bhutan Burkina Faso Burundi Cambodia Cameroon Central Afr. Rep. Chad Congo Côte d'Ivoire Dem. Rep. Congo Ethiopia Gambia Ghana Guinea Guinea-Bissau Haiti Kenya Laos Liberia Madagascar Malawi Mali Mauritania Mozambique Myanmar Nepal Niger Nigeria P. N. Guinea Rwanda Senegal Sierra Leone Sudan Tajikistan Tanzania Togo Uganda Yemen Zambia	Australia Canada Finland Iceland New Zealand Norway Sweden United States	Bosnia and Herze. Bulgaria Croatia Czech Rep. Estonia Greece Hungary Jamaica Latvia Lebanon Lithuania Macedonia Poland Romania Serbia & Monteneg. Slovakia Trinidad & Tobago Turkey	Argentina Bolivia Botswana Brazil Chile Colombia Costa Rica Ecuador Gabon Guatemala Guyana Honduras Namibia Nicaragua Panama Paraguay Peru Uruguay Venezuela	Algeria Armenia Azerbaijan Belarus Iraq Kazakhstan Kuwait Kyrgyzstan Libya Moldova Mongolia North Korea Oman Russia Saudi Arabia Turkmenistan Ukraine United Arab Em. Uzbekistan	Albania Bangladesh China Cuba Dominican Rep. Egypt El Salvador Georgia India Indonesia Iran Jordan Malaysia Mexico Morocco Pakistan Philippines South Africa Sri Lanka Syria Thailand Tunisia Viet Nam Zimbabwe

Table 15: Characteristics of Clusters

Cluster:		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
	Number of countries	17	41	8	18	19	19	24
	ESI	52.9	47.1	66.3	49.6	57.1	44.0	46.2
Average values of ESI Component Values	Environmental Systems	39.1	50.8	75.6	43.4	66.9	51.5	37.4
	Reducing Environmental Stresses	33.9	54.7	44.0	50.9	55.7	52.6	50.9
	Reducing Human Vulnerability	71.3	26.6	78.0	72.2	51.0	54.2	49.4
	Social and Institutional Capacity	77.7	36.1	83.5	52.3	52.1	29.6	44.4
	Global Stewardship	57.5	63.6	49.4	31.4	54.5	26.8	52.2
Average values of other characteristics	GDP/capita	\$27,480	\$420	\$29,860	\$4,390	\$2,980	\$3,810	\$1,730
	Population (millions)	33.6	19.0	46.1	11.8	21.2	20.7	149
	Total Area (thousand square kilometers)	171	539	3,466	123	102	156	1,010
	Population Density (per square kilometer)	238	70.3	13.5	122	32.1	56.0	174
	Environmental Governance Indicator (z-score)*	1.0	-0.5	1.0	0.2	0.1	-0.6	-0.2

* Note: Higher z-scores correspond to more effective environmental governance.

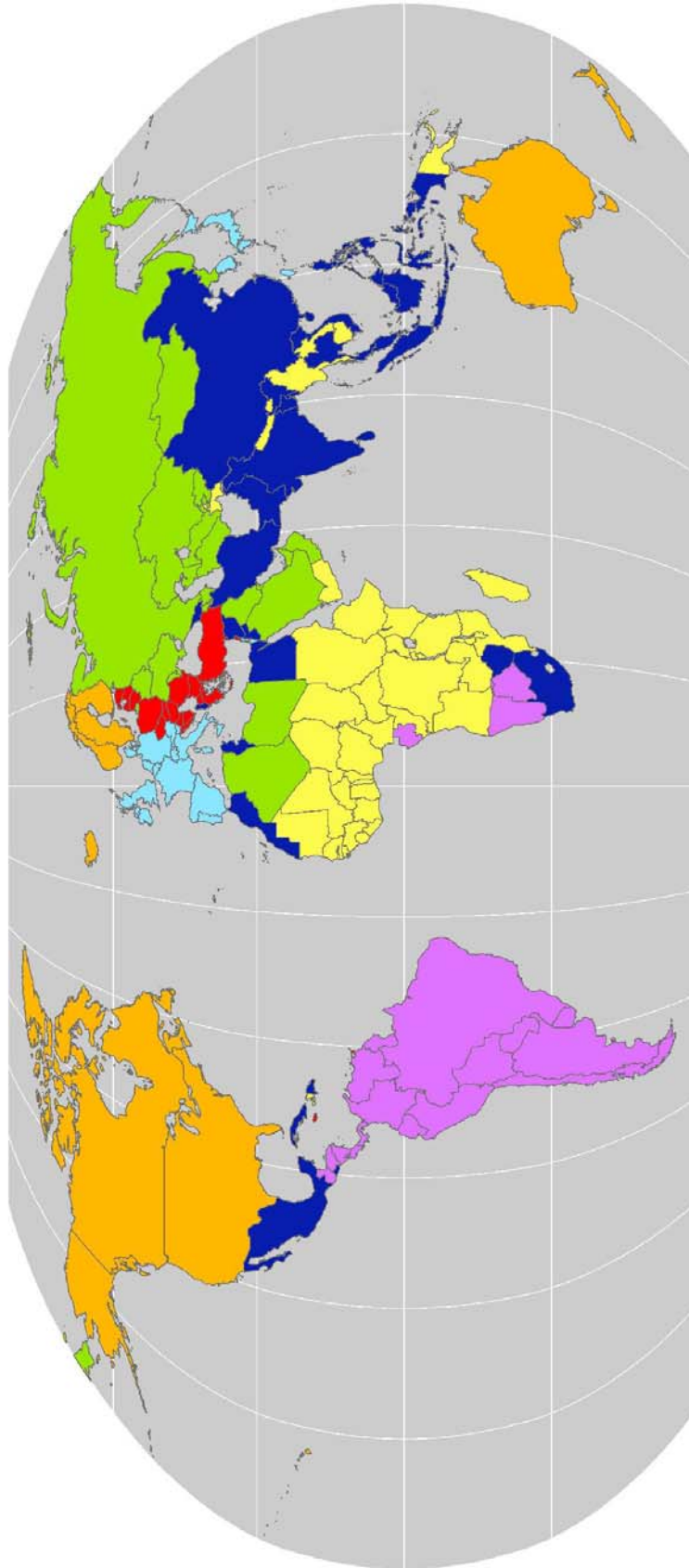
Cluster 1 represents relatively high population density industrialized countries with above average social and institutional capacity. Cluster 2 groups the least-developed countries, most of whom experience relatively low environmental stress, but have very weak institutional capacity and are particular vulnerable to natural disasters, undernourishment, and lack of sanitation and safe water supply.

Distinct from the first set of developed countries, Cluster 3 is formed by large land area, low population density countries with low levels of vulnerability and well-developed institutional capacity. Cluster 4 encompasses many of the countries of the former Eastern Bloc along with a handful of other nations (Jamaica, Lebanon, Trinidad & Tobago, and Turkey) who have similar patterns of

moderate systems and environmental stresses and relatively low human vulnerability.

Cluster 5 brings together a large number of Central and South American countries, along with a few African countries, which all show relatively strong environmental systems, and middle-tier results with regard to their vulnerability and capacity. Cluster 6 includes Russia and the most ecologically burdened of the former republics of the Soviet Union along with a number of Middle Eastern countries (and a few other nations) who have average environmental systems, stresses, and human vulnerability but very low capacity and global stewardship. Cluster 7 covers largely high population density, middle-tier developing countries with strained ecological systems but middle-range scores across the rest of the components.

Cluster Analysis ESI Characteristic-Based Country Groupings



Robinson Projection

Cluster Component Characteristics

- 1 Low system and stress scores; low vulnerability and high capacity; moderate stewardship
- 2 Moderate system and stress scores; high vulnerability and low capacity; above average stewardship
- 3 Above average system score; low vulnerability; high capacity; moderate stresses and stewardship
- 4 Moderate system, stresses, and capacity scores; low vulnerability and stewardship
- 5 Above average system score, moderate stresses, vulnerability, capacity, and stewardship
- 6 Moderate system, stresses, and vulnerability scores; low capacity and stewardship
- 7 Low system score; moderate stresses, vulnerability, capacity, and stewardship

ESI in Action

Because the ESI was the first effort to rank countries according to their environmental sustainability, it generated considerable attention. Approximately 100,000 downloads of the 2002 ESI report were recorded at Columbia University servers, and the report was made available through other websites as well. The ESI website has been widely read and linked from many locations. It is the second site listed in a Google search for the phrase “environmental sustainability.” This attention itself illustrates the desire for information and quantitative metrics of environmental sustainability.

In the course of the five years since the release

of the pilot ESI, many countries have used the ESI as a policy guide. Their experiences provide a powerful logic for further efforts to refine the ESI and other environmental indicator efforts. We highlight some of these experiences below.

Mexico’s low ranking in the pilot 2000 ESI sparked a cabinet-level review within the country ordered by President Ernesto Zedillo who had read an account of the ESI in *The Economist*. An exchange of visits took place between the ESI team and Mexico’s environment and natural resources ministry, SEMARNAT, in order to explain the ESI methodology and data sources and to demonstrate how the ESI’s measures related to

Box 4: The Environmental Sustainability Index in the Philippines

The Environmental Sustainability Index as a basic conceptual and analytical framework has now been introduced to the discourse on environmental policymaking in the Philippines. As Member of the Committee on Appropriations and Vice-Chair of the Committee on Ecology, I learned of the ESI and argued for its inclusion as a framework for discussion in budget hearings for Department of Environment and Natural Resources (DENR) and its enforcement arm, the Environmental Management Bureau (EMB). Noting the consistently dismal ranking (the lowest among the countries in Southeast Asia) of the Philippines, I insisted again on the government using the ESI as a policy tool in budget hearings in subsequent years.

In advancing the Philippines Clean Air Act, I proposed that the ESI and its measurement criteria be utilized as a benchmark for the assessment and evaluation of environmental policies and sustainability in our country. In a span of four years, two Secretaries of the DENR took careful heed of such proposals and instructed mid-level DENR directors to view and adopt the ESI – in whole or in parts – as a helpful, albeit tentative, gauge of the department’s performance. While the DENR has stopped short of formally institutionalizing the ESI, the focus on quantitative measurement of performance has become integral to the decisionmaking and evaluation processes within the department.

As the new Chair of the Committee on Ecology in the House of Representatives, I have renewed the call for government to be more serious about measuring the efficacy of programs and policies on a range of environmental issues and sectors. With the dearth of data-driven environmental indices in the country, the ESI could well provide a reasonably sound basis for judging which technologies, approaches, strategies and regulatory mechanisms are effective or in need of improvement or overhaul. I am confident that the Philippine government will see fit to move towards more empirically based policy-formulation – notably in the environmental realm, with the ESI as an example.

Neric Acosta
Congressman, Philippine House of Representatives
Chair, Committee on Ecology (2004 - present)
Manila

environmental activities within Mexico. One of the most immediate consequences of this review was a high-level delegation from Mexico that visited the World Bank and the World Resources Institute to explore more effective ways to have their publications reflect recent Mexican data.

After Vicente Fox's election as President of Mexico in 2000, Mexican interest in the ESI intensified. Victor Lichtinger, Fox's first Environment Minister, put in place a set of policy reforms that prominently featured quantitative environmental sustainability metrics. In addition, reforms were adopted providing for enhanced transparency concerning environmental information.

Mexico has failed to fully implement Lichtinger's metrics-based sustainable development strategy. Nonetheless, the environmental policy agenda within Mexico has been permanently altered. Sustainability indicators now receive much more attention, and this sensitivity is seen within the private sector as well as the government. The Mexican Business Council on Sustainable Development released a set of state-level sustainability indicators in 2001.

South Korea embarked on a similar set of internal evaluations stemming from its 8th from bottom ranking in the 2002 ESI. The Ministry of Environment carried out a study examining the factors accounting for the low rank, and invited a representative from the ESI team to visit the country to meet with members of government, industry, civil society, and academia. The country sent two environmental policy experts from the Korea Environment Institute to spend a month with the ESI team learning the ESI methodology. The government adopted a strategic plan aimed at improving its rankings in a number of high-profile global indices, including the ESI. Special attention was paid to water policy and to patterns of international collaboration.

The United Arab Emirates, ranked second from the bottom in the 2002 ESI, launched a major internal review to explore the reasons for its low position and brought two members

of the ESI team to the country for a series of high-level meetings. The most concrete response came from the Emirate of Abu Dhabi, which launched a regional initiative to dramatically improve the ability to monitor and communicate environmental conditions. This initiative, formally launched at the 2002 World Summit on Sustainable Development, is now being implemented.

Belgium ranked far below other European countries in the 2002 ESI, which triggered substantial media attention and political inquiry, including parliamentary hearings. The environmental authorities, particularly those in the Walloon region, undertook an issue-by-issue review of the ESI. This effort helped to identify a number of problems related to the gathering and reporting of environmental data, as well as raising a number of important theoretical questions about the construction of the ESI. The Walloon authorities recalculated the ESI based on updated data for Belgium but found that their nation still lagged other EU countries. This result spurred a focus on various policy shortcomings in Belgium, including the division of responsibilities among Belgian, Flemish, and Walloon authorities.

The Global Environmental Monitoring System Water Program (GEMS Water) has been an important source of data for the ESI because it is the primary source of comparable international information on surface water quality. The ESI reports were straightforward in their assessment that the suitability of the GEMS Water data for comparing water quality across nations was very low. In the past, very few countries provided data to the program and the data were difficult to obtain. When the 2003 World Water Development Report reprinted the 2002 ESI water quality indicator data, it drew attention to water quality data issues. Some governments were unhappy with the fact that the data table included only estimates of water quality where data was missing from GEMS Water. Others were dissatisfied with the fact that some countries reported data from a large number of water monitoring stations whereas others reported only a small number.

These complaints drew high-level attention to the serious deficiencies in the GEMS Water program, and played a significant role in a strategic effort to build the program into a more robust repository of relevant water quality data. A major drive was launched to bring new countries into the program. The approach shifted from passively receiving data from countries to actively requesting data updates on a regular basis. In addition, the data was made much more easily accessible. As a result of these changes, participation in GEMS Water has grown from less than 40 countries when the ESI first started using the data to over 100 countries today, although data coverage is still low. While the ESI cannot take credit for this shift, it did contribute to it by aggregating the GEMS Water data into national indicators and raising those indicators to high prominence.

Scholarly studies have made use of the ESI data to facilitate quantitative exploration of environmental phenomena. A partial list of known citations is provided in Appendix I. Globerman and Shapiro (2002), for example, modeled foreign direct investment flows as a function of governance structures and of environmental and development outcomes, and utilized the ESI effectively as a proxy for environmental outcomes. Several studies have sought to compare the ESI to alternative sustainability measures (Parris and Kates 2003), or as a benchmark by which to evaluate new indicators (Sutton 2003).

Some studies have made use of components of the ESI in order to construct new indicators for other purposes (Birdsall and Clemens 2003). The ESI has also been used for pedagogical purposes allowing educators to create quantitatively-based themes related to environmental stewardship.

Limitations

The results of the 2005 ESI should be seen as a relative gauge of environmental performance and a tool for highlighting policy issues that need to be addressed. The resulting rankings are subject to a number of uncertainties and qualifications. Our knowledge of environmental sustainability is incomplete, and our ability to draw precise conclusions is hampered by additional elements of uncertainty such as measurement error and missing data.

We do not have sufficient information to estimate the uncertainty due to knowledge gaps and measurement problems, but we can estimate the degree of error due to missing data. Although it underestimates the true uncertainty associated with the ESI scores, in Appendix A we report the variability in the ESI scores and ranks due to different sources of uncertainty and modeling assumptions as a measure of the level of confidence that can be placed on the ESI.

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Chapter 4 – Sensitivity Analysis

The robustness of the ESI cannot be fully assessed without evaluation of its sensitivity to the structure and aggregation methods utilized. To test this sensitivity, the ESI team launched a partnership with the Joint Research Centre (JRC) of the European Commission in Ispra, Italy. A short version of their findings is below. The more detailed version is included in Appendix A.

2005 ESI Sensitivity Analysis

Prepared by Michaela Saisana, Michela Nardo, and Andrea Saltelli (Applied Statistics Group), Joint Research Centre of the European Commission

Every composite index, including the ESI, involves subjective judgments such as: the selection of variables, the treatment of missing values, the choice of aggregation model, and the weights of the indicators. These subjective choices create the analytic framework and influence the message it communicates. Because such indices can send non-robust policy messages if they are poorly constructed or misinterpreted, it is important that their sensitivity be adequately tested.

Because the quality of a model depends on the soundness of its assumptions, good modeling practice requires evaluating confidence in the model and assessing the uncertainties associated with the modeling process. Sensitivity analysis lets one see the impact of the model frame by studying the relationship between information flowing in and out of the model (Saltelli, Chan et al. 2000).

Using sensitivity analysis, we can study how variations in ESI ranks derive from different sources of variation in the assumptions. Sensitivity analysis also demonstrates how each indicator depends upon the information that composes it. It is thus closely related to uncertainty analysis, which aims to quantify the overall uncertainty in a country's ranking as a result of the uncertainties in the model. A

combination of uncertainty and sensitivity analyses can help to gauge the robustness of the ESI ranking, to increase the ESI's transparency, to identify the countries that improve or decline under certain assumptions, and to help frame the debate around the use of the Index.

The uncertainty and sensitivity analysis explores the effect of four main uncertainties/assumptions in the ESI: (1) variability in the imputation of missing data (2) equal v. expert weighting of indicators (3) aggregation at the indicator v. the component level, and (4) linear v. non-compensatory aggregation schemes.

The main findings are summarized below. The detailed methodological approach and results are given in Appendix A.

Overall, the ESI shows only modest sensitivity to the choice of aggregation, indicator weighting, and the imputation procedure. For most countries, the possible scores and ranks are rarely at odds with their actual ESI score when tested against various combinations of assumptions in the sensitivity analysis. For 90 out of 146 countries, the difference between the ESI rank and the most likely (median) rank is less than 10 positions, given that all sources of uncertainty are simulated simultaneously. This outcome implies a reasonable degree of robustness of the ESI.

Which countries have the most volatile ranks and why? The top ten ranking countries in the ESI all have modest volatility (2 to 4 positions in the ranking) with the exceptions of Guyana (23 positions) and Argentina (9 positions). This small degree of sensitivity implies a very limited degree of uncertainty about the ESI scores for these countries. Guyana's high volatility can mainly be attributed to imputation uncertainties (28 variables out of 76 have been imputed) as well as the choice of the aggregation level. Argentina's volatility is entirely due to imputation, although only 5 variables have been

imputed. The countries with the highest volatility (50 to 80 positions) are found between rank 39 (Congo) and rank 113 (Dem. Rep. Congo), which is partially due to the conversion of tightly bundled ESI scores to equidistant ranks.

Would the ESI be more stable and useful if no imputation had been carried out? Imputation allows us to include many countries in the ESI that would otherwise have to be dropped for lack of data – and it reduces the incentive for a country to fail to report data in categories where its performance is weak. Imputation, however, reduces to some degree our confidence in the accuracy of the scores and rankings. Imputation affects countries with larger amounts of missing data more than others. But this relationship is not entirely straightforward. Among the countries that are missing almost 33% of the observations, only Guinea-Bissau and Myanmar are highly susceptible to rank changes due to imputation. If no imputation had been applied, Syria, Algeria, Belgium and Dominican Republic would have improved by between 9 and 37 positions. Conversely, Mali, Guinea-Bissau, Myanmar and Zambia, would go down 27 to 43 positions. Overall, imputation creates an average uncertainty of 10 ranks.

What if a “non-compensatory” aggregation scheme had been used, instead of the linear aggregation scheme? Aggregation schemes matter mainly for the mid-performing countries. When the assumption of compensability among indicators is removed, countries having very poor performance in some indicators, such as Indonesia or Armenia, decline in rank, whereas countries with fewer extreme values,

such as Azerbaijan or Spain, improve their position. Overall, the aggregation scheme methodology has an average impact of 8 ranks.

What if aggregation had been applied at the component level instead at the indicator level? Weighting the 5 components equally versus weighting the 21 indicators equally has only a small effect on most countries. But a few are significantly affected. For example, Belgium and South Korea improve their rank by almost 40 positions if aggregation is done at the component level. However, countries such as Congo or Nicaragua decline by 30 positions. This movement is can be traced to the fact that aggregation at the component level gives added weight to the components with fewer indicators (e.g., Reducing Human Vulnerability and Global Stewardship). Overall, the assumption on the aggregation level has an average impact of 8 ranks, similar to the impact of the aggregation scheme.

What if a set of expert-derived weights had been used for the 21 indicators instead of the equal weighting? An alternate weighting obtained by surveying the experts at the December 2004 ESI Review Meeting assigns slightly higher values to indicators within the System and Stress Components of ESI and less to the remaining indicators. Using these weights has a pronounced positive effect on the rank of a few countries such as Sri Lanka and Niger, but a negative effect on others such as the Chile, South Africa or Italy. Overall, the analysis shows only a small sensitivity to the weighting assumption with an average impact of 5 ranks.

Chapter 5 – Conclusions and Next Steps

The ESI is fundamentally a policy tool designed to make environmental decisionmaking more empirical and analytically rigorous. It provides a way to benchmark performance, highlight leaders and laggards on an issue-by-issue basis, and facilitate efforts to identify best practices. In these regards, the ESI represents an important step forward. But the data on which the ESI builds are crude and patchy, and the methodologies for combining data sets into a single index continue to be refined.

Measuring trends with respect to environmental sustainability is a conceptually difficult and ambitious undertaking. We recognize the many layers of uncertainty surrounding the measurement of environmental sustainability: the lack of a clear definition of the concept and benchmarks against which to verify current performance; the need to fold into a common metric the past, the present, and the future; the implicit assumptions and judgments made in the selection of the variables and indicators as well as their aggregation, and the uncertainty resulting from data gaps, including the possibility of failing to measure important aspects of environmental sustainability.

Yet, local, regional, and global environmental problems are increasing at a rate and scope that demands new approaches to facilitate action. As a “process,” the ESI is designed and made available to the public in a transparent way. Its imperfections are openly acknowledged and discussed. Its use as a sustainability measure is largely constrained to serving as a tool for policymakers to signal trends in environmental pollution, natural resource use, environmental health, social and economic factors as well as international environmental law and policy. Although the ESI score provides a snapshot view of the relative position of countries, more informative analysis derives from the 21 indicators and underlying data sets. Simply put, no country will achieve sustainability by tracking the ESI score alone. Identifying the areas for improvement using the ESI’s stepwise hierar-

chy offers a more fruitful approach to policy progress.

The problem of persistent data gaps, slow adoption of remote sensing and GIS technology for environmental monitoring, and incompatible methodologies constitute the most serious impediment to giving a full and unbiased picture of environmental sustainability trends. The quantitative basis is stronger in OECD countries than in many low-income nations especially in Africa and Asia. Consequently more data need to be imputed to calculate the indicator, component, and ESI values in these countries. The gaps and our imperfect means of filling them increase the uncertainty associated with the results.

Despite the data gaps, the statistical foundation of the 2005 ESI represents a significant refinement from earlier editions of the ESI. We made more extensive use of statistical modeling and analysis techniques to (i) impute missing data (ii) investigate similarities and differences among the countries with respect to their environmental performance and socioeconomic driving forces (iii) understand better the relationships between the variables and indicators in the ESI, and (iv) rigorously test the sensitivity of the ESI to the implicit and explicit assumptions and methodological choices made. The results have facilitated several improvements to the ESI’s construction as well as its interpretation.

The variables included in the ESI have also been updated with new data sets, more recent information, and extended geographical coverage by merging different data sources where possible and by developing new variables based either on new data initiatives or our own design. The country review of the ESI data has provided updated data and useful feedback, which have improved the ESI substantially.

Although we cannot determine with any satisfactory level of accuracy the precise position of a country on an overall basis, we can

identify clearly the leaders and the laggards. Seen in this context, the ESI has proven to be a useful gauge of national environmental stewardship, providing a valuable counterpart and counterpoint to GDP growth as a metric of governmental policy “success.”

We cannot say with confidence that any country is currently on a sustainable trajectory. Indeed, we do not have established benchmarks against which to measure long-term sustainability. But the variables and indicators in the ESI shed light on a range of unsustainable pollution and consumption paths. Every country faces serious pollution problems and is experiencing unsustainable levels of consumption of some natural resources. There are, however, significant differences in the progress toward sustainability within different societies. By assembling a broad array of data and metrics on a basis that makes cross-country comparisons possible, the ESI provides a powerful benchmarking tool and a valuable mechanism for identifying leading performers on each issue and isolating the best practices which they follow.

The ESI also helps to highlight some of the critical factors that shape environmental performance including: the quality of governance, the lack of corruption, and low population density. Some of these variables have long been identified as theoretically important. The ESI provides empirical support for these theories.

While environmental sustainability has become a buzzword, the concept of sustainability – with its combination of past, present, and future timeframes – inescapably presents some serious methodological complexities. The concept is dynamic and requires constant monitoring and re-adjustment. On the country level, sustainability is affected strongly by natural resource endowments, past development paths, current and future pressures, and capacities to deal with them. To provide policymakers with more immediate feedback on their current policy performance, a more focused index and set of indicators will be needed.

With this goal in mind, the ESI team plans to develop an environmental policy barometer that gauges more narrowly the impacts of current environmental policies, including pollution control, natural resource use and management, and environmental health regulations, on environmental outcomes such as air and water quality, land and habitat protection, exposure to environmental toxins, and the provision of global public goods. The project aims at supporting the Millennium Development Goals, specifically Goal 7 “Ensuring Environmental Sustainability.” The new initiative will center on a system of target-oriented indices that track performance of countries towards the established policy goals.

Future Directions

While the ESI represents the state of the art in performance measures of environmental sustainability, it has limitations as a policy-making guide. We see a number of directions for future work, both technical and institutional.

All indices are handicapped by the poor quality and coverage of available data, with inconsistent methodologies, poor time series, and significant gaps, particularly for developing countries. There is no simple centralized solution to this problem. It requires a long-term effort by many partners. Each individual data set for a variable should be the responsibility of an appropriate organization that can ensure its quality control and regular updating. Governments need to recognize their primary responsibility for data collection. Public investments in data collection are more than repaid in improved decisionmaking. International assistance needs to be provided to countries without the capacity or resources to collect all the data necessary. Better coordination is needed among the providers of data sets.

This effort should be extended to build new data sets for key variables and indicators that should be in the ESI but had to be omitted for lack of adequate data. There is a particular gap in measures of sustainable resource

management in productive activities, such as agriculture, forestry, and fisheries. New technologies such as remote sensing and automated monitoring stations are making it possible to produce new uniform global data series for various environmental parameters. In this regard, we believe that collaboration among the new Global Earth Observation System of Systems (GEOSS), the Integrated Global Observing Strategy (IGOS) Partnership and the various global observing projects to define and generate new data sets will better capture aspects of environmental sustainability, such as land use and vegetation changes, soil degradation, salinization, and air and water pollution.

Filling the gaps in the ESI will both help to move towards an ideal ESI, which would include all critical environmental parameters, and improve the balance and weighting of variables and indicators within the ESI. We are also committed to engaging with others who may be in a position to help eliminate data gaps.

Data availability has limited the ESI to “snapshot” measures at a single point in time, yet sustainability has much to do with dynamic changes and trends over time. We will work to develop the variables as time series data that can give the direction and speed of change, and thus the distance to sustainability targets. For some variables, this target will be reducing a damaging activity or pollutant to minimal levels; for others, sustainability will mean striking a balance between two undesirable extremes, and each variable should be scaled accordingly.

The ESI is not yet mature enough to begin comparing ESI values between editions. There are too many refinements in the methodology and improvements in variables for such comparisons at present. This flux will probably continue for some years. However, it is possible to back-calculate the ESI for previous years using the latest methodology and variables, in order to begin measuring not only the relative performance between countries but also how each country's performance is changing over time.

Finally, the production of the index itself needs to be put on a sustainable basis through better institutionalization. While it is quite appropriate that innovative measures like the ESI should be developed in an academic setting, an operational index for regular use by governments will be more credible if it becomes the responsibility of an appropriate international organization.

We hope to build the interest of governments in the ESI, and with their support discuss with intergovernmental bodies such as UNDP, UNEP, and the UN Statistics Division where an operational ESI might best be situated. Support for the ESI, and the development of various derivative products, could also be explored with other global and regional intergovernmental bodies and specialized agencies. Non-governmental organizations such as the World Resources Institute and Redefining Progress (with its Ecological Footprint) should also be involved, as should the private sector through organizations such as the World Economic Forum.

To build the case for the continued financing of the production of the ESI, and the generation of the necessary data series, some attention should be given to cost-benefit analyses of more data-driven decisionmaking. One of the goals of the ESI is to show the advantages of better science-based information. Some case studies of its impact on government decisionmaking processes and the resulting benefits would facilitate the transition of the ESI from an academic research program to an operational tool for decisionmaking.

The ESI is still a work in progress, but it has reached the point where it provides a credible measure of relative government performance on many of the short- and medium-term actions necessary to achieve environmental sustainability. With continued improvement, it will grow in validity and impact – perhaps someday becoming as important a measure as GDP in assessing national progress.

Box 5: Directions for Further Work: Data “Drill Down”

One of the remarkable stories behind the Information Age is how much environmentally relevant data and knowledge are being generated and shared without any plan, government mandate, or structured set of incentives to promote innovation. The ability to sift information is beginning to become as important as the capacity to gather it, beginning at the global level tackled by the ESI. This is particularly true for the quantitative performance measures that increasingly drive companies, communities, and even individuals to gauge their relative environmental performance against relevant peer groups. Even where government collects useful information, “hybrid” regulatory strategies may split responsibilities across two or more administrative levels, fragmenting data collection and leading to inconsistent data categories and collection methodologies. International collators of environmental data have, in particular, yet to “drill down” systematically to subnational sources where much of the most critical performance information is to be found.

In short, information sources change as decisionmaking becomes more market-oriented and decentralized, but by definition newcomers don’t fit the organizing principles or “schema” previously designed to assist in the identification and classification of globally relevant information. Although designed for efficiency, these sorts of information-processing strategies often yield systematic and predictable errors which, when magnified on a global level, can severely distort both how nations approach environmental decisionmaking and how they analyze and discuss improvements to the global system of environmental indicators. The ESI counters this tendency by not only permitting but also encouraging change in technical details (both variables and how they are synthesized into indicators) on how to measure progress toward environmental sustainability.

This bottom-up, evolutionary approach to indicators takes more time and money than repetition of standard sources and methods. It also risks changing overall results so much that not only the ESI but the objectivity of indicators in general can be called into question. Fortunately, even changing a number of variables and adding several indicators produced relatively few major changes in country rankings between the 2005 ESI and the 2002 ESI. Nevertheless, one direction for further work centers on devising a more systematic approach to changing variables and justifying changes so the ESI can show where better environmental data needs to percolate up from decentralized and market-oriented decisionmaking processes.

Some environmental problems cannot be resolved by improving information flows among decisionmaking processes — or even by generation of more and better information. Improved data and information will not address questions of distributional equity. Nor will information fix human limitations with regard to risk perception. Nonetheless, the Information Age creates the possibility of reduced information gaps and restructuring institutional arrangements to form an environmental protection regime that is more refined, individualized, and efficient (Esty 2004). Realizing the possibility may require that national governments (and the international institutions they create) devise a decentralized and market-oriented information strategy that identifies gaps by origin (for example, technical and analytic barriers, market failures, and institutional shortcomings) and then decides who should fill them and who should pay. The ESI might become a catalyst for such a strategy, by going beyond the “wish list” of better indicators that has been given in reports to date. Such taxonomy would also help to connect indicators to actions, clarifying who should act and what might be done to effect progress on a particular variable or indicator.

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References

- 2001 Environmental Sustainability Index (ESI) (2001). *2001 Environmental Sustainability Index*. New Haven, Conn.: Yale Center for Environmental Law & Policy.
- 2002 Environmental Sustainability Index (ESI) (2002). *2002 Environmental Sustainability Index*. New Haven, Conn.: Yale Center for Environmental Law & Policy.
- Birdsall, Nancy and Michael Clemens (2003). *Promise to Performance: How Rich Countries Can Help Poor Countries Help Themselves*. (Center for Global Development, ed.). Washington, D.C.: Center for Global Development.
- Center for International Earth Science Information Network (CIESIN) (2003). *Population, Landscape, and Climate Estimates (PLACE)*. (<http://sedac.ciesin.columbia.edu/plue/nagd/place.html>).
- European Statistical Laboratory (ESL) (2004). *Dashboard of Sustainability*. (<http://esl.jrc.it/envind/dashbrds.htm>).
- Esty, Daniel C. and Michael E. Porter (2005, forthcoming). "National Environmental Performance: an Empirical Analysis of Policy Results and Determinants." *Journal of Environmental Development Economics*.
- Esty, Daniel C. (2002). "Why Measurement Matters." *Environmental Performance Measurement: The Global 2001-2002 Report* (D. C. Esty and P. Cornelius, ed.). New York: Oxford University Press.
- Esty, Daniel C. (2004). "Environmental Protection in the Information Age." *NYU Law Review*. 79(1): 115-211.
- Esty, Daniel C., Mark A. Levy, et al. (2003). "Environmental Sustainability in the Arab World." *The Arab World Competitiveness Report 2002-2003* (P. Cornelius, ed.). New York: Oxford University Press.
- Globerman, Steven and Daniel Shapiro (2002). "Global Foreign Direct Investment Flows: The Role of Governance Infrastructure." *World Development*. 20(11): 1899-1919.
- Grossman, Gene M. and Alan B. Krueger (1995). "Economic Growth and the Environment." *Quarterly Journal of Economics*. CX(2): 353-77.
- International Institute for Sustainable Development (IISD), et al. (2004). *Compendium of Sustainable Development Indicators*. Winnipeg: IISD.
- The World Conservation Union (IUCN) (2001). *Wellbeing of Nations*. (http://www.iucn.org/info_and_news/press/wbon.html). Cambridge, U.K.: IUCN.
- Levy, Marc A. and Patrick P. Meier (2004). "Early Warning and Assessment of Environment, Conflict, and Cooperation". *United Nations Environment Program, Understanding Environment, Conflict, and Cooperation*. UNEP and Woodrow Wilson Center.
- Parris, Thomas M. and Robert W. Kates (2003). "Characterizing and Measuring Sustainable Development." *Annual Review Environmental Resources*. 28(13): 1-28.
- Porter, Michael E. (1991). "America's Green Strategy." *Scientific American*. 264(4): 96.
- Porter, Michael E. and Claas van der Linde (1995). "Green and Competitive: Ending the Stalemate." *Harvard Business Review*. (September-October 1995):120-134.

2005 Environmental Sustainability Index Report

Prescott-Allen, Robert (2001). *The Wellbeing of Nations, A Country-by-Country Index of Quality of Life and the Environment*. Washington, D.C.: IDRC/Island Press.

Saltelli, Andrea, Karen Chan, et al. (2000). *Sensitivity Analysis*. Probability and Statistics series. New York: John Wiley & Sons.

Sutton, Paul C. (2003). "An Empirical Environmental Sustainability Index Derived Solely from Nighttime Satellite Imagery and Ecosystem Service Valuation." *Population and Environment*. 24(4): 293-311.

United Nations (UN) (2000). *General Assembly Resolution 55/2, A/RES/55/2*.

United Nations Division for Sustainable Development (1996). *Indicators of Sustainable Development Framework and Methodologies*. Division for Sustainable Development. New York: United Nations Division for Sustainable Development.

United Nations Division for Sustainable Development (2001). *Indicators of Sustainable Development: Guidelines and Methodologies*. New York: United Nations Division for Sustainable Development.

Endnotes

¹ What we term Systems correspond to the DPSIR's State category. Our Stresses are largely the same as the Pressure measures, though we include a handful of Driving Forces, such as population growth rates. Our Vulnerability component corresponds closely with the DPSIR Impact category. In many ways, our Capacity component has much in common with the Response category of the DPSIR framework, but there is an important difference. The Response category typically is used to monitor deliberate social responses to environmental change, such as governmental policy or human behavior. It is usually seen as causally subsequent to the other elements of the DPSIR framework. In our case, we seek primarily to measure aspects of social and institutional capacity that will influence the nature of ongoing environmental stewardship. Many of the relevant measures in this regard are not strictly responses to environmental change. Rather they include independent measures of social strength that in many ways will shape environmental outcomes. The Global Stewardship component has no simple counterpart in the DPSIR framework, but rather deploys some of its elements within the category of global responsibility.

List of Acronyms

ASEAN	Association of Southeast Asian Nations
BA	Budget Allocation
BOD	Biochemical Oxygen Demand
CGSDI	Consultative Group on Sustainable Development Indicators
CFC	Chlorofluorocarbons
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
DJSGI	Dow Jones Sustainability Group Index
DPSIR	Driving Force-Pressure-State-Impact-Response
EcoValue 21	Innovest corporate environmental responsibility rating of companies
EM	Expectation Maximization
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
ESL	European Statistical Laboratory
EU	European Union
EVI	Environmental Vulnerability Index
EWI	Ecosystem Wellbeing Index
FSC	Forest Stewardship Council
GCI	Growth Competitiveness Index
GEMS	Global Environmental Monitoring System
GEOSS	Global Earth Observation System of Systems
GDP	Gross Domestic Product
HDI	Human Development Index
IGOS	Integrated Global Observation Strategy
IIASA	International Institute for Applied Systems Analysis
IISD Inventory	International Institute for Sustainable Development Compendium of Sustainability Indicators Initiatives
IPCC	Intergovernmental Panel on Climate Change
ISO 14001	International Organization of Standardization's Environmental Management Standards
IUCN	World Conservation Union
LA21	Local Agenda 21
MAR	Missing at Random
MCAR	Missing Completely at Random
MCMC	Markov Chain Monte Carlo
MDGs	Millennium Development Goals
NEPAD	New Partnership for Africa's Development

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NIS	Newly Independent States of the former Republics of the Soviet Union
NO _x	Nitrogen oxides
OAS	Organization of American States
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
PEFC	Pan-European Forest Certification Council
PLACE	Population, Landscape and Climate Estimates (CIESIN 2003)
POPs	Persistent Organic Pollutants
PPP	Purchasing Power Parities
PSR	Pressure-State-Response environmental policy model
SA	Sensitivity Analysis
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales (Secretariat of Environment and Natural Resources, Mexico)
SO ₂	Sulfur dioxide
SO _x	Sulfur oxides
UA	Uncertainty Analysis
UN CSD	Commission for Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VOC	Volatile Organic Compounds
WWF	World Wildlife Fund

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Benchmarking National Environmental Stewardship

Appendix A Methodology

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Methodology

Considerable conceptual and analytical processing precedes the calculation of the ESI scores and rankings. The purpose of this Appendix is to provide detailed descriptions of the statistical techniques and methods used to calculate the ESI¹. Appendices C and D provide the data underlying the ESI. We offer this detail in support of the belief that transparency is an essential foundation for good analysis and policymaking.

The issues addressed here mirror those commonly encountered in the computation of composite indices: variable selection, missing data treatment, aggregation and weighting methodologies, as well as performance testing (OECD 2003).

In addition, the Appendix describes in greater depth the methods used in the statistical analyses that support the policy conclusions presented in the report. While the core text focuses on the key messages emerging from the analyses, this section includes the results of the ESI analyses and the relationships of the index to other key socio-economic and environmental benchmarks. The statistical procedures applied in the preparation of the 2005 ESI report include cluster analysis, principal component analysis as well as stepwise and multiple regression models.

The Appendix is organized into four sections. The first section provides step-by-step explanations of the construction of the 2005 ESI. It is divided into sub-sections, which describe:

1. The selection criteria for the countries included in the ESI.
2. The standardization of the variables for cross-country comparisons.
3. The transformation of the variables for the imputation and aggregation procedures.
4. The multiple imputations algorithm used to substitute missing data.
5. The winsorization of the data.

6. The aggregation of the data to indicator scores and the final ESI score.

The next section discusses the important issues of data quality and coverage and how we have managed them in the 2005 ESI. We include the “country data review,” which was carried out to crosscheck our data and to increase temporal and spatial coverage. In addition to identifying the best available data for the 2005 ESI, we also explain the logic and motivation for assessing the quality of all datasets used and provide detailed information on their sources.

The uncertainty and sensitivity analysis carried out in collaboration with the Joint Research Centre of the European Commission is presented in the third section. In a significant move towards greater transparency, we evaluate the major sources of uncertainty in the ESI, including missing data treatment, aggregation, and weighting. Each source of potential uncertainty is tested individually as well as jointly to estimate the impacts on the country rankings. The results are used to emphasize key limitations in the accuracy of the ESI scores, to address methodological criticism levied at previous ESI releases, as well as to strengthen the scientific basis for the policy conclusions presented in the report.

Finally, in the fourth section, we offer more detailed descriptions and results of the statistical analyses that form the backbone of our policy conclusions. The statistical tools used include principal component analysis, stepwise regression, and cluster analysis.

Principal component analysis is used to investigate the number of distinct dimensions that exist within the ESI indicator matrix and to show the influence of the indicators along these dimensions. It is furthermore used to determine a set of weights for the 21 indicators based on their statistical importance. These statistical weights are then compared with the equal weights used in the 2005 ESI.

In addition to identifying the most important indicators along the direction of the principal components, a stepwise regression analysis is conducted to determine the relative importance of the 76 variables with respect to the ESI score.

Because the ESI is a benchmarking tool for comparing national environmental stewardship, we emphasize the need to identify country peer-groups and “best practices” within those groups. We have conducted extensive cluster analyses, which identify seven relatively homogeneous country groupings with respect to the ESI indicators. This analysis brings to light several interesting patterns that cannot be attributed solely to the level of economic development. The characteristics with distinct patterns across the seven clusters, include population density, country size, and governance.

Calculating the ESI

1. Country Selection Criteria

A total of 146 countries met our inclusion criteria for the 2005 ESI. The decision to include a country in the index is based on country size, variable coverage, and indicator coverage as follows:

1. **Country Size:** Small countries are excluded. Countries with a total 2003 population under 100,000 or with land area under 5,000 square kilometers are excluded from the ESI because the nature of the interactions between elements of environmental sustainability are fundamentally different compared to larger countries. In particular, very small countries with large enough economies to be included in international data compilations resemble cities more than countries. They lack any sizable hinterland and have evolved to rely almost entirely on outsiders for provision of critical natural resources. Such profound differences make it difficult to justify including them in the same framework as other countries. However, separate ESI scores and compo-

nent values for five small states are provided in Appendix E.

2. **Variable coverage:** While we seek to include as many countries as possible, the large number of missing observations makes it difficult to accurately and appropriately rank a country. We exclude countries that have observations for fewer than 45 of the 76 requisite data points for the ESI.
3. **Indicator coverage:** Some countries that survive the first two screens do not have even coverage across all 21 ESI indicators. We require that all countries in the ESI have observed variables for each of the ESI indicators, with two exceptions. Air Quality and Water Quality have relatively low country coverage across their constituent variables, but these indicators are judged too important to be eliminated. Because they are such vital issues, we want to retain the information we can for countries that report air and water quality, and we choose not to exclude the many countries that fail to report such data. If a country was missing *all* variables in *any* one of the remaining 19 indicators, it was removed.

2. Variable Standardization for Cross-Country Comparisons

To calculate the ESI scores for each country and to facilitate the aggregation of variables into indicators, the raw data need to be transformed to comparable scales. Some of the ESI variables already are denominated to make such cross-country comparison possible. Where this is not the case, we identify an appropriate denominator such as GDP, agricultural GDP, the total value of imports of goods and services, total population, the world average price of gasoline, city population, population aged 0-14 years, total land area, populated land area, as well as known amphibian, breeding bird, and mammal species.

3. Variable Transformation

After making the variables fit for cross-country comparisons, the next step is to prepare them for the imputation and aggregation processes. The procedure spelled out below explains the data transformations undertaken prior to and after the imputations, as well as the impacts they may have on the Environmental Sustainability Index scores.

First, we test all variables for normality of distribution. In many cases, the observations exhibit substantial skewness (see formula below). Most variables also exhibit patterns of heteroskedasticity, which means that the variance of the observations increases with the magnitude of the data. Both interfere with the imputation model's assumption of multivariate normality.

$$S_{x_j} = \frac{1}{\sigma_{x_j}^3} \frac{\sum_{j=1}^p (x_j - \mu_j)^3}{p}$$

A perfectly normally distributed variable is symmetric around its mean and hence has a skewness of zero. Skewed and/or heteroskedastic variables can be transformed to improve these properties but this may also change their distributions in ways that may affect the interpretation of the ESI scores. The logarithmic function, for example, is commonly used to reduce the influence of a few very large values by moving them closer to the mean. Similarly, it shifts very small values closer to the center of the distribution. Although the transformation may help approximating the normal distribution more closely, it will cause countries with exceptional values on a particular issue to no longer be such distinct outliers.

In addition to improving the imputation model, we also argue in favor of transformations as a means of reducing the impact of outliers on the ESI. In our experience, extremely small or large values have a relatively high probability of being measurement errors. A more normal, symmetric distribution implies that the majority of observations fall within two standard deviations of the mean (for a normal distribution, two standard deviations include 95% of the data) and extreme values occur with small probability.

However, in order to strike a balance between improving the distributional characteristics of the data and minimizing the impacts of the transformations on the ESI scores and ranks, we apply a 2-step procedure that recognizes the importance of normality for the imputations but its less significant value for the aggregation:

1. Prior to the generation of multiple imputations we transform all variables that have a skewness value larger than two using the base-10 logarithm or power transformations. In most cases the distributional effects of the transformations are beneficial.
2. After the imputations, we transform the variables back to their original scale with the exception of those variables with extreme skewness values of at least four (see Table A.1). In doing so, we ensure that only variables with extreme values outside four standard deviations are corrected for symmetry.

Table A.1: 2005 Environmental Sustainability Index – Variable Transformations after Imputations

Variable	Variable Code	Transformation	Constant*
Urban population weighted SO ₂ concentration	SO2	Logarithm	0
Threatened mammal species as percentage of known mammal species in each country	PRTMAM	Logarithm	0
Freshwater availability per capita	WATAVL	Power ¼	1
Internal groundwater availability per capita	GRDAVL	Power ¼	0
Anthropogenic NO _x emissions per populated land area	NOXKM	Square root	0
Anthropogenic SO ₂ emissions per populated land area	SO2KM	Logarithm	0
Anthropogenic VOC emissions per populated land area	VOCKM	Logarithm	0
Coal consumption per populated land area	COALKM	Square root	0
Vehicles in use per populated land area	CARSKM	Logarithm	0
Generation of hazardous waste	HAZWST	Power ¼	0
Industrial organic water pollutant (BOD) emissions per available freshwater	BODWAT	Square root	496
Fertilizer consumption per hectare of arable land	FERTHA	Square root	0
Pesticide consumption per hectare of arable land	PESTHA	Logarithm	0
Percentage of total forest area that is certified for sustainable management	FORCERT	Square root	0
Child death rate from respiratory diseases	DISRES	Square root	0
Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts	DISCAS	Square root	0
IUCN member organizations per million population	IUCN	Square root	0
Local Agenda 21 initiatives per million people	AGENDA21	Logarithm	0
Number of ISO 14001 certified companies per billion dollars GDP (PPP)	ISO14	Square root	0
Carbon emissions per million dollars GDP	CO2GDP	Logarithm	0
Carbon emissions per capita	CO2PC	Logarithm	0

* If the observed minimum of the variable is negative, a constant is added such that the transformation of negative values can be computed. For example, if the minimum observed value is -5, a constant value of 6 is added to all observations before the logarithm or power transformation is computed.

4. Multiple Imputation of Missing Data

The question of how to treat missing or incomplete observations, which arise in virtually all types of environmental data collection, is among the most persistent and complicated problems facing policy analysts.

The degree of uncertainty due to the lack of data affects the ability to draw accurate conclusions and in many cases increases with the level of data aggregation. Insufficient data availability therefore has direct implications for effective and efficient decisionmaking.

We wish to minimize uncertainty and therefore attach substantial importance to the selection of the appropriate imputation method, i.e., the method used to fill data gaps with plausible estimates.

Two major assumptions are commonly made in the imputation literature:

1. The pattern of missing values in a multivariate vector of observations does not depend on the unobserved responses. In other words, the probability that a value is missing may be completely random (the statistical term is Missing Completely At Random or MCAR). Alternatively, it may depend on the observed values, which is called Missing At Random or MAR. The MAR assumption is more realistic for most real-life situations. If the parameters governing the missingness process are also independent of the parameters of the observed data model, the missing data mechanism is called “ignorable” and can be estimated.
2. A parameterized, functional form for the distribution of the vector observations can be formulated, and in most cases the estimates for the parameters of that form can be approximated using an iterative procedure (Johnson and Wichern 1998).

The following sections describe in detail how we selected and built the imputation model for the ESI.

Ad-hoc Methods v. More Sophisticated Approaches

The simplest ways of handling missing data are ad-hoc techniques such as *complete-case* and *available-case* methods (Little and Rubin 1987). The complete-case method uses only those observations for which all variables are observed. It is not applicable to the ESI because none of the 146 countries has observations for all 76 variables. We would hence be left with no observations in the imputation dataset.

The available-case method is based on analyzing subsets of the data for which all variables have been observed. For example, to impute missing water quality data using available cases, the imputation dataset could be limited to the water quality parameters only and all countries with one or more water quality parameters missing would be eliminated from this imputation dataset. Other variables are then imputed analogously.

It is apparent that both methods do not only lead to reduced ESI country coverage but also to potentially biased imputation results: both implicitly assume that the data are MCAR, which is highly improbable for the ESI data, because MCAR implies that all possible missingness patterns in the data matrix are equally likely.

Recognizing the complex relationships among the ESI variables we therefore opt for an imputation algorithm that broadens the base of actual experience, which allows us to involve as many countries as possible.

Table A.2 shows the top and bottom 20 countries in terms of data coverage. This list further corroborates that MCAR is not an appropriate model assumption for the ESI given the high correlation of data availability with level of income. We therefore investigated the use of a more sophisticated imputation model that does not require the

data to be separated into subgroups and allows for the less restrictive MAR assumption.

The statistical foundation for dealing with ignorable MAR processes was developed in the 1970s but has been integrated only recently into standard statistical software packages. The essential idea behind MAR is that the probability that an observation is missing may not be completely random but depend on other observed variables.

More formally, if r_{ij} denotes a missingness indicator for country i and variable j , which is 1 if the country i has an observation for variable j and 0 otherwise, and if the data matrix X is partitioned into observed, X_o , and missing data, X_m , then,

$$P(r_{ij} = 1 | X_o, X_m) = P(r_{ij} = 1 | X_o)$$

For example, if variable X_2 is not collected anymore and is hence missing once the value for variable X_1 has reached a certain level, the probability that X_2 is missing given the value of X_1 is determined by X_1 and is a MAR process. In Table A.2 we can see a correlation between income per capita and the number of observed values. There are many other cases in which GDP per capita is a strong predictor for the values of ESI variables, and we utilized these relationships in the imputation model by including GDP per capita as an ancillary variable (see also the section dealing with deciding which variable to impute for a list of other ancillary variables).

Although the MAR assumption is more suitable for the ESI, we cannot determine if the assumption holds or if the missing data follow a non-ignorable process, i.e., a process in which the probability of X_2 missing not only depends on X_1 but also on the missing value itself.

So far, we only considered replacing a missing value with a single, plausible alternative, but imputation procedures can also generate multiple substitutes for a missing value. The key idea behind multiple imputations is to create a finite number of m completed data sets, each of which is then analyzed using

Table A.2: Countries with Highest and Lowest Data Coverage

Country	Observed	Missing	GDP / cap
Finland	75	1	\$32,830
Germany	75	1	\$32,800
Netherlands	75	1	\$30,990
Austria	74	2	\$34,240
Belgium	74	2	\$31,390
France	74	2	\$30,700
Ireland	74	2	\$30,890
Italy	74	2	\$21,480
Mexico	74	2	\$3,720
Poland	74	2	\$4,780
United Kingdom	74	2	\$23,460
Canada	73	3	\$23,840
Denmark	73	3	\$39,720
South Korea	73	3	\$15,290
United States	73	3	\$32,510
China	72	4	\$1,020
Greece	72	4	\$14,760
Hungary	72	4	\$5,940
Spain	72	4	\$18,400
Switzerland	72	4	\$45,980

Country	Observed	Missing	GDP / cap
Sudan	53	23	\$350
Bosnia & Herze.	52	24	\$1,720
Gabon	52	24	\$4,370
Mauritania	52	24	\$550
Myanmar	52	24	\$1,800
Niger	52	24	\$210
P. N. Guinea	52	24	\$880
Yemen	52	24	\$330
Dem. Rep. Congo	51	25	\$90
Libya	51	25	\$6,400
Sierra Leone	50	26	\$170
Uzbekistan	50	26	\$710
Turkmenistan	49	27	\$1,050
Guyana	48	28	\$940
Iraq	48	28	\$1,500
Liberia	48	28	\$190
North Korea	47	29	\$1,300
Serbia & Montenegro	47	29	\$1,900
Bhutan	45	31	\$600
Guinea-Bissau	45	31	\$160

Source for GDP per capita data: World Bank, World Development Indicators 2004. Data in constant 1995 US dollars.

standard statistical methods. The results of the m single analyses are combined to yield a final estimate of the parameter of interest. The advantage of using multiple imputations is that with repeated application of complete data analysis procedures, the uncertainty inherent in the imputation process can be captured in the variances within and between imputations.

We tested three different methods:

1. A simulation model using Markov Chain Monte Carlo (MCMC) techniques.
2. A regression-based modeling approach for missing data using observed values and existing correlations between the variables.
3. An Expectation-Maximization (EM) algorithm.

The Markov Chain Monte Carlo based imputation algorithm assumes multivariate normality of the data and generates imputations from the posterior distribution of the missing data given the observed data using a Bayesian approach. The missing data are presumed to be missing at random (MAR). Although in many cases the assumption of

multivariate normality of the joint data distribution is not a realistic assumption, simulation tests have demonstrated relative robustness to deviations from this assumption (Little and Rubin 1987).

The regression imputation procedure is conceptually and computationally simple. Its underlying assumptions are that the marginal distributions of the data are normal and that linear relationships exist between the variables, which can be utilized for building linear regression models that predict the missing data. As with the MCMC model, the missing observations are assumed to be MAR.

The EM method uses an iterative process to estimate the mean vector and covariance matrix of the variables but does not generate multiple, independent draws from the data distribution. These can be obtained through the addition of a random noise, simulated from a specified distribution such as the standard normal distribution.

The relative usefulness of the three methods depends on the characteristics of the ESI data and the purpose of the analysis. Since we are interested in multiple imputations we elimi-

nate the EM algorithm and compare the performance of the MCMC model with that of the regression model.

Comparison of Regression Imputation with MCMC Imputation

Using the ESI data, we generate imputations for both the MCMC and regression model and compare the results to see how robust the imputations and ESI scores and ranks are to the choice of imputation model. In general, we find that the differences in the results of the two methods with respect to the indicator values and ESI scores are limited, with a few exceptions. Table A.3 shows a sample of preliminary results for the ESI scores for both models using only ESI data in the first case and a set of additional socio-economic variables in the second.

Generally, we find that the inclusion of ancillary variables reduces the imputation variance of many variables that correlate with the additional data (for a list of ancillary variables refer to the sub-section Deciding Which Variables to Impute).

The ranks of the countries in the top and bottom quarter of the ESI appear to be relatively stable with only minor rank variation. Higher variation occurs in the middle 50% of the distribution. We attribute this in part to the heterogeneity of these countries with respect to environmental, institutional,

and social circumstances and to the relative proximity of the ESI scores in the center of the ESI.

The deviation in means between variables imputed under the MCMC model and the regression model is higher when the fraction of missing data is large and when there are few comparable countries the imputation algorithm can build on to generate stable estimates. Variables that depend on largely unmeasured characteristics such as geography and climate are particularly affected. Such variables for which we do not have good “predictors” are used in the imputation model but are not imputed themselves (see Table A.4 for a complete list of not imputed variables.)

The relative robustness of the ESI ranks to the choice of imputation model, especially in the top and bottom quintiles, is further supported by the findings of the uncertainty and sensitivity analysis carried out with the Joint Research Centre of the European Commission, which is explained in the third section of this Appendix.

Although computationally more intensive, we use the MCMC method for the 2005 ESI because it provides the most flexible model for the ESI data and resulted in plausible imputations based on comparative tests among the three models. The exact procedure is described in the following section.

Table A.3: Impact of Imputation Model on 2005 ESI Ranks

Country	Regression		MCMC		Rank Standard Deviation	Average Rank
	No ancillary variables	With Ancillary variables	No ancillary variables	With Ancillary variables		
Finland	3	3	1	1	1.2	2.0
Sweden	1	2	4	2	1.3	2.3
Norway	2	1	2	3	0.8	2.0
Iceland	4	4	3	4	0.5	3.8
Switzerland	5	5	5	6	0.5	5.3
Canada	9	6	7	7	1.3	7.3
Austria	13	7	9	9	2.5	9.5
Australia	14	9	13	10	2.4	11.5
New Zealand	11	15	14	12	1.8	13.0
Gabon	10	17	10	18	4.4	13.8
Peru	25	18	17	20	3.6	20.0
Latvia	22	19	23	23	1.9	21.8
Colombia	60	57	22	30	19.1	42.3
Belgium	96	59	70	78	15.6	75.8
Italy	79	61	61	64	8.6	66.3
Nepal	54	63	60	58	3.8	58.8
Malawi	71	64	81	66	7.6	70.5
Chile	64	67	46	49	10.5	56.5
Myanmar	66	68	100	101	19.4	83.8
Belarus	49	69	64	76	11.5	64.5
Thailand	108	71	86	86	15.2	87.8
Chad	67	72	75	75	3.8	72.3
Ecuador	61	73	35	31	20.3	50.0
Cameroon	74	74	63	60	7.3	67.8
Madagascar	86	75	79	92	7.5	83.0
Gambia	63	76	98	97	17.0	83.5
Guinea	62	79	85	85	10.9	77.8
Russia	81	80	49	47	18.8	64.3
Côte d'Ivoire	44	81	94	98	24.6	79.3
Sri Lanka	80	82	68	83	7.0	78.3
Venezuela	123	85	76	74	22.8	89.5
Kazakhstan	105	86	91	84	9.5	91.5
Jordan	82	87	92	90	4.4	87.8
Guatemala	73	88	57	55	15.4	68.3
Benin	70	89	72	89	10.4	80.0
Senegal	83	90	88	80	4.6	85.3
Burkina Faso	41	91	93	87	24.8	78.0
Ukraine	113	92	102	105	8.7	103.0
South Korea	106	93	109	111	8.1	104.8
Iran	142	135	140	139	2.9	139.0
Syria	140	136	130	125	6.6	132.8
Libya	138	137	133	129	4.1	134.3
Uzbekistan	139	138	141	141	1.5	139.8
Nigeria	141	140	126	135	6.9	135.5
China	135	141	139	136	2.8	137.8
Kuwait	134	143	143	144	4.7	141.0
Saudi Arabia	144	144	145	146	1.0	144.8
Haiti	145	145	146	145	0.5	145.3
Yemen	143	146	144	143	1.4	144.0

Note: Results based on preliminary data, i.e., ranks do not in all cases correspond to final 2005 ESI ranking.

Markov Chain Monte Carlo Simulation

Markov Chain Monte Carlo (MCMC) simulation substitutes missing values with plausible quasi-random draws from their conditional distribution given the observed data. The MCMC approach assumes an ignorable MAR process for the missing data generating mechanism. The full data set, Y , is assumed to have a well-specified distribution, generally a multivariate normal distribution, with independent and identically distributed, or *iid*, observations. The missing values are then imputed iteratively in a Bayesian framework using a sequence of Markov Chains. Let the observed data be denoted X_o and the missing data X_m so that the full data matrix is given by $X = \{X_o, X_m\}$. The algorithm is as follows:

1. Given a prior distribution for the parameters θ of the data model (in the case of the multivariate normal distribution the parameters are the mean and the covariance matrix) and an initial estimate of the parameters, $\theta^{(0)}$, the missing data, X_m , are imputed through random sampling from the conditional distribution of the missing data, X_m , given the observed data, X_o , and the initial parameter estimates.
2. The completed data set is then used to update the initial parameter estimate by sampling from the joint posterior distribution of the parameters given in the completed data set. The new parameter $\theta^{(1)}$ is then used to generate a new sample, $X_m^{(1)}$.
3. Iterating through steps 1 and 2 generates a Markov Chain of pairs of $(X_m^{(i)}, \theta^{(i)})$, which converges to the posterior conditional distribution of the missing data given the observed data. After a sufficiently long convergence time (burn-in), the first imputed data set can be drawn from the Markov Chain by sampling consecutively or every k^{th} draw ($k > 0$).
4. Steps 1 to 3 are then repeated m times to generate m imputed data sets.
5. The m data sets are then analyzed individually and their results combined to a final ESI score for each country. From the

m imputed data sets we can also obtain estimates of the standard errors of the missing data.

Number of Imputations

The larger the number of imputed values for each missing observation, the more that can be learned about the variation inherent in the missing observation. In the simplest case only one imputation (see single imputation methods discussed earlier) is generated. No statements can be made whether the substitute value is close to the “true” but unobserved value. The larger the number of imputations, the better our ability to estimate the variation and the more insight we have into the amount of missing information in the dataset and the band of uncertainty it creates.

Simulation studies have shown that for modest amounts of missing information (less than 30%), five to ten imputed datasets are sufficient to provide reasonable estimates of the parameters of interest.

Although we invested a great deal of effort in finding the most complete global data, the ESI still has approximately 18.6% empty cells in the data matrix. The amount of information missing may be somewhat higher depending on the importance of the variables with incomplete observations for determining a country’s ESI. We therefore tested the robustness of the ESI by increasing the number of imputed datasets in our simulations from $m=10$ to $m=30$ and $m=100$.

With 30 or even 100 imputed datasets, it is possible to analyze not only the pattern of imputed values across countries for a specific variable, but also the distribution of the imputed values for a single country. We find that 30 sets of imputations provide a good compromise performance of the imputation model as well as computational efficiency.

Deciding which Variables to Impute

The ability of the imputation model to generate plausible and stable imputations depends not only on how well the data fit the model assumptions of MAR and multivariate

normality but also on the inherent correlation structure.

For many aspects measured in the ESI we could identify predictor variables through correlation analysis. In addition to the existing observations for each variable, the observations of the predictors assist the model in generating more reasonable values. But we do not rely on the ESI variables alone. Previous releases of the ESI have already pointed out that certain ancillary variables such as transformations of GDP per capita, area, and population density can help to further fine-tune the predictions.

We therefore identified and include the following ancillary variables: populated land area (at least 5 persons per square kilometer), square of the base-10 logarithm GDP per capita, base-10 logarithm GDP per capita, health expenditure per capita, high technology exports as percentage of total exports, base-10 logarithm of total area, arable land as percentage of total land, base-10 logarithm of population, base-10 logarithm of population density, trade as percentage of GDP, and memberships in the Organisation for Economic Co-Operation and Development (OECD) and the Organization of the Petro-

leum Exporting Countries (OPEC). All data except for the populated land area dataset are from the World Bank's *World Development Indicators*.

Based on 30 fully imputed datasets, we compare the performance between imputations to check if the imputed values are stable. This is not the case for all variables. Variables that depend heavily on conditions not captured by the ESI or the ancillary variables, such as climatic, geographical, and many ecological factors, perform inadequately in the imputation model. These variables are therefore not imputed but used to assist in imputing missing values for variables that the ESI data and external data could impute in a stable manner. Table A.4 lists the variables that are not imputed.

In particular, we excluded Suspended Solids and SO₂ Exports from imputation because the results are too volatile and the fraction of missing values is large for both. We do not have sufficient confidence in being able to estimate their missing values with acceptable accuracy.

The final dataset is then obtained as the average of all values in each cell in the data matrix.

Table A.4: List of Variables not Imputed

Indicator	Variable	Code	Logic for not imputing
Biodiversity	National Biodiversity Index	NBI	Dependence on ecological and geographical factors not captured in ESI
	Percentage of country's territory in threatened ecoregions	ECORISK	Dependence on ecological and geographical factors not captured in ESI
	Threatened mammal species as percentage of known mammal species in each country	PRTMAM	Dependence on ecological and geographical factors not captured in ESI
	Threatened bird species as percentage of known breeding bird species in each country	PRTBRD	Dependence on ecological and geographical factors not captured in ESI
	Threatened amphibian species as percentage of known amphibian species in each country	PRTAMPH	Dependence on ecological and geographical factors not captured in ESI
Water Quality	Suspended solids	WQ_SS	High volatility of imputation results and dependence on factors not captured in the ESI
Water Quantity	Freshwater availability per capita	WATAVL	Dependence on ecological and geographical factors not captured in ESI
	Internal groundwater availability per capita	GRDAVL	Dependence on ecological and geographical factors not captured in ESI
Reducing Waste and Consumption Pressures	Generation of hazardous waste	HAZWST	Whether a country generates hazardous waste depends on factors not captured by the ESI.
	Waste recycling rates	RECYCLE	The data set is merged from two different sources, imputations would not be interpretable
Reducing Water Stress	Percentage of country under severe water stress	WATSTR	Dependence on ecological and geographical factors not captured in ESI
Natural Resource Management	Productivity overfishing	OVRFSH	Dependence on ecological and geographical factors not captured in ESI
	Salinized area due to irrigation as percentage of total arable land	IRRSAL	Dependence on ecological and geographical factors not captured in ESI
	Agricultural subsidies	AGSUB	Lack of information on external factors determining this variable
Reducing Environment-Related Natural Disaster Vulnerability	Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts	DISCAS	Dependence on ecological and geographical factors not captured in ESI
	Environmental Hazard Exposure Index	DISEXP	Dependence on ecological and geographical factors not captured in ESI
Environmental Governance	Local Agenda 21 initiatives per million people	AGENDA21	Lack of information on external factors determining this variable
	Civil and Political Liberties	CIVLIB	Complete coverage
	Percentage of variables missing from the CGSDI "Rio to Joburg Dashboard"	CSDMIS	Information which variables from the CSD CG list are missing cannot be imputed
	Knowledge creation in environmental science, technology, and policy	KNWLDG	Lack of information on external factors determining this variable
	Democracy measure	POLITY	Lack of information on external factors determining this variable
Eco-efficiency	Hydropower and renewable energy production as a percentage of total energy consumption	RENPC	Renewable energy sources depend on geography, climate, and other factors not captured by the ESI
Private Sector Responsiveness	Dow Jones Sustainability Group Index (DJSGI)	DJSGI	Not applicable
	Average Innovest EcoValue rating of firms headquartered in a country	ECOVAL	Not applicable
	Number of ISO 14001 certified companies per billion dollars GDP (PPP)	ISO14	Not applicable
	Participation in the Responsible Care Program of the Chemical Manufacturer's Association	RESCARE	Not applicable
Participation in International Collaborative Efforts	Number of memberships in environmental intergovernmental organizations	EIONUM	Not applicable
	Participation in international environmental agreements	PARTICIP	Not applicable
Reducing Transboundary Environmental Pressures	SO ₂ Exports	SO2EXP	Dependence on factors not captured in the ESI such as prevailing winds and geographical location

5. Data Winsorization

Following imputations, we “winsorize” or trim the tails of the variable distributions. Winsorization corresponds to shifting observations in the tails of the distribution to specified percentiles.

The purpose of the winsorization is to avoid having a few extreme values overly dominate the aggregation algorithm. We apply winsorization because we believe that such extreme values are more likely to reflect data quality problems in the tails of the distribution as opposed to values closer to the center of the distribution.

For each variable, the values exceeding the 97.5 percentile are lowered to the 97.5 percentile. Similarly, values smaller than the 2.5 percentile are raised to the 2.5 percentile.

Although we apply the transformation to every variable, the total number of affected values is very small. As another quality check on the imputations, we verified whether variables with imputed values have a higher degree of observations in the extreme tails. We observe a small, significant correlation between the number of winsorized values and the number of data points imputed for the 97.5% percentile, indicating that the imputation is more likely to generate large outliers than small outliers (see Table A.5).

The ESI could be criticized for using winsorization because it changes the distribution of the variable and either benefits or penalizes countries with values outside the center 95%. But our finding that winsorization affects only a very small fraction of the data and correlates

with the imputations only to a small extent convinces us believe that its benefits outweigh this potential drawback. The Uncertainty and Sensitivity Analysis in Section 3 provides further support for this methodological decision.

6. Data Aggregation and Weighting

Aggregation

Composite indices are aggregations of sets of variables for the purpose of meaningfully condensing large amounts of information. Various aggregation methods exist and the choice of an appropriate method depends on the purpose of the composite indicator as well as the nature of the subject being measured.

The most common types of indices used are weighted sums and weighted geometric means of sub-components. The ESI belongs to the first group because it is the equally weighted sum of the 21 indicators:

$$I_i = \sum_{j=1}^p w_j \tilde{X}_j \quad i = 1, \dots, n,$$

where w_j is the j^{th} weight given to \tilde{X}_j , which corresponds to the z-score of the j^{th} indicator. Each indicator is itself a weighted sum of the 2 to 12 underlying variables. Within each indicator the variables are also weighted equally.

Weighted summations, in the form of averages, are not necessarily scale invariant. That means that the resulting index value, I_i , for the i^{th} object depends on the scales of the variables aggregated in the index.

Table A.5: Correlation between Number of Imputations and Number of Winsorizations.

Winsorization	Number of Imputations		
	Pearson	Kendall's Tau	Spearman's Rho
2.5 Percentile	0.16	0.12	0.18
97.5 Percentile	-0.25*	-0.20*	-0.24*
2.5 and 97.5 Percentile	0.06	0.03	0.04

* Correlation is significant at the 0.05 level (2-tailed).

Multiplicative expansions from one scale to another, for example, are abundant in the environmental domain. Because of this, the construction of indices based on weighted summation needs to take into account the possibility that the index values may change depending on the scale used.

The aggregation therefore requires that the $(n \times p)$ matrix X of n countries and p variables is normalized, i.e., all variables are on the same scale, in order to avoid distortions due to variables with very large values or variances. Most economic indices are built on a monetary unit of measurement, which provides a unified framework for comparing country performance. Environmental data do not generally have a common scale and normalization is necessary to remove the scale effects of different units of measurement without changing the relative distances between observations.

The ESI preserves the relative distances between countries' values by converting all variables to z-scores, which are obtained by subtracting the mean from the observation and dividing the result by the standard deviation of the variable. For variables in which high values correspond to low levels of environmental sustainability, we reverse the order by subtracting the observation from the mean and dividing the result by the standard deviation. In other words, for variables such as "percentage of land area under protected status" we use the conventional z-score, whereas for variables such as "percentage of mammals threatened" we produce a z-score in which higher percentages of threatened mammals correspond to lower levels of environmental sustainability.

Although normalization of the variables to z-scores removes the scale effects, z-scores depend on observed data statistics. They are "relative transformations" and change every time the ESI is updated due to shifts in the distribution of the variables over time. Furthermore, if all countries improve their performance on a given variable by the same amount between two time periods, the z-scores

will remain the same even though performance has improved across the board.

The relationship among the variables and their individual contribution to the ESI merits significant attention. Linear weighted summation implies that the variables are preferentially independent (Munda and Nardo 2003b). Preferential independence means that the trade-off ratio between any two variables in a set, \wp , of variables is independent of the values taken on by the variables in \wp^c (the complement of \wp). Under preferential independence, the summation of variables in the ESI corresponds to their marginal contributions to environmental sustainability, and requires that there are no synergistic or antagonistic effects among the variables. This is hardly a realistic assumption for environmental data. Given, for example, the proven synergistic relationships between several SO₂ and NO_x in the formation of acid rain, we cannot realistically assume preferential independence.

Weighted geometric mean aggregation is a potential alternative. It is defined as

$$I_i = \prod_{j=1}^p (w_j X_j)^{1/p} \quad i = 1, \dots, n$$

Ebert and Welsch demonstrate that in the case of strictly positive, ratio-scale noncomparable variables, including many environmental variables, the aggregation by geometric mean can provide meaningful indices, i.e., indices with unambiguous orderings (Ebert and Welsch 2004). Another, more advanced approach is the multi-criteria decision method, which does not allow poor performance on one variable to be compensated by good performance on another.

When comparing the properties of the three different aggregation methods, the trade-offs become clear. When the objective is to design the best possible index, considerations of the most advanced statistical techniques available are important. On the other hand, if transparency and easy understanding by non-experts is equally important, the logical framework of

the ESI represents a useful and valid alternative.

In an important expansion of our analysis of the properties of the ESI, we include in this Appendix the uncertainty and sensitivity analysis of the ESI, carried out by the Joint Research Centre of the European Commission in Ispra, Italy. The analysis identifies and quantifies the impact of the different sources of uncertainty in the ESI data as well as the effects of the weighting and aggregation methods on the rankings of the ESI.

Weighting

In composite indices, the choice of weights can reflect the importance given to the variables comprising the index or the substitution rates between them. In other instances, the weights are used to adjust for unequal variances of the variables, and hence their unequal levels of certainty. The specification of the weights is thus an integral part of index development and below we discuss our logic and motivation for choosing equal weights for the 21 indicators in the ESI.

Different methods to determine weights have been developed. They include data-dependent statistical tools as well as judgment-based expert opinions and budget allocation schemes.

Relative weights can be derived from least squares estimation, i.e., the line fitting method that minimizes the sums of squares of the relative distances of points from their expected value. Least squares minimization is the procedure underlying the linear regression model. A frequently occurring problem in least squares is that larger values tend to be associated with larger standard errors. Large observations will therefore have a disproportional influence on the sum of squares compared to smaller values. A weighted least squares approach corrects for this effect.

Principal component analysis and factor analysis are also useful statistical tools for estimating weights. They build on the relative

importance of the variables for the principal components.

Statistically determined weights have the advantage that they apply a neutral and data-reliant weighting. However, statistical weights do not always reflect the priorities of decisionmakers or the budget constraints that limit free choice among a range of policy options.

Various methods for eliciting subjective preferences have been developed using elements ranging from budget allocation techniques to correspondence analysis. Regardless of whether the weights are determined statistically or subjectively, in most cases there exists no unique set of weights.

The ESI uses equal weights at both the indicator and the variable level. Our argument for equal indicator weights is based on the premise that no objective mechanism exists to determine the relative importance of the different aspects of environmental sustainability. At the country level, the indicators would almost certainly be weighted differently, but we cannot determine a globally applicable, differential set of weights that would allow a fair comparison between countries. As unsatisfactory as the choice of equal weights may appear, it is a neutral and justifiable allocation of importance across the indicators. Moreover, the principal component analysis in section 4 demonstrates that, even if the weights are determined through statistical means, no indicator stands out as being more or less important than others.

The variables within each of the 21 indicators are equally weighted because we think that each variable contributes roughly proportionately to the indicator to which it is allocated. In cases in which a country is missing a variable (and it is not imputed), the variable is not included in the average.

We note here that an interactive form of the ESI, that allows the user to set his or her own weights and to re-calculate an ESI based on these weights, is under development and will be made available on our website.

Data Quality and Coverage

1. Variable Grading

One of the most important conclusions of the ESI is the need for better data and a policy commitment to developing the necessary analytic underpinnings for a more data-driven approach to environmental decisionmaking. To further facilitate this process, we evaluated all ESI data sets with respect to the following criteria:

Relevancy:

1. The degree to which the variable matches the issue of interest.

Accuracy:

1. The reliability of the data source.
2. Whether the variable methodology is well established and widely adopted.
3. The availability of other data for cross-checking to assess the accuracy of the variable.

Coverage in space and time:

1. The availability of the most recent data.
2. The frequency with which the variables are updated.
3. The spatial coverage of the variable.
4. Whether the time series data can be constructed.

Certain variables are based on more than one data source, in which case, each data source is

rated separately. In most cases, there are no deviations between the ratings of the sources. In the few instances where they are judged differently, this has been marked.

The evaluation of the variables was conducted by team members at the Yale Center for Environmental Law and Policy and Columbia University's Center for International Earth Science Information Network and combined into a single rating. The participants of the 2005 ESI Expert Review Meeting in December were also asked to comment on the preliminary "grades" and evaluations.

The evaluation process is inescapably subjective and limited by the knowledge base of the research teams. The goal of this exercise is not to establish a definitive quality assessment for each dataset, rather it is to begin a dialogue about data quality and to encourage further investments in data collection and methodological improvements. The grading scale used for the evaluation rates each variable according to its relevancy, accuracy, and coverage in space and time using grades ranging from A (Excellent) to F (Unacceptable), or U (Unknown).

The resulting matrix of variable grades summarizing our assessment of the relevancy, accuracy, and coverage of the variables in the ESI is shown in Table A.6.

Table A.6: Quality Assessment of ESI Variables

Component	Indicator Number	Indicator	Variable Number	Variable	Variable Description	Match between variable and issue	Reliability of data source	Variable methodology	Cross-check criteria	Most recent data set	Frequency of update	Spatial coverage	Consistent time series
Environmental Systems	1	Air Quality	1	NO2	Urban population weighted NO ₂ concentration	A	A	B	C	A-	A-	D	B-
			2	SO2	Urban population weighted SO ₂ concentration	A	A	B	B-	A-	A-	D	B-
			3	TSP	Urban population weighted TSP concentration	A	A	B	B-	A-	A-	D	C-
			4	INDOOR	Indoor air pollution from solid fuel use	B	B-	C	D+	A	U	B	F
	2	Biodiversity	5	ECORISK	Percentage of country's territory in threatened ecoregions	B	B	C	D	A	A	A	F
			6	PRTBRD	Threatened bird species as percentage of known breeding bird species in each country	B	A-	B+	B-	A	A-	A	A-
			7	PRTMAM	Threatened mammal species as percentage of known mammal species in each country	B	A-	B+	B-	A	A-	A	A-
			8	PRTAMPH	Threatened amphibian species as percentage of known amphibian species in each country	B	A-	A-	B-	A	B	A	B
			9	NBI	National Biodiversity Index	A	A-	B	B	A	U	B	D
	3	Land	10	ANTH10	Percentage of total land area (including inland waters) having very low anthropogenic impact	A-	B	B-	B-	A-	D	A	C-
			11	ANTH40	Percentage of total land area (including inland waters) having very high anthropogenic impact	A-	B-	B-	B-	A-	D	A	C-
	4	Water Quality	12	WQ_DO	Dissolved oxygen concentration	A	B+	B-	B	A	A	D	C+
			13	WQ_EC	Electrical conductivity	A-	B+	B-	B	A	A	D	C+
			14	WQ_PH	Phosphorus concentration	A	B+	B-	B	A	A	D	C+
			15	WQ_SS	Suspended solids	A	B+	B-	B	A	A	D	C+
5	Water Quantity	16	WATAVL	Freshwater availability per capita	A	B	A-	B	C	A	B	A-	
		17	GRDAVL	Internal groundwater availability per capita	A-	B	C-	C	A	C	B	D	
Reducing Environmental Stresses	6	Reducing Air Pollution	18	NOXKM	Coal consumption per populated land area	A	A-	B	B+	B	B-	C	C-
			19	SO2KM	Anthropogenic NO _x emissions per populated land area	A	A-	A-	B+	B	B-	C-	C-
			20	VOCKM	Anthropogenic SO ₂ emissions per populated land area	A	A-	B	B+	B	B-	C	C-
			21	COALKM	Anthropogenic VOC emissions per populated land area	C	A-	A-	A-	A	A	A	A
			22	CARSKM	Vehicles in use per populated land area	C+	A	A	A-	A	A	A	A
	7	Reducing Ecosystem Stress	23	FOREST	Annual average forest cover change rate from 1990 to 2000	A-	A-	B-	B	B	B-	B	C-
			24	ACEXC	Acidification exceedance from anthropogenic sulfur deposition	A	C	B	B	D	F	A	F
	8	Reducing Population Pressure	25	GR2050	Percentage change in projected population 2004-2050	A	B	A	A	A	A	A	A
			26	TFR	Total Fertility Rate	A	A-	A	A-	A	A	A	A
	9	Reducing Waste & Consumption Pressures	27	EFPC	Ecological Footprint per capita	A	B	B-	C-	B	A-	B	B
28			RECYCLE	Waste recycling rates	B	A	C	B-	B	A-	C	D	
29			HAZWST	Generation of hazardous waste	B	A-	B	A	B	A/B	C	C	
10	Reducing Water Stress	30	BODWAT	Industrial organic water pollutant (BOD) emissions per available freshwater	A	A	A-	A	B	A	B-	A-	

Component	Indicator Number	Indicator	Variable Number	Variable	Variable Description	Match between variable and issue	Reliability of data source	Variable methodology	Cross-check criteria	Most recent data set	Frequency of update	Spatial coverage	Consistent time series
Reducing Environmental Stresses	10	Reducing Water Stress	31	FERTHA	Fertilizer consumption per hectare of arable land	B-	A-	B+	B	A	A	A	A
			32	PESTHA	Pesticide consumption per hectare of arable land	B	A-	A-	B	C	A	D	A
			33	WATSTR	Percentage of country under severe water stress	A	B	C	B-	C	C	B	D
	11	Natural Resource Management	34	OVRFSH	Productivity overfishing	B	B	C+	D	C	U	B	F
			35	IRRSAL	Salinized area due to irrigation as percentage of total arable land	A	B	C	D	C	C	D	F
			36	FORCERT	Percentage of total forest area that is certified for sustainable management	B	A	B+	B+	A	A	A	B
			37	WEFSUB	World Economic Forum Survey on subsidies	C	B	B-	D	A	A	A	B-
			38	AGSUB	Agricultural subsidies	B	A&B	A&C	B-	B	B	B	D
Reducing Human Vulnerability	12	Environmental Health	39	DISINT	Death rate from intestinal infectious diseases	B	A-	C-	B-	B	A	C	B
			40	DISRES	Child death rate from respiratory diseases	B	A-	C-	B-	B	A	C	B
			41	U5MORT	Children under 5 mortality rate per 1000 live births	C+	A	A	A	A	A-	A	A-
	13	Basic Human Sustenance	42	UND_NO	Proportion of undernourished in total population	B	A	B-	B	B	A-	A-	B
			43	WATSUP	Percentage of population with access to improved drinking water source	A	B	B	B	A	A	A-	B-
	14	Reducing Environment-Related Natural	44	DISCAS	Average number of deaths per million inhabitants from floods, tropical cyclones,	B+	A	B	B+	B	A	B	A
45			DIEXP	Natural Disaster Exposure Index	B+	A	B	B+	A	A	B	A	
Social and Institutional Capacity	15	Environmental Governance	46	PRAREA	Percentage of total land area under protected status	C	B+	B	A-	A	A-	A	B-
			47	GASPR	Ratio of gasoline price to world average	B-	A	B-	A-	A	A-	B	A-
			48	CSDMIS	Percentage of variables missing from the CGSDI "Rio to Joburg Dashboard"	B-	B	A	A-	A	A	B-	B
			49	KNWLDG	Knowledge creation in environmental science, technology, and policy	C	B+	D	B	A	F	C	C
			50	IUCN	IUCN member organizations per million population	B-	A	A	A-	A	A	A	A
			51	AGENDA21	Local Agenda 21 initiatives per million people	A-	B	A-	B-	A	B	C	B
			52	GRAFT	Corruption measure	A-	B-	B	D	A	B	A	B-
			53	LAW	Rule of law	A-	B-	B	C+	A	A-	A	B-
			54	CIVLIB	Civil and Political Liberties	A-	B	B-	D	A	A	A	A
			55	WEFGOV	World Economic Forum Survey on environmental governance	B-	B	B-	D	A	A	C	B-
			56	GOVEFF	Government effectiveness	A-	B-	B	C+	A	A-	A	B-
	57	POLITY	Democracy measure	B-	B+	A-	C	A	A	B	A		
	16	Eco-efficiency	58	ENEFF	Energy efficiency	A	A	A-	A-	A	A	B	A
			59	RENPC	Hydropower and renewable energy production as a percentage of total energy	A	A	A	A-	A	A	B	A
	17	Private Sector Responsiveness	60	DJSGI	Dow Jones Sustainability Group Index (DJSGI)	B	B	C	C	A	A	D	B
			61	ECOVAL	Average Innovest EcoValue rating of firms headquartered in a country	A-	A	B	A-	A	A	D-	B
			62	ISO14	Number of ISO 14001 certified companies per billion dollars GDP (PPP)	B	B-	A	A-	A	A	A	A
63			WEFPRI	World Economic Forum Survey on private sector environmental innovation	B-	B	B-	D	A	A	C	B-	
64			RESCARE	Participation in the Responsible Care, Program of the Chemical Manufacturers Association	C	A	D	A	A	A	A	B	

Component	Indicator Number	Indicator	Variable Number	Variable	Variable Description	Match between variable and issue	Reliability of data source	Variable methodology	Cross-check criteria	Most recent data set	Frequency of update	Spatial coverage	Consistent time series
Social and Institutional Capacity	18	Science and Technology	65	INNOV	Innovation Index	B-	B	C+	A	B	B	B	B
			66	DAI	Digital Access Index	A-	A&B	C	B-	A	U	A	B
			67	PECR	Female primary education completion rate	B	B	B	A-	A	A-	B	A
			68	ENROL	Gross tertiary enrollment rate	C	B+	A	A-	A	A	A-	A
			69	RESEARCH	Number of researchers per million inhabitants	B	B	B	B	A	A	D	B
Global Stewardship	19	Participation in International Collaborative Efforts	70	EIONUM	Number of memberships in environmental intergovernmental organizations	B	B	D	D	A	A-	A	B
			71	FUNDING	Contribution to international and bilateral funding of environmental projects and development aid	B	A	C-	B-	A	B-	A	B-
			72	PARTICIP	Participation in international environmental agreements	B	A	D	A-	A	A	A	B-
	20	Greenhouse Gas Emissions	73	CO2GDP	Carbon emissions per million US dollars GDP	A	B+	B+	A-	A-	A	A-	A
			74	CO2PC	Carbon emissions per capita	A	B+	B+	A-	B+	A	A-	A
	21	Reducing Transboundary Environmental Pressures	75	SO2EXP	SO ₂ exports	A-	B+	B	A/D	A	A/D	D	A/D
76			POLEXP	Import of polluting goods and raw materials as percentage of total imports of goods and services	B	A	C	A	A	A	B	A	

2. Country Data Review Initiative

One of our main objectives is to advance the global availability of reliable, timely, and comparable environmental information for environmental decisionmaking.

For this purpose, we provided our updated data for the 2005 ESI to the environmental ministries and statistical offices of 152 countries, requesting that they review the data for accuracy and provide, where applicable, corrections or recent updates.² We also set up a website through which we were able to provide regular updates and additional information on the ongoing data review process. A total of 62 countries responded to our request. Of these, 25 countries sent us updated and additional data and 14 provided useful feedback on methodological aspects of the ESI. Thirty-nine of the countries also sent us references to reports and websites or informed us that they had no comments on the

data we sent (see Table A.7 for a detailed list of responses).

We also made it clear in our data review that we support the established environmental data collection activities of international institutions, especially the United Nations system of data collections, and requested that responses also be submitted to the respective international organizations compiling the statistics.

We utilized all information from the responses that was consistent with our methodology. Through the metadata provided by countries and follow-up communication with our contacts in the countries we were able to determine the consistency of the data with those provided by international sources. Table C.1 in Appendix C – Variable Profiles provides source information, including country sources where country data were incorporated, for all variables.

Table A.7: Responses by Countries that Provided Data

Country	Data	Reports/ Websites	Commentary	Other
Albania	♦			
Argentina				♦
Australia	♦			
Austria	♦		♦	
Azerbaijan				♦
Belarus				♦
Belgium	♦		♦	
Botswana				♦
Cameroon				♦
Canada	♦		♦	
Costa Rica	♦			
Croatia		♦		
Czech Republic				♦
Denmark		♦		
El Salvador				♦
Estonia		♦		
Finland	♦		♦	
France		♦		
Germany				♦
Greece				♦
Guatemala				♦
Hong Kong				♦
Hungary				♦
Iceland				♦
India				♦
Indonesia		♦		
Ireland	♦		♦	
Israel				♦
Italy	♦			
Japan	♦		♦	
Jordan	♦			
Korea	♦		♦	
Latvia				♦
Lebanon				♦
Lithuania	♦	♦	♦	
Madagascar	♦			
Malawi				♦
Malaysia				♦
Mauritius	♦	♦		
Nepal	♦			
New Zealand		♦		
Nigeria				♦
Pakistan				♦
Philippines		♦		
Poland	♦	♦		
Portugal				♦
Romania		♦		
Singapore	♦			
Slovak Republic			♦	♦
Slovenia		♦	♦	♦
South Africa	♦		♦	
Sweden				♦
Switzerland			♦	
Taiwan	♦		♦	
Thailand		♦		
Trinidad & Tob.				♦
Turkey	♦			
Uganda	♦			
United Arab Em.	♦			
United Kingdom	♦			
United States			♦	
Zimbabwe	♦			
TOTALS	25	13	14	26

(continued)

3. Search for Additional and Better Data

In our attempt to update the ESI with the most recent, comparable, and high-quality data, we searched extensively for data to both improve current proxy variables in the ESI and to fill important gaps in the range of environmental, socio-economic, and institutional topics that the ESI indicators cover.

We carefully reviewed critiques of previous ESI reports and addressed a range of peer review comments to identify issues that are not adequately addressed by the ESI. An important outcome of this review and analysis is the revision of the ESI structure. The 2005

ESI includes 14 new variables, which are allocated to an improved 21-indicator framework. Two indicators – Natural Resource Management and Reducing Environment-Related Natural Disaster Vulnerability – have been added to the 2005 ESI. The Capacity for Debate indicator used in the 2002 ESI has been folded into the Environmental Governance indicator as we became convinced that they track the same phenomenon. The description and logic for each variable is given in Table A.8 while Table A.9 explains the replacements and deletions we have made in the variable composition.

Table A.8: Variable Additions to the 2005 ESI (alphabetical order)

Variable	Variable Description	Units	Logic
AGENDA21	Local Agenda 21 initiatives per million people	Number of Local Agenda 21 initiatives per million people	Local Agenda 21 (LA21) is an international sustainability planning process that provides an opportunity for local governments to work with their communities to create a sustainable future. The number of Local Agenda 21 initiatives in a country measures the degree to which civil society is engaged in environmental governance.
AGSUB	Agricultural subsidies	Percentage of total agricultural GDP (USD) that comes from subsidies	Agricultural subsidies reduce environmental sustainability primarily by creating price distortions, promoting the production of input intensive crops, wasteful use of natural resource inputs; use of marginal and fragile lands, and rent-seeking behavior.
DAI	Digital Access Index	Score between 0 and 1 with higher scores corresponding to better access	The Internet has created a new economy and promoted an unprecedented increase in the amount of environmental information that can be accessed and disseminated worldwide. Access to the Internet thus is important for access to information, stakeholder participation, decisionmaking, and generation of innovative solutions to environmental problems.
DISCAS	Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts	Average number of deaths per million inhabitants	Vulnerability to natural disasters is a function of the severity of the hazard and the resilience of the socioeconomic system to perturbations. High vulnerability, as reflected in large numbers of disaster-related casualties, affects a country's ability to achieve longer-term sustainable development by redirecting resources to disaster recovery and reducing future resiliency.
DISEXP	Environmental Hazard Exposure Index	Average number of hazards to which the population is exposed (between 0 and 4)	Vulnerability to natural disasters is a function of the severity of the hazard and the resiliency of the socioeconomic system to perturbations. High exposure to natural hazards means that resources that could be used to achieve longer-term sustainable development must either be used for preventative measures or for disaster response.
FORCERT	Percentage of total forest area that is certified for sustainable management	Percentage of total forest area that is FSC or PEFC certified	This variable measures the extent to which a country seeks sustainable forestry practices.
GOVEFF	Government effectiveness	Z-score with high values corresponding to high levels of effectiveness	Governmental Effectiveness is defined in this data set as "quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies." It is relevant for environmental sustainability because basic governmental competence enhances a society's ability to monitor and respond to environmental challenges.
GRDAVL	Internal ground water availability per capita	Thousand cubic meters per capita	Surface water is an important part of the picture of a country's water resources. The more groundwater is available per capita, the higher the probability that a country can sustainably manage its groundwater resources, e.g. for agricultural production.
INDOOR	Indoor air pollution from solid fuel use	Percentage of households using solid fuels, adjusted for ventilation	The public health community has drawn attention to the deleterious effects of indoor air pollution, especially on women who cook inside using solid fuels. High exposure to the fumes from solid fuel combustion is dangerous to human health. Solid fuel use has further consequences for deforestation and soil depletion because of dung collection.
IRRSAL	Salinized area due to irrigation as percentage of total arable land	Percentage of total arable land salinized due to irrigation	Soil salinization is a form of land degradation. The transport of salts to the land's surface due to irrigation renders the land unfit for production, and is therefore unsustainable in the long-term.
LAW	Rule of law	Z-score with high values corresponding to high degrees of rule of law	The rule of law is important in terms of establishing the "rules of the game" for the private sector, and for ensuring that violations of environmental regulations are enforced.
OVRFSH	Productivity overfishing	Score between 1 and 7 with high scores corresponding to overfishing	Overfishing of a country's exclusive economic zone is unsustainable.
POLEXP	Import of polluting goods and raw materials as percentage of total imports of goods and services	Import of polluting goods and raw materials as percentage of total imports of goods and services	Countries that import a large volume of commodities that are associated with negative environmental externalities at the point of extraction or processing may not be pursuing an environmentally sustainable path because of the likelihood that their actions are contributing to damage abroad. This measure does not take into account variation in actual environmental externalities within exporting countries, nor does it factor in other relevant imports that are not classified as commodities; as such it should be considered a rough proxy.
RESEARCH	Number of researchers per million inhabitants	Number of researchers per million inhabitants	Scientific capacity is important for the development of new technologies for sustainable environmental management.

The new variables greatly strengthen the ESI's capacity to assess key aspects of environmental sustainability. The gains emerge in some cases through better measures such as the Digital Access Index, which replaces the Number of Internet Hosts per million Inhabitants, or through incorporating a policy element that was previously unaddressed, such as Agricultural Subsidies as a proxy for agricultural sustainability and Indoor Air Pollution from Solid Fuel Use as a proxy for air quality.

In some cases, the new datasets are only rough gauges of issues we wish to track, e.g., overfishing and agricultural subsidies. But they reflect our best effort to produce a useful assessment of very complex concepts and to

capture critical dimensions of sustainability that are often difficult to measure.

For other ESI variables, we could not identify better measures but succeeded in improving their geographical coverage by merging several data sources. In this context, several water and air quality variables were supplemented with information from additional sources. Despite their crucial influence on public health, infrastructure, and associated economic impacts, a real shortcoming exists with respect to ambient air pollution and water pollution. If it were not for their importance, the variables allocated to these two indicators would not have met our criteria for inclusion in the Index.

Table A.9: Summary of Changes in Variable Composition

Variable Replacements	
New in 2005 ESI	Previously in 2002 ESI
Percentage of variables missing from the CGSDI "Rio to Joburg Dashboard"	Percentage of ESI variables in publicly available data sets
Generation of hazardous waste	Radioactive waste
Gross tertiary enrollment rate	Technology Achievement Index
Digital Access Index	Technology Achievement Index
Percentage of total forest area that is certified for sustainable management	FSC accredited forest area as percent of total forest area
Female primary education completion rate	Technology Achievement Index
Participation in international environmental agreements	Percentage of CITES reporting requirements met; Participation in Vienna Convention / Montreal Protocol; Participation in Climate Change Convention
Contribution to international and bilateral funding of environmental projects and development aid	Global Environmental Facility participation; Participation in Montreal Protocol multilateral fund
Freshwater availability per capita	Internal renewable water per capita; Per capita water inflow from other countries
New or Additional Variables or Data Sources	Logic
National Biodiversity Index	Improving the Biodiversity indicator
Percentage of country's territory in threatened ecoregions	Improving the Biodiversity indicator
Threatened amphibian species as percentage of known amphibian species in each country	Improving the Biodiversity indicator
Knowledge creation in environmental science, technology, and policy	Knowledge generation in environmental science and policy facilitates development of innovative environmental technologies and policies
Participation in Responsible Care Program of the Chemical Manufacturer's Association	Voluntary and self-regulatory program of the chemical industry that, albeit non-binding, demonstrates willingness of private sector to take more responsibility for environmental protection and resource management
Waste recycling rates	Waste and consumption intensities can be counter-balanced by high resource recycling rates

Table A.9 continued on next page

New or Additional Variables or Data Sources	Logic
Dissolved oxygen	Increasing geographical coverage
Electrical conductivity	Increasing geographical coverage
Phosphorus concentration	Increasing geographical coverage
Suspended solids	Increasing geographical coverage
Anthropogenic SO ₂ emissions per populated land area	Increasing geographical coverage
Anthropogenic NO _x emissions per populated land area	Increasing geographical coverage
Anthropogenic VOC emissions per populated land area	Increasing geographical coverage
Agricultural subsidies	Important proxy for measuring sustainable agricultural practices
Productivity overfishing	Important proxy for measuring sustainable fisheries management
Local Agenda 21 initiatives per million people	Gauges country's capacity and ability to implement sustainable development strategies at the local level
Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts	Assessing a country's vulnerability to environmental disasters
Environmental Hazard Exposure Index	Assessing a country's vulnerability to environmental disasters
Government effectiveness	Effective government is important for sustainable natural resource use and management
Internal groundwater availability per capita	Supplementing surface water availability
Indoor air pollution from solid fuel use	Indoor air quality is at least as important an environmental health factor as ambient air quality
Salinized area due to irrigation as percentage of total arable land	Proxy for sustainable agricultural practices
Rule of law	Effective law enforcement is important for sustainable natural resource use and management
Number of researchers per million inhabitants	Gauges a country's capacity to generate and adopt innovative technologies and to implement them
Variables deleted	Logic
World Business Council on Sustainable Development memberships	Memberships do not imply tangible actions by private sector
CFC Consumption	CFC consumption successfully regulated under Vienna Convention and Montreal Protocol (and Amendments)
Subsidies for commercial fishing sector	Important but outdated data set
Total marine fish catch	Inadequate measure of transboundary pressure
Seafood consumption per capita	Inadequate measure of transboundary pressure

One solution to the problem of insufficient national data is to use modeling data. If the phenomenon of interest is regional or global in scope, complex modeling systems built on observed input data, for example meteorological records, can achieve astonishing accuracy. The ESI used data from several widely accepted models. The variables for which we adopted model estimates are water availability and water stress (WaterGap model version 2.1e, Kassel University, Germany), excessive acidification (Stockholm Environment Institute at York), long-range air transport of sulfur dioxide (Europe's EMEP program and IIASA), anthropogenic emissions of NO_x, SO₂, and VOCs modeled by the Intergovernmental Panel on Climate Change (IPCC), and

populated land area measured as the area of a country with a population density of at least 5 people per square kilometer. This data set was constructed by CIESIN as part of the Gridded Population of the World GPW version 3 program using nine geospatially referenced input data sets.

Finally, we also received custom-made data sets from two private entities that evaluate corporate sustainability: the EcoValue21 rating from Innovest and the Dow Jones Sustainability Index from the Dow Jones Sustainability Group. These data sets have real limitations as proxies for private sector contributions to environmental sustainability. Notably, they are oriented to the environ-

mental stewardship of large companies and are thus likely to be skewed toward efforts in the developed world. We include these variables to highlight the central role of business in the quest for environmental progress in every society. However, finding better ways to gauge private sector environmental performance must be seen as a high priority.

Despite our efforts to find data or build our own measures, persistent shortcomings exist with respect to long-term local, regional, and global environmental processes such as the evolution of biological diversity in ecosystems, the flux, dispersion, and deposition of long-range air pollution, and the monitoring of global weather, hydrological, and climate processes.

Enormous scientific progress has been made in understanding the functioning of these systems. However, global data availability is lagging behind. We believe that the Environmental Sustainability Index could be improved by including data on several variables, all of which are believed to have significant impact on natural resource use, human health, and ecosystem resilience. Among these variables are emissions of Persistent Organic Pollutants (POPs) as well as emissions of mercury and lead. However, we decided not to include any information on these variables in the Index because of their lack of sufficient quality and coverage. Other measures of importance but lacking data include toxic and solid waste management, wetlands loss, nuclear reactor safety, and sustainable agricultural practices.

Uncertainty and Sensitivity Analysis of the 2005 ESI

Prepared by Michaela Saisana, Michela Nardo, and Andrea Saltelli (Applied Statistics Group), Joint Research Centre of the European Commission

Sensitivity analysis is the study of how output variation in models such as the ESI can be apportioned, qualitatively or quantitatively, to different sources of variation in the assumptions. In addition, it measures how the given composite indicator depends upon the information that composes it. Sensitivity analysis is closely related to uncertainty analysis, which aims to quantify the overall variation in the countries' ranking resulting from the uncertainties in the model input.

A combination of uncertainty and sensitivity analysis can help to gauge the robustness of the ESI, to increase its transparency, and to frame policy discussions. The validity and robustness of the ESI depends on a number of factors including:

- The model chosen for estimating the measurement error in the data, which is based on available information on variance estimation.
- The mechanism for including or excluding variables in the index.

- The transformation and/or trimming of variables during the construction process of the index.
- The type of normalization scheme, such as re-scaling or standardization, applied to remove scale effects from the variables.
- The amount of missing data and the choice of imputation algorithm, in this case Markov-Chain Monte Carlo (MCMC) simulations or the EM algorithm.
- The choice of weights, e.g., equal weights or weights derived from factor analysis and expert opinion models.
- The level of aggregation, at the indicator or the component level.
- The choice of aggregation system, e.g., additive, multiplicative, or multi-criteria analysis.

All these assumptions can heavily influence the ESI country rankings and should be taken into account before attempting an interpretation of the results. The Joint Research Centre

of the European Commission in Ispra, Italy, systematically evaluated the impacts that the above conceptual and methodological choices have on the robustness of the ESI ranking using uncertainty analysis and sensitivity analysis.

Among the chief questions in assessing the robustness of the ESI ranking is how sensitive it is to changes in its structure and aggregation.

While uncertainty arises from all of the items listed above only some are significant and can be measured. The measurement error is unknown for virtually all variables, and the inclusion criteria, transformations and winsorization, and normalization to z-scores were found to negligibly change the country ranks. They are thus excluded from the results presented in this Section.

The output of interest in all tested scenarios of the sensitivity analysis is each country's rank. This is denoted $Rank_c$ for $c = 1, \dots, 146$. The average shift, \bar{R} , in the ranks across countries, is calculated as the average of the absolute differences in countries' rank with respect to the original ESI rank:

$$\bar{R} = \frac{1}{146} \sum_{c=1}^{146} |Rank_{ESI2005,c} - Rank_c|$$

We analyzed the following issues:

1. How do the ESI 2005 ranks compare to the most likely rank under all scenarios?
2. What is the optimal scenario for each country?
3. Which are the most volatile countries and why?
4. What are the major sources of volatility in the ranking?

The sensitivity analysis procedure is a simulation-based procedure that acts on the equations that create the ESI model. Each equation corresponds to one step in the ESI construction. Although a range of methods exists for evaluating output uncertainty (Saltelli, Chan et al. 2000) we choose a Monte Carlo approach because it considers all uncertainty sources

simultaneously. The simultaneity of the approach allows us to capture all possible synergistic effects among uncertain input factors, including their interactions as well as individual effects.

1. Our Approach

All uncertainties are then translated into a set of scalar input factors, which are sampled from their distributions (discrete in the case of triggers, or continuous in the case of imputed data). We specified the following inputs of uncertainty:

1. Imputation: We consider the variance associated with the $m=30$ fully imputed datasets that are generated for each missing datum to construct a distribution centered around the mean. This allows us to study the effect of imputation variability on the ESI ranking.
2. Weighting schemes: We consider an expert opinion model as an alternative weighting scheme to the equal weighting approach used in the original ESI. A sample expert rating of a set of ESI indicators was obtained by averaging the opinion from 17 experts working on a broad spectrum of environmental sustainability and policy issues. (1)
3. Aggregation level: We studied the impact of aggregation at the level of the five components compared to the 21 indicators in the original ESI.
4. Aggregation method: We compare the ESI's linear aggregation model with a non-compensatory multi-criteria model to account for the compensability issue among indicators.

By sampling the input space we obtained some $N=10,000$ combinations of the 4 independent input factors \mathbf{X}^l , $l=1,2,\dots,N$, where N corresponds to the total number of simulations. For each trial sample \mathbf{X}^l , the ESI was computed, generating values for the scalar output variable of interest Y^l , where Y^l was either $Rank_c$, the rank assigned by the index to each country, or \bar{R} , the averaged shift in

countries' rank. Each output vector, \mathbf{Y}^l , is then associated with the corresponding generating input vector \mathbf{X}^l .

For the choice of sampling method we consider simple random sampling, stratified sampling, quasi-random sampling and others (Saltelli, Chan et al. 2000). We use the sampling strategy based on Sobol sequences vectors (LP_τ sequences, (Sobol 1967)), which are quasi random sequences, to produce sample points that best scan the entire space of possible combinations between the input factors (Sobol 1976). Quasi-random sequences are used in place of random points to guarantee convergence of estimates. Moreover, Sobol sequences usually result in better convergence when employed in numerical integration. Bratley and Fox provide a good summary description (Bratley and Fox 1988).

The sequence of \mathbf{Y}^l allows estimation of the empirical probability distribution function (pdf) of the output Y . The distribution reflects the uncertainty of the output due to the uncertainty in the input. Its characteristics, such as the variance and higher order moments, can be estimated with an arbitrary level of precision that only depends on the number of simulations, N .

The present analysis models several inputs of uncertainty simultaneously, which causes the index to be non-linear (Saisana, Tarantola et al. 2005). As argued by practitioners (Saltelli, Tarantola et al. 2000; EPA 2004), robust, "model-free" techniques for sensitivity analysis should be used for non-linear models.

Variance-based techniques for sensitivity analysis are model free and display the following additional properties convenient for the present analysis:

- Exploration of the whole range of variation in the input factors, instead of only sampling factors over a limited number of values, as done in fractional factorial design (Box, Hunter et al. 1978);
- Distinguish main effects (first order) and interaction effects (higher order);
- Easy interpretation and explanation;

- Simultaneous consideration of uncertainty factors;
- Justification of rigorous settings for sensitivity analysis, as is discussed later in this section.

2. Results and Discussion

1. How do the ESI 2005 ranks compare to the most likely ranks under all scenarios?

The uncertainty analysis results of the 146 countries ranks are given in Figure A.1. Countries are ordered by their original ESI 2005 rank.

The original ESI ranks (grey mark) and the Monte Carlo based median ranks (black mark) rarely deviate: In most cases the 5th – 95th percentile bounds overlap the original 2005 ESI rank. For about 90 countries the difference between the ESI rank and the median rank when considering alternative approaches/assumptions is less than 10 positions.

This outcome reinforces the conclusion that the ESI is a fairly robust index. The main source of the variation is the combined effect of imputation and aggregation level. For countries in the first group, the average rank deviation is 7 positions, which increases to 12 positions for the second group and 11 for the third group. Surprisingly, both OECD and non-OECD countries have an average shift in rank of almost 9 positions. These findings indicate that the number of imputations for each country is less important than the imputation model itself.

Five countries have above average differences between the ESI rank and the simulation-based median rank: Mali, Nicaragua, Mongolia, Guinea-Bissau and Syria. The 2005 ESI rank for the first four countries is almost 35 positions higher when compared to their median rank, while the opposite is valid for Syria.

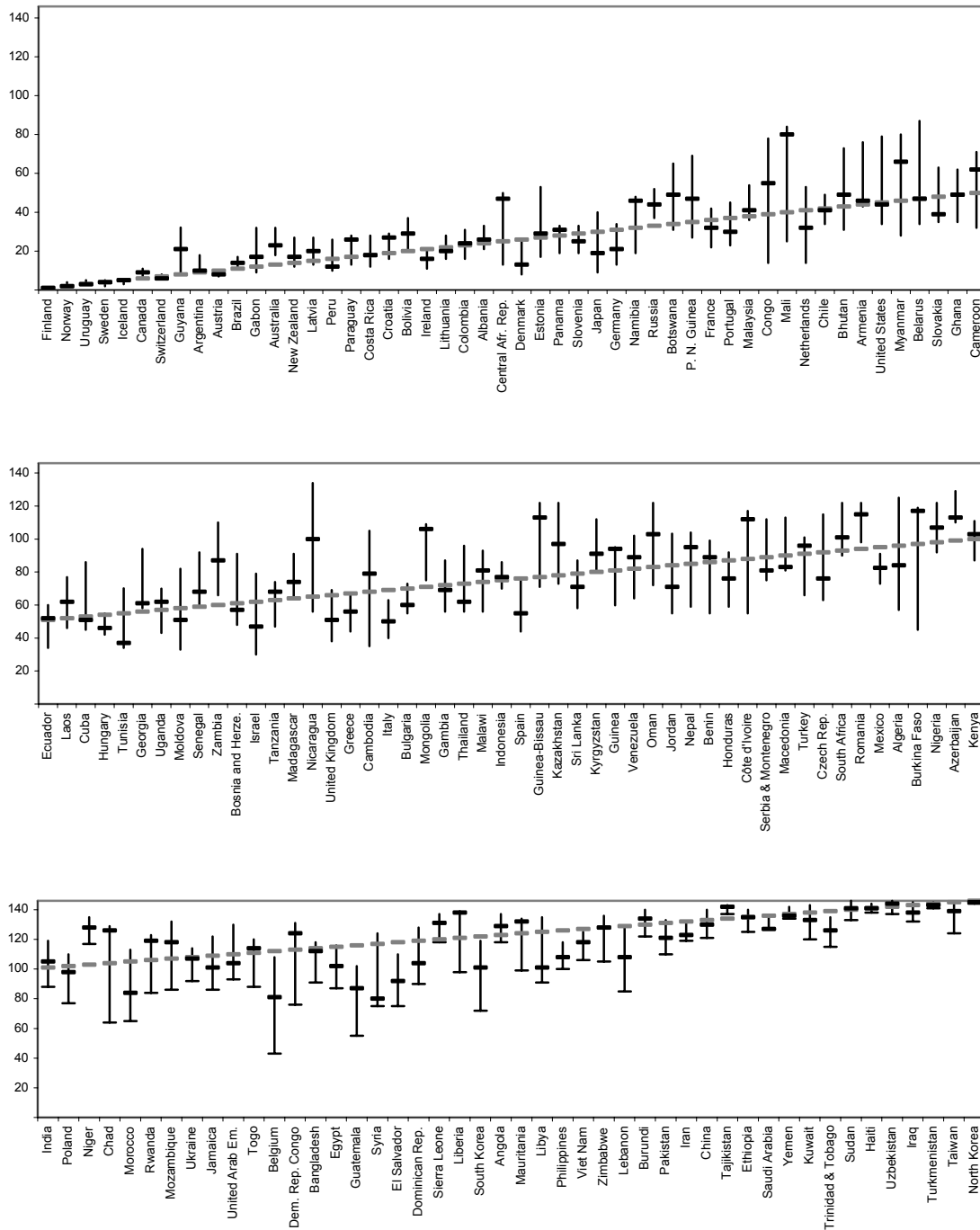


Figure A.1: 2005 ESI Rank v. Median Rank

Note: Grey marks correspond to actual ESI rank and black marks correspond to median rank. Whiskers show 5th and 95th percentiles (bounds) of rank distribution.

Table A.10: 2005 ESI Ranking and Optimal Rank for Each Country under All Combinations of Uncertainty Inputs

Country	2005 ESI Rank	Best Rank	Country	2005 ESI Rank	Best Rank	Country	2005 ESI Rank	Best Rank
Finland	1	1	Cameroon	50	32	Azerbaijan	99	110
Norway	2	2	Ecuador	51	34	Kenya	100	87
Uruguay	3	3	Laos	52	46	India	101	88
Sweden	4	2	Cuba	53	45	Poland	102	77
Iceland	5	3	Hungary	54	42	Niger	103	117
Canada	6	7	Tunisia	55	34	Chad	104	64
Switzerland	7	6	Georgia	56	58	Morocco	105	65
Guyana	8	9	Uganda	57	43	Rwanda	106	84
Argentina	9	9	Moldova	58	33	Mozambique	107	86
Austria	10	7	Senegal	59	59	Ukraine	108	92
Brazil	11	11	Zambia	60	66	Jamaica	109	86
Gabon	12	9	Bosnia & Herze.	61	48	United Arab Em.	110	93
Australia	13	18	Israel	62	30	Togo	111	88
New Zealand	14	12	Tanzania	63	47	Belgium	112	43
Latvia	15	13	Madagascar	64	65	Dem. Rep. Congo	113	76
Peru	16	10	United Kingdom	65	56	Bangladesh	114	91
Paraguay	17	13	Nicaragua	66	38	Egypt	115	87
Costa Rica	18	12	Greece	67	44	Guatemala	116	55
Croatia	19	16	Cambodia	68	35	Syria	117	75
Bolivia	20	20	Italy	69	40	El Salvador	118	75
Ireland	21	11	Bulgaria	70	55	Dominican Rep.	119	90
Lithuania	22	16	Mongolia	71	75	Sierra Leone	120	118
Colombia	23	16	Gambia	72	56	Liberia	121	98
Albania	24	21	Thailand	73	56	South Korea	122	72
Central Afr. Rep.	25	13	Malawi	74	56	Angola	123	118
Denmark	26	8	Indonesia	75	70	Mauritania	124	99
Estonia	27	17	Spain	76	44	Philippines	125	91
Panama	28	19	Guinea-Bissau	77	71	Libya	126	100
Slovenia	29	19	Kazakhstan	78	73	Viet Nam	127	106
Japan	30	9	Sri Lanka	79	58	Zimbabwe	128	105
Germany	31	13	Kyrgyzstan	80	81	Lebanon	129	85
Namibia	32	19	Guinea	81	60	Burundi	130	122
Russia	33	37	Venezuela	82	64	Pakistan	131	110
Botswana	34	31	Oman	83	72	Iran	132	119
P. N. Guinea	35	27	Jordan	84	55	China	133	121
France	36	22	Nepal	85	59	Tajikistan	134	137
Portugal	37	23	Benin	86	55	Ethiopia	135	125
Malaysia	38	36	Honduras	87	59	Saudi Arabia	136	127
Congo	39	14	Côte d'Ivoire	88	55	Yemen	137	134
Netherlands	40	25	Serbia & Montenegro	89	75	Kuwait	138	120
Mali	41	14	Macedonia	90	81	Trinidad & Tobago	139	115
Chile	42	34	Turkey	91	66	Sudan	140	133
Bhutan	43	31	Czech Rep.	92	63	Haiti	141	138
Armenia	44	43	South Africa	93	90	Uzbekistan	142	137
United States	45	34	Romania	94	98	Iraq	143	132
Myanmar	46	28	Mexico	95	73	Turkmenistan	144	141
Belarus	47	34	Algeria	96	57	Taiwan	145	124
Slovakia	48	35	Burkina Faso	97	45	North Korea	146	144
Ghana	49	35	Nigeria	98	92			

2. What is the optimal scenario for each country?

We interpret the 5th percentile of a country's rank distribution as its best rank. We note in Table A.10 that among the first 50 countries the most pronounced improvement in the performance are observed for Congo, the Netherlands, and Japan, which all gain more than 20 positions under a different scenario in the sensitivity analysis.

Among the countries ranked between 51st and 100th in the ESI, the most pronounced improvement under a different structure would have been for Burkina Faso and Algeria (gaining more than 40 positions in the ranking). In particular, Burkina Faso owes its improvement to the imputation, while Algeria improves its rank under aggregation at the indicator level.

Among the lowest ranked 46 countries, Belgium, South Korea and Guatemala display the most pronounced improvement (more than 50 positions). For Belgium and South Korea, this is due to aggregation at the components' level, while Guatemala's rank alters due to imputation.

3. Which countries have the most volatile rankings and why?

In order to provide an estimate of the magnitude of movement in ranks under the different simulation models, we define 'volatility' as the difference between a country's best and worst rank, which are given by the 5th and the 95th percentiles of the rank distribution.

The volatility for the top ten countries, with the exception of Guyana and Argentina, suggests a robust performance for those countries. Guyana's high volatility of 23 positions is mainly attributed to the high variability in the imputation – 28 variables out of the total of 76 have been imputed – and its interaction with the aggregation level. Argentina's volatility of 9 positions is entirely due to imputation, although only 5 variables have been imputed.

Table A.11 presents the 15 countries that are affected the most by the construction procedure of the index. These countries ranked between 13 and 39 and experience differences in their best and worst ranks of 50 to 80 positions.

Only Congo, Mali, Myanmar and Belarus are ranked among the top 50 in the ESI. Their volatility can be attributed mainly to the interaction effect of imputation and aggregation level, as indicated by the Sobol sensitivity indices (1993). In some simulation runs the imputed values are favorable, partly compensating for the low scores in other variables and improving the country's rank. In other runs, however, the imputed value is far below average performance, which lowers the country's position.

4. What are the largest influences on the 2005 ESI?

To answer this question, we focus on the following comparisons:

- Imputation versus no imputation

Table A.11: Most Volatile Countries in the 2005 ESI

Country	Rank ESI	Range of Ranks	Country	Rank ESI	Range of Ranks
Congo	39	14 to 78	Côte d'Ivoire	88	55 to 117
Mali	41	25 to 84	Czech Rep.	92	63 to 115
Myanmar	46	28 to 80	Algeria	96	57 to 125
Belarus	47	34 to 87	Burkina Faso	97	45 to 119
Nicaragua	66	56 to 134	Chad	104	64 to 129
Cambodia	68	35 to 105	Belgium	112	43 to 108
Guinea-Bissau	77	71 to 122	Dem. Rep. Congo	113	76 to 131
Oman	83	72 to 122			

- Expert-weighting versus equal weighting of the 21 indicators
- Aggregation at the components level versus at the indicators level
- Non-compensatory aggregation scheme versus linear aggregation

Imputation

Imputation should be more influential for countries where missing data are a large problem. However, this relationship is not straightforward. Among the countries that miss almost 33% of their observations, only Guinea-Bissau and Myanmar are strongly affected by the imputations (Table A.12). Without imputation, Syria, Algeria, Belgium and the Dominican Republic improve their ranks between 29 and 37 positions. Conversely, Mali, Guinea-Bissau, Myanmar, and Zambia, decline 27 to 43 positions. Overall, the imputation has an average impact of 10 ranks and a rank-order correlation coefficient of 0.949.

Linear Weighting v. Budget Allocation (BA)

The ESI uses equal weights to calculate the country scores from the 21 indicators. As alternative weighting schemes we test a “budget allocation scheme,” in which the weights are obtained from experts with a

demonstrated understanding of environmental sustainability.

For the ESI composite indicator, the 21 experts present at the December 2004 ESI Expert Review Workshop were each given a “budget” of 100 points and asked to allocate them to the 21 indicators according to their personal judgment of the relative importance of the indicators.

Four of those experts assigned zero priority points to a significant number of indicators and were therefore eliminated from the sample. The sets of weights obtained by the 17 remaining experts together with the overall average are listed in Table A.13.

The average expert weighting is slightly different from the equal weighting used in the ESI: the indicators within the Systems and Stresses components were weighted somewhat higher than the indicators within the Human Vulnerability, Social and Institutional Capacity, and Global Stewardship. Nevertheless, the variance of experts’ opinions is rather large, varying from 40-80% of the mean weight. This explains the difference between the ESI ranking and the one provided by Budget Allocation. Overall, the weighting has an average impact of 5 ranks in the simulations and a rank-order correlation coefficient of 0.989 (Table A.14).

Table A.12: Most Improvement with Imputation v. No Imputation.

	Imputation	ESI Rank with Imputation	Rank without Imputation	Change in Rank
Improvement	Syria	117	80	-37
	Algeria	96	64	-32
	Belgium	112	82	-30
	Dominican Republic	119	90	-29
Deterioration	Mali	41	84	+43
	Guinea-Bissau	77	114	+37
	Myanmar	46	76	+30
	Zambia	60	87	+27
Average change over 146 countries:				10

Table A.13: Expert Group Weights for 2005 ESI Indicators

	Experts									
	1	2	3	4	5	6	7	8	9	10
Air Quality	0.03	0.05	0.09	0.14	0.04	0.02	0.03	0.05	0.03	0.02
Biodiversity	0.05	0.09	0.07	0.14	0.05	0.05	0.02	0.05	0.03	0.1
Land	0.05	0.09	0.06	0.14	0.05	0.02	0.04	0.06	0.11	0.05
Water Quality	0.05	0.05	0.09	0.14	0.06	0.02	0.03	0.05	0.03	0.02
Water Quantity	0.05	0.02	0.05	0.02	0.04	0.07	0.04	0.06	0.03	0.1
Reducing Air Pollution	0.06	0.05	0.05	0.02	0.05	0.07	0.08	0.04	0.03	0.1
Reducing Ecosystem Stresses	0.06	0.05	0.06	0.02	0.05	0.05	0.06	0.06	0.03	0.02
Reducing Population Growth	0.04	0.05	0.07	0.02	0.06	0.05	0.08	0.06	0.03	0.02
Reducing Waste & Consumption Pressures	0.06	0.05	0.05	0.02	0.06	0.05	0.08	0.05	0.03	0.05
Reducing Water Stress	0.06	0.05	0.04	0.02	0.06	0.07	0.05	0.05	0.03	0.1
Natural Resource Management	0.07	0.09	0.06	0.02	0.04	0.07	0	0.06	0.05	0.05
Environmental Health	0.05	0.09	0.04	0.02	0.06	0.05	0.05	0.06	0.03	0.05
Basic Human Sustenance	0.05	0.05	0.04	0.02	0.05	0.05	0.05	0.06	0.11	0.05
Reducing Environment-Related Natural Disaster Vulnerability	0.05	0	0.05	0.04	0.06	0.07	0	0.04	0	0.02
Environmental Governance	0.03	0.03	0.03	0.02	0.04	0.05	0.04	0.01	0.14	0.03
Eco-efficiency	0.04	0.02	0.03	0.02	0.04	0.05	0.02	0.05	0.11	0.02
Private Sector Responsiveness	0.03	0.05	0.03	0.02	0.05	0.05	0.06	0.05	0.03	0.05
Science and Technology	0.03	0.05	0.05	0	0.05	0.05	0.06	0.03	0.11	0.05
Participation in International Collaborative Efforts	0.04	0.02	0.03	0	0.04	0.04	0.04	0.02	0.03	0.02
Greenhouse Gas Emissions	0.04	0.02	0.03	0.1	0.06	0.09	0.07	0.05	0.03	0.1
Reducing Transboundary Environmental Pressures	0.06	0.05	0.03	0.06	0.04	0	0.06	0.05	0.03	0.02

	Experts							Average	Equal weighting
	11	12	13	14	15	16	17		
Air Quality	0.05	0.1	0.06	0.06	0.07	0.05	0.1	0.06	0.05
Biodiversity	0.05	0.05	0.06	0.05	0.06	0.05	0.02	0.06	0.05
Land	0.05	0.05	0.02	0.04	0.04	0.05	0.03	0.06	0.05
Water Quality	0.05	0.1	0.02	0.04	0.07	0.05	0.1	0.06	0.05
Water Quantity	0.05	0.05	0.02	0.06	0.03	0.05	0.04	0.05	0.05
Reducing Air Pollution	0.05	0.1	0.05	0.05	0.06	0.05	0.05	0.06	0.05
Reducing Ecosystem Stresses	0.05	0.1	0.08	0.05	0.04	0.05	0.07	0.05	0.05
Reducing Population Growth	0.05	0.01	0.06	0.05	0.05	0.02	0.01	0.04	0.05
Reducing Waste & Consumption Pressures	0.05	0.1	0.08	0.05	0.05	0.05	0.03	0.05	0.05
Reducing Water Stress	0.05	0.03	0.02	0.05	0.06	0.05	0.03	0.05	0.05
Natural Resource Management	0.05	0	0.02	0	0	0.05	0.03	0.04	0.05
Environmental Health	0.03	0.05	0.05	0.06	0.06	0.08	0.02	0.05	0.05
Basic Human Sustenance	0.03	0.05	0.02	0.04	0.05	0.05	0.05	0.05	0.05
Reducing Environment-Related Natural Disaster Vulnerability	0.03	0	0.05	0	0	0.04	0.04	0.03	0.05
Environmental Governance	0.06	0.02	0.01	0.05	0.04	0.06	0.12	0.05	0.05
Eco-efficiency	0.05	0.05	0.08	0.05	0.05	0.05	0.02	0.04	0.05
Private Sector Responsiveness	0.05	0.01	0.06	0.04	0.06	0.05	0.05	0.04	0.05
Science and Technology	0.07	0.05	0.02	0.06	0.04	0.05	0.03	0.05	0.05
Participation in International Collaborative Efforts	0.05	0.01	0.04	0.05	0.05	0.04	0.07	0.03	0.05
Greenhouse Gas Emissions	0.05	0.1	0.08	0.06	0.05	0.04	0.05	0.06	0.05
Reducing Transboundary Environmental Pressures	0.05	0.01	0.08	0.04	0.04	0.04	0.05	0.04	0.05

Table A.14: Most Improvement/Deterioration for Equal Weighting (EW) v. Budget Allocation (BA).

	Weighting	ESI Rank with EW	Rank with BA	Change in Rank
Improvement	Sri Lanka	79	61	- 18
	Niger	103	86	- 17
	Dem. Rep. Congo	113	98	- 15
	El Salvador	118	103	- 15
	Hungary	54	40	- 14
Deterioration	Chile	42	59	+ 17
	United Arab Emirates	110	127	+ 17
	South Africa	93	109	+ 16
	Italy	69	82	+13
	Nicaragua	66	78	+ 12
Average change over 146 countries:				5

Because the experts weighting assigns larger weights to indicators within the Systems and Stresses Components of ESI compared to the remaining indicators, it has a positive impact on the rank of countries such as Sri Lanka and Niger, but a negative effect on others such as the Chile, South Africa or Italy.

Aggregation at the Components Level v. Aggregation at the Indicators Level

In order to further assess the robustness of the ESI, we analyze the possibility of equally weighting the five components Environmental Systems, Reducing Environmental Stresses, Human Vulnerability, Social and Institutional Capacity, and Global Stewardship, instead of the 21 indicators.

Figure A.2 compares the ranking obtained from equally weighting the 21 indicators with those obtained by equally weighting the 5 components (indicators within component receive equal weight). We find that by changing the aggregation level, the average shift of the top 40 and the bottom 30 countries of the ESI 2005 is 7 positions and the shift of the remaining countries averages 11 positions. As expected, mid-level performers display higher variability than the top and bottom of the ranking.

Weighting the five components instead of the indicators affects only 38 countries by more

than 10 positions. The average impact is 8 ranks and the rank-order correlation coefficient remains very high at 0.964.

If component weighting were used in the ESI, Belgium and South Korea would improve their ranks by almost 40 positions (Table A.15). On the contrary, countries such as Congo or Nicaragua would see their ranks decline by some 30 positions.

The reason for these substantial shifts for some countries is due to their relatively good performance in the systems and stresses components, which are more heavily weighted when the aggregation is takes place at the indicators level.

Linear Aggregation v. Non-Compensatory Multi-Criteria

The literature on index development offers a suite of aggregation techniques, including additive methods. However, additive aggregations imply certain properties and requirements for the indicators and the associated weights, which are often not desirable and at times difficult to verify. Other, less widespread, aggregation methods include multiplicative (geometric) and non-linear aggregations such as multi-criteria analysis.

Several authors (Debreu 1960; Keeney and Raiffa 1976; Krantz, Luce et al. 1971) note

that an additive aggregation function for a given set of indicators exists only if these indicators are mutually preferentially independent. Preferential independence is a very strong condition because it implies that the trade-off ratio between two indicators is independent of the values of the remaining indicators (Ting 1971).

In practice, this means that an additive aggregation function allows for the estimation of the marginal contribution of each indicator to the index. This marginal contribution can then be added together to yield a total value.

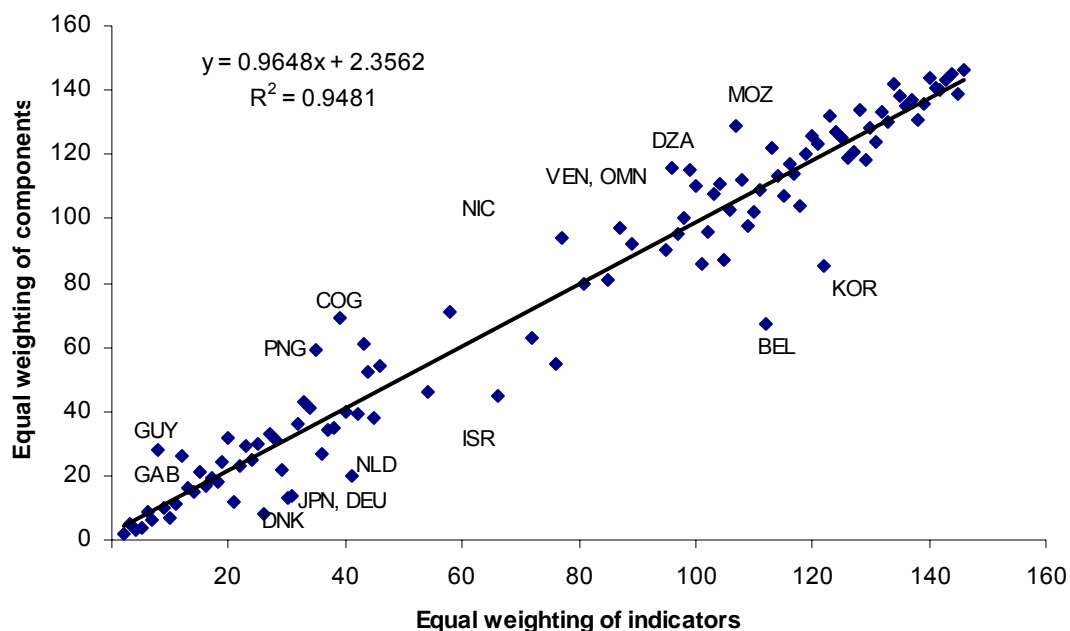


Figure A.2: Equal Weighting of the 21 Indicators v. Equal Weighting of the 5 Components.

Table A.15: Most Improvement/Deterioration in Ranks of Equal Weighting of Indicators (EWI) v. Equal Weighting of Components (EWC).

	Weighting	ESI Rank with EWI	Rank with EWC	Change in Rank
Improvement	Belgium	112	67	- 45
	South Korea	122	85	- 37
	Israel	62	37	- 25
	Italy	69	47	- 22
	Netherlands	40	20	- 20
Deterioration	Congo	39	69	+ 30
	Nicaragua	66	93	+ 27
	P. N. Guinea	35	59	+ 24
	Venezuela	82	106	+ 24
	Oman	83	105	+ 22
Average change over 146 countries:				8

However, it is unrealistic to assume that no synergies exist among the indicators of the ESI (Funtowicz, G. et al. 1990). The combined impact of the acidifying substances SO₂, NO_x, NH₃ and O₃ on plant growth, for example, is substantially more severe than the (linear) addition of the impacts of each of these substances alone would be (Dietz and Straaten 1992).

Furthermore, linear aggregation entails full compensability: a poor performance in some indicators can be compensated by a good performance in others. Yet not everybody would trade an increase in the 'Participation in International Collaborative Efforts' indicator with a decrease in the 'Biodiversity' indicator. Taken to its extreme, full compensability implies that weights become substitution rates (e.g., how much 'Biodiversity' can be traded against 'Participation'), and do not indicate the importance of the indicator with which they are associated.

This means that a potential inconsistency exists between the way the weights are used and their theoretical meaning. For the weights to be interpreted as "importance coefficients" (e.g. place the greatest weight on the most important "dimension"), non-compensatory aggregation procedures should be used to construct composite indices (Podinovskii 1994). This can be done using a non-compensatory multi-criteria approach

A Non-Compensatory Multi-Criteria Approach (NMC)

A non-compensatory multi-criteria approach (NMC) is based on mathematical aggregation conventions that can be divided into two main steps, the pair-wise comparison of countries according to the whole set of indicators used and the ranking of countries in a complete pre-order.

The result of the first step is an (M×M) matrix where M corresponds to the number of countries, commonly termed outranking matrix (Arrow and Raynaud 1986; Roy 1996). The information in the outranking matrix is used in the second step taking into consideration the intensity of preference (i.e., the

difference in rank between countries for a given indicator); the number of indicators in favor of a given country; the weight attached to each indicator; and the relationship of each country with respect to all the other countries.

There are several ranking procedures for this second step (Young 1988). One possible algorithm is derived from the Condorcet-Kemeny-Young-Levenglick (CKYL) ranking procedure (Munda and Nardo 2003a). According to CKYL, the ranking of countries with the highest likelihood is the one supported by the maximum number of indicators for each pair-wise comparison, summed over all pairs of countries considered. The multi-criteria method has the advantage of overcoming some of the problems inherent in additive or multiplicative aggregations: preference dependence between indicators, and the meaning of trade-offs given to the weights. Furthermore, both qualitative and quantitative information can be treated simultaneously. In addition, the approach does not require any transformation of the raw data, such as truncation, logarithmic transformation or normalization to assure the comparability of indicators.

Figure A.3 compares the results of the non-compensatory multi-criteria method with the ranking of the original ESI. In both cases we weight all 21 indicators equally. It is apparent that the aggregation method primarily affects the mid-range countries and, to a lesser extent, the laggards. Overall, the aggregation scheme has an average impact of 8 ranks and a rank-order correlation coefficient of 0.962, very similar to the impact of weighting the components instead of the indicators. In particular, while the top 50 countries move an average of only 5 positions, the next 50 countries' volatility averages 12 positions, and the lowest 46 countries shift ranks on average by 8 positions.

Both aggregation schemes, therefore, produce comparable rankings (the R² is 0.92). Using the NMC, only 43 out of 146 countries display a change of more than 10 positions and none of these countries is in the top 30.

When compensability among indicators is not allowed, countries performing poorly on a number of indicators decline in rank while countries with moderate values tend to improve their situation. Table A.16 shows the countries displaying the largest variation in their ranks.

3. Conclusions

We can assess the validity of the ESI rankings by evaluating how sensitive they are to the assumptions that have been made in the structure and aggregation of the indicators. Uncertainty and sensitivity analysis allows us to assess the impact of four main methodological sources of uncertainty: variability in the imputation of missing data, equal versus

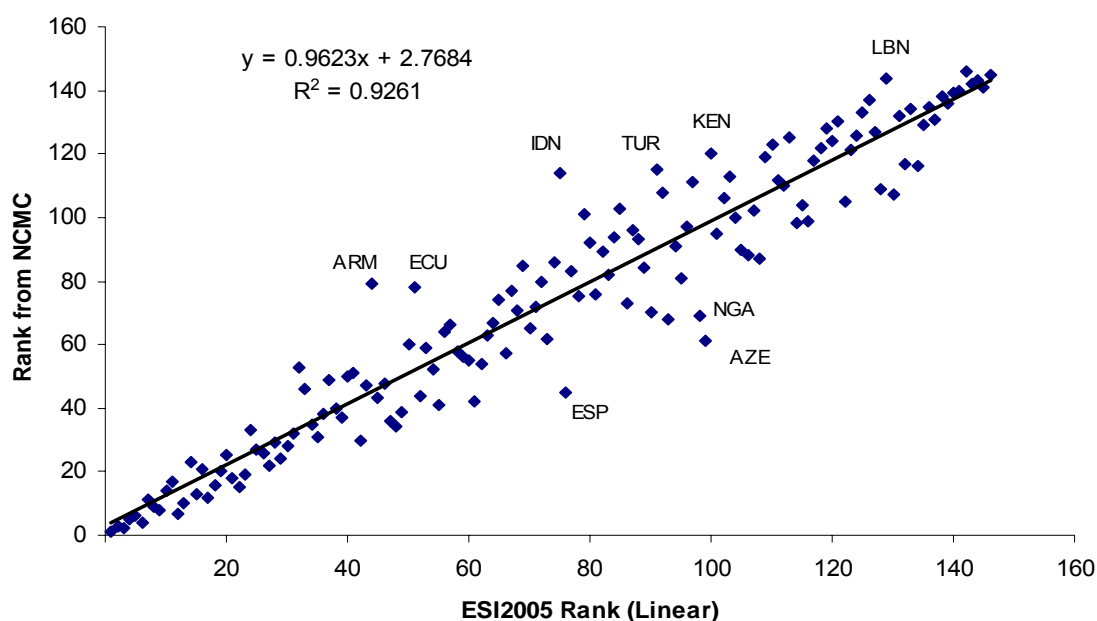


Figure A.3: Linear Aggregation of Indicators v. Non-Compensatory Multi-Criteria (NCMC) Aggregation of Indicators

Table A.16: Most Improvement/Deterioration in Ranks of Linear Aggregation (LIN) v. Non-Compensatory Multi-Criteria (NCMC) Aggregation.

	Aggregation	ESI rank with LIN	Rank with NCMC	Change in Rank
Improvement	Azerbaijan	99	61	- 38
	Spain	76	45	- 31
	Nigeria	98	69	- 29
	South Africa	93	68	- 25
	Burundi	130	107	- 23
Deterioration	Indonesia	75	114	+ 39
	Armenia	44	79	+ 35
	Ecuador	51	78	+ 27
	Turkey	91	115	+ 24
	Sri Lanka	79	101	+ 22
Average change over 146 countries:				8

experts opinion weighting of indicators, aggregation at indicators versus at components level, and linear versus non-compensatory aggregation scheme. The main findings can be summarized as follows:

Which countries have the most volatile ranks and why? The top ten ranking countries in the ESI all have modest volatility (2 to 4 positions) with the exceptions of Guyana (23 positions) and Argentina (9 positions). This small degree of sensitivity implies a robust evaluation of performance for those countries. Guyana's high volatility is mainly attributed to imputation (28 variables out of 76 have been imputed) and its combined effect with the choice of the aggregation level. Argentina's volatility is entirely due to imputation, although only 5 variables have been imputed. The countries that present the highest volatility (between 50 and 80 positions), are found between rank 39 (Congo) and rank 113 (Dem. Rep. Congo).

Would the ESI be more stable if no imputation had been carried out? Imputation should be more influential for countries where missing data are a large problem. However, this relation is not straightforward. Among the countries that are missing almost 33% of the observations, only Guinea-Bissau and Myanmar are highly impacted by imputation. If no imputation were carried out, Syria, Algeria, Belgium and Dominican Republic could improve their ranks by 9 to 37 positions. Conversely, Mali, Guinea-Bissau, Myanmar and Zambia would decline in the ranking by 27 to 43 positions. Overall, imputation changes a country's rank by 10 positions on average.

What if a "non-compensatory" aggregation scheme had been used, instead of the linear aggregation scheme? Aggregation schemes matter mainly for the mid-performing coun-

tries. When the assumption of compensability among indicators is removed, countries having very poor performance in some indicators, such as Indonesia or Armenia, decline in rank, whereas countries with fewer extreme values, such as Azerbaijan or Spain, improve their position. Overall, the aggregation scheme methodology has an average impact of 8 ranks.

What if aggregation had been applied at the component level instead of at the indicator level? Weighting the five components equally has little effect on most countries, with a few significant exceptions. Belgium and South Korea would rise by almost 40 positions in the ranking if aggregation were done at the component level rather than the indicator level. Conversely, Congo and Nicaragua would fall by 30 positions. The reason for this effect lies in the fact that aggregation at the component level gives added weight to components with fewer indicators, such as Human Vulnerability and Global Stewardship. Overall, the level at which aggregation to the ESI takes place has an average impact of 8 ranks, similar to the impact of the aggregation scheme.

What if a set of expert-derived weights had been used for the 21 indicators instead of the equal weighting? An alternate weighting obtained by surveying the experts at the December 2004 ESI Review Meeting assigns slightly higher values to indicators within the Systems and Stresses Components of ESI and less to the remaining indicators. Using these weights has a pronounced positive effect on the rank of a few countries such as Sri Lanka and Niger, but a negative effect on others such as Chile, South Africa, or Italy. Overall, the analysis shows only a small sensitivity to the weighting assumption with an average impact of 5 ranks.

Statistical Analyses of the ESI for Policy Conclusions

1. Principal Component Analysis

Principal component analysis is a statistical method for identifying the key drivers or dimensions in a multivariate model. It is a useful tool to investigate the relationships between the 21 indicators in the ESI. This section describes in greater detail the steps and statistical assumptions underlying the method, followed by the results of applying principal component analysis to the ESI.

Principal component analysis is designed to summarize a p -dimensional dataset into a smaller number, q , of dimensions while preserving the variation in the data to the maximum extent possible. The objective to maximize the amount of variance explained is equivalent to losing as little of the information in the data as possible. The q new dimensions are constructed such that:

1. They are linear combinations of the original variables.
2. They are independent of each other.
3. Each dimension captures a successively smaller amount of the total variation in the data.

The number of linear combinations of variables can theoretically range from none to all p variables but the goal is to find the q ($0 < q < p$) of linear combinations of the p variables that “best” summarize the information in the data.

While principal component analysis provides considerable flexibility in determining q , the objective is to capture those features in the data that help better understand an issue of interest or to discover interesting new patterns among the relationships between variables.

The p original variables are combined into q linear combinations, which form the new principal components of the system. A standardized linear combination Z_1 of a data vector, $X_1 = (X_{11}, X_{12}, \dots, X_{1p})$, of length p is defined as:

$$Z_1 = w_1' X_1, \text{ where } \sum_{i=1}^p w_i^2 = 1$$

Principal component analysis chooses the weights by determining the linear combination of all p variables in the transformed data set that maximizes the variance of the data. That is, the vector w of weights is calculated such that the squared difference of the new variable values and their respective means is maximized in relation to the total variance of the untransformed data.

The results for w_1 determine the first principal component. The second principal component with weights w_2 is then obtained analogously by maximizing the variance orthogonal to the direction of the first component. The third principal component with weights w_3 maximizes the residual variance in the direction orthogonal to the first and second components, and so forth.

The orthogonality of the principal components means that they are statistically independent. For example, if all water indicators of the ESI formed one principal component and all air emission indicators formed another, then any changes in either set of indicators would have no impact on the other.

The consecutive process of maximizing residual variance implies that at every step less variance is remaining. Once it falls below a specified threshold, the procedure is halted and no more additional principal components are calculated. Several criteria exist to determine the threshold value. One method considers the eigenvalues of the data matrix. The eigenvalue, λ , is the value that solves the equation

$$X_{corr} a = \lambda a,$$

where X_{corr} is the $(p \times p)$ correlation matrix calculated from the data for n countries and p variables and a is a vector in $\mathfrak{R}^p \neq 0$.

The eigenvalues, $\lambda_1, \dots, \lambda_p$ decrease in magnitude: $\lambda_1 > \lambda_2 > \dots > \lambda_p$. The first λ_j that is less than 1 corresponds to the j^{th} principal

component that explains less variance than is contained in the original, untransformed data. Values $\lambda < 1$ therefore indicate that there is no gain to be expected from adding the principal component to the set of selected components. The first $(i-1)$ components are sufficient to summarize the data.

Another rule of thumb for determining the number of principal components is to plot the eigenvalues in decreasing order and to connect the values in the plots by straight lines. The resulting plot is called a scree plot and usually has the form of an “elbow”, starting from larger eigenvalues and dropping quickly to a lower value after which the decrease is more gradual until all p principal components are added to the system. The point where the transition from strong decrease in λ_i to λ_{i+1} to a more gradual decline occurs is often chosen for q . This “elbow” criterion generally tends to yield fewer components than the $\lambda < 1$ criterion.

A third approach using the Longman-Allen values builds on the fact that in a random multivariate normal distribution, all eigenvalues should be of approximately the same size. A random p dimensional normal data set is generated and the eigenvalues calculated. They are added to the scree plot. All eigenvalues of the original data matrix X that lie above the Longman-Allen values signify principal components that represent non-random information in the data and should therefore be retained.

In the analysis of the ESI indicator data, we use eigenvalues and the scree plot to specify the number of principal components for the 21 indicators. The resulting factor loadings of the indicators on each principal component indicate their importance, i.e., the higher the loading of an indicator, the more useful it is for explaining variation in the direction of the principal component. Variables with similarly large loadings on the same principal component can be interpreted as being related along

the direction of this component. The interpretation for the ESI is that these variables measure latent concepts such as air or water quality.

As noted earlier, the loadings from principal component analysis can also be treated as inherent weights of the variables or indicators for the aggregation process. As statistically derived weights they can be compared with:

1. The equal weights chosen for the ESI at both the variable and the indicator level.
2. The preferences a panel of experts would give to the 21 indicators of the ESI.

The uncertainty and sensitivity analysis in this Appendix analyzes the differences in these approaches with respect to the resulting ESI values and ranks.

Results of the Principal Component Analysis

Our results indicate the existence of six principal components for the 21 indicators, which explain more than 76% of the variation in the data. Although the number of components selected depends to a certain extent on the decision criteria chosen to determine the cut-off point for adding more components, the scree-plot, $\lambda > 1$, and explained variance criteria all support the choice of six principal components (see Table A.17 and Figure A.3 for a summary of the results).

After deciding to keep six principal components in the model, we need to repeat the model to re-allocate the indicator loadings on the selected components. For better interpretability of the results, we choose a Varimax rotation, which rotates the principal components in six-dimensional space in such a way that maximizes each indicator's loadings on only one of the six directions. After 36 iterations the rotation algorithm has converged and the rotated component matrix is shown in Table A.18.

Table A.17: Determining the Number of Principal Components – Cumulative Variance Explained.

Principal Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	7.57	36.07	36.07
2	2.96	14.07	50.14
3	2.22	10.55	60.69
4	1.20	5.70	66.39
5	1.11	5.30	71.69
6	1.02	4.84	76.53
7	0.67	3.21	79.75
8	0.65	3.08	82.82
9	0.57	2.72	85.54
10	0.53	2.53	88.07
11	0.47	2.24	90.31
12	0.37	1.75	92.06
13	0.32	1.54	93.59
14	0.26	1.25	94.84
15	0.21	0.99	95.83
16	0.20	0.96	96.79
17	0.19	0.92	97.70
18	0.16	0.75	98.45
19	0.14	0.64	99.09
20	0.10	0.49	99.58
21	0.09	0.42	100.00

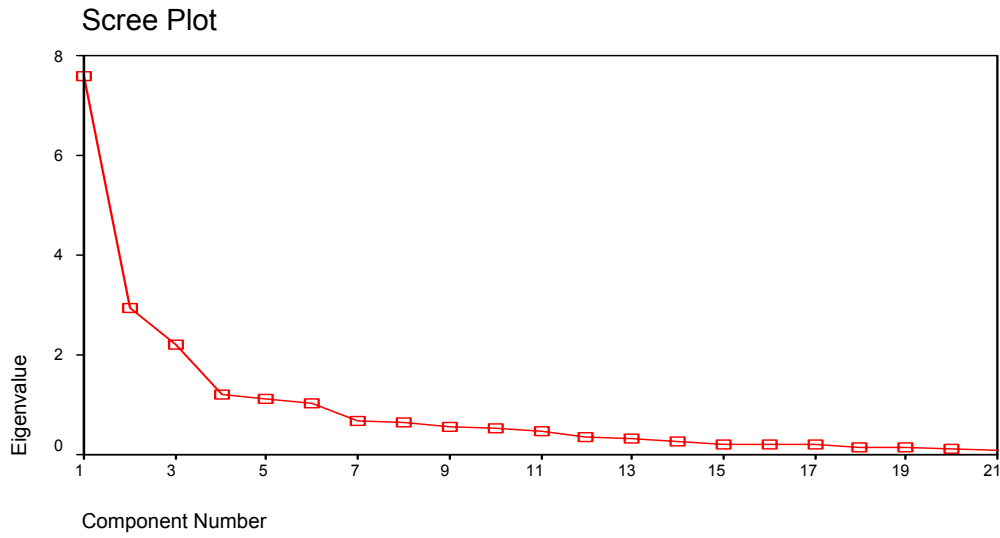


Figure A.4: Scree plot of Eigenvalues v. Principal Components

Table A.18: Rotated Component Loading Matrix

Indicator	Principal Component						Weights (scaled to 1)
	1	2	3	4	5	6	
Air Quality	0.17	-0.81	0.06	-0.1	0.27	0.19	0.05
Biodiversity	-0.20	0.32	0.15	0.04	0.59	-0.40	0.04
Land	-0.41	0.27	0.41	-0.5	0.22	-0.30	0.05
Water Quality	0.41	-0.08	0.71	-0	0.16	0.06	0.04
Water Quantity	-0.08	0.17	0.84	-0.1	0.01	-0.10	0.05
Reducing Air Pollution	-0.67	0.48	0.25	-0.1	0.12	0.11	0.05
Reducing Ecosystem Stresses	-0.14	-0.18	0.02	-0.8	0.00	0.07	0.05
Reducing Population Growth	0.54	-0.65	0.06	0.03	-0.20	-0.10	0.05
Reducing Waste and Consumption Pressures	-0.32	0.37	-0.14	0.51	-0.10	0.18	0.03
Reducing Water Stress	-0.55	0.38	0.47	0.16	0.26	0.10	0.05
Natural Resource Management	-0.72	-0.07	0.30	0.3	-0.10	-0.20	0.05
Environmental Health	0.70	-0.43	0.17	0.12	-0.30	-0.10	0.05
Basic Human Sustenance	0.68	-0.53	0.00	-0.1	-0.10	-0.20	0.05
Reducing Environment-Related Natural Disaster Vulnerability	0.07	-0.32	0.08	-0.1	0.81	0.14	0.05
Environmental Governance	0.86	-0.11	0.23	0.2	0.03	0.00	0.05
Eco-Efficiency	0.08	0.77	0.39	0.18	-0.10	0.15	0.05
Private Sector Environmental Responsiveness	0.89	-0.10	0.01	0.07	0.09	0.00	0.05
Science & Technology	0.79	-0.49	0.10	-0.1	-0.10	-0.10	0.06
Participation in Global Collaborative Efforts	0.76	0.34	0.04	0.05	0.00	-0.10	0.05
Greenhouse Gas Emissions	-0.07	0.80	0.20	0.22	0.04	0.33	0.05
Reducing Transboundary Air Pollution	-0.17	0.21	0.01	0.02	0.01	0.83	0.05

Rotation method: Varimax with Kaiser Normalization

* Absolute value

>=0.75* >=0.5* >=0.25*

From Table A.17 we already expected that most indicators would load highly on the first, second, and third principal component because they have the highest eigenvalues. Since the eigenvalues are calculated using the correlation matrix of the input data, they represent the variance explained by each principal component.

The factor loadings matrix highlights which indicators load together on the same component as well as which indicators do not load strongly on any of the six components.

The results demonstrate several important characteristics of the ESI: Firstly, the ESI is a multidimensional index and environmental sustainability is a multidimensional concept. Although the number of principal components is smaller than the number of ESI indicators,

six components are required to capture at least 75% of the variation in the data. The rotated principal components also load strongly on distinct sets of indicators, which corroborates our assumption that if the ESI were based on a small number of indicators such as the Human Development Index (HDI) produced by the United Nations Development Program (UNDP), it would not fully describe all dimensions of environmental sustainability.

Secondly, the analysis of the component loadings matrix in Table A.18 above suggests that some indicators relate more closely to each other than others. These sets of indicators have high loadings on the same principal component and in the same direction along the component.

Thirdly, since no indicator has low loadings on all six principal components, we can conclude that none of them is redundant in the calculation of the ESI.

Principal component 1 is determined predominantly by indicators belonging to the Social and Institutional Capacity component: Environmental Governance, Private Sector Environmental Responsiveness, Science & Technology, and Participation in Global Collaborative Efforts are the most influential indicators of this principal component. They are among the most influential indicators in the dataset, a result that confirms the findings of the correlation analysis, which also demonstrates that Environmental Governance and Participation in International Collaborative Efforts correlate most significantly with the overall ESI.

Aside from governance, principal component 1 is dominated by the indicators Natural Resource Management, Reducing Air Pollution, and Reducing Water Stress.

Other interesting findings exist for components 2 through 6. While the second component correlates strongly with several ESI indicators; most prominently with Air Quality, Eco-efficiency, and Greenhouse Gas Emissions; the remaining four components are determined by only one or two indicators. Given that all axes are orthogonal to each other, this means that the indicators loading on principal components 3 to 6 measure distinctly different aspects of environmental sustainability than are captured by components 1 and 2.

Component 3, for example, correlates most significantly with the quantity and quality of country's water resources as measures by Water Quality and Water Quantity.

Component 5, on the other hand, highlights clearly the importance of the new Vulnerability to Environment-Related Natural Disasters indicator. This indicator assesses a country's vulnerability to natural disasters that have a strong climate and weather component such as droughts, floods, and tropical cyclones. High losses of human and economic capital due to natural disasters reflect not only a natural

geography-related susceptibility of the country to adverse catastrophic natural events but also a lack of capacity to prepare and deal with such events. The sixth dimension is dominated by the environmental impact countries have on other countries, as measured through the Reducing Transboundary Environmental Pressures indicator. It thereby emphasizes the importance of an indicator that is difficult to measure but vitally important to the overall sustainability picture.

The second important application of principal component analysis to the ESI consists of its ability to determine the statistical weights of the indicators. We calculate the weights of the 21 indicators as follows. Using the Varimax rotated component loading matrix, the six factor loadings of each indicator were squared to avoid negative weights and added together, thereby reflecting the total squared loadings across the six principal components. The sum of squared loadings for the 21 indicators was then re-scaled so that the final weights add up to 1. If an indicator has comparatively strong capacity to explain the variation in the data, it would be expected to receive a relatively high weight, and vice versa.

The weights estimated through principal component analysis for the 21 indicators are nearly identical, representing approximately 1/21. This finding lends further support to the choice of equal weights on the indicator level for calculating the ESI and supports the finding of the uncertainty and sensitivity analysis that budget allocation and the multi-criteria decision model do not substantially affect the ESI ranks. It should be noted, however, that weights estimated through principal component analysis reflect the average weight of each indicator, not the set of weights any particular country might apply in efforts to prioritize environmental policy.

2. Stepwise Linear Regression Analysis

Stepwise linear regression is an iterative regression method that determines the most influential variables among a set of variables. The three standard types of performing

stepwise linear regression are *forward*, *backward*, and *exhaustive*. Although each method is built on the same objective of identifying the most powerful predictors in a regression model, the methods can lead to different answers.

Forward stepwise regression starts with a “zero-model” and adds one variable at a time. The variables with the highest R^2 are retained in the model and the search starts again for the next most powerful predictor, and so forth until all variables have been added. Cut-off values can be set to exclude those variables that do not add to the explanatory power of the model and to terminate the process once a desirable R^2 has been reached.

Backward stepwise regression is similar to the forward method but starts with the full model, i.e., all variables in the regression model. It then removes one variable at a time and excludes the variable that causes the smallest decrease in R^2 . It then starts again removing one variable at a time, excluding the next worst predictor, and so forth until no more variables are left. Cut-off values can be set so as to avoid discarding useful variables and to prevent the model R^2 falling below a desirable level.

Exhaustive stepwise regression is a combination of the two methods above in that it adds and removes variables to find the best combination of predictors. This method is computationally much more intensive, especially as the number of variables in the data set increases, but has the advantage of performing the most extensive search for the best predictors.

We apply an exhaustive stepwise regression model to determine which of the 76 ESI

variables are the most useful predictors of the ESI.

For the variable model, we set the entry level of significance to 0.05, i.e., for a variable to be included in the model, it must explain at least 5% of the ESI's variance. The level of significance to remain in the model is set to 0.10 or 10% of the variance in the ESI. After 45 iterations of the procedure no more change in the model composition occurs. Based on the adjusted R^2 value statistic we select a model with 12 variables, which cumulatively explain approximately 89% of the variation in the ESI.

The selected variables and summary statistics summary are shown in Tables A.19 and A.20. Overall, Air Quality, Imports of Polluting Goods, Water Quality and Quantity, Environmental Governance, Fertility Rates, High Anthropogenic Land Conversion, and Deaths from Natural Disasters are the most important predictors for the ESI. The results thereby confirm the studies that have focused on “governance” as a critical driver of policy success (Esty and Porter 2001) but also suggest that environmental quality and stresses have important implications for the ESI scores.

It should be noted, however, that due to differential weighting of variables in the global Index, the importance of the variables as determined by statistical analysis is somewhat confounded with the magnitude of the implicit weights for each variable. Implicit weights for individual variables range from 1/42 for variables in indicators with only two variables (such as Water Quantity and Eco-Efficiency) to 1/252 for the 12 variables in the Environmental Governance indicator.

Table A.19: Summary of Stepwise Regression Variable Selection (Transformed variables)

Model		Unstandardized Coefficients			
Variable	Variable Description	beta	Std. Error	t	p-value
(Constant)	Intercept	49.88	0.23	216.61	<0.0001
DISRES	Child death rate from respiratory infections	2.17	0.35	6.29	<0.0001
WATAVL	Water availability per capita	3.23	0.28	11.70	<0.0001
WEFGOV	World Economic Forum Survey on environmental governance	4.37	0.40	11.00	<0.0001
COALKM	Coal consumption per populated land area	1.91	0.34	5.69	<0.0001
FERTHA	Fertilizer consumption per hectare of arable land	1.67	0.33	5.03	<0.0001
POLEXP	Import of polluting goods and raw materials as percentage of total imports of goods and services	1.50	0.26	5.73	<0.0001
WQ_DO	Dissolved oxygen concentration	1.48	0.33	4.51	<0.0001
TFR	Total Fertility Rate	2.51	0.37	6.75	<0.0001
ANTH40	Percentage of total land area (including inland waters) having very high anthropogenic impact	1.93	0.35	5.59	<0.0001
GASPR	Ratio of gasoline price to world average	1.32	0.32	4.19	<0.0001
SO2KM	Anthropogenic SO ₂ emissions per populated land area	1.23	0.35	3.55	<0.0001
DISCAS	Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts	0.81	0.26	3.14	<0.001

Table A.20: Stepwise Regression Model Summaries for 1 to 12 Variables.

Model	R ²	Adjusted R ²	Std. Error of the Estimate	Change Statistics				
				R ² Change	F Change	df1	df2	Sig. F Change
1	0.35	0.35	6.84	0.35	78.72	1	144	0
2	0.55	0.55	5.7	0.2	64.03	1	143	0
3	0.68	0.67	4.85	0.13	55.63	1	142	0
4	0.74	0.73	4.39	0.06	32.14	1	141	0
5	0.77	0.76	4.12	0.03	20.3	1	140	0
6	0.8	0.79	3.86	0.03	20.47	1	139	0
7	0.83	0.82	3.56	0.03	25.13	1	138	0
8	0.85	0.84	3.36	0.02	18.5	1	137	0
9	0.87	0.86	3.15	0.02	19.85	1	136	0
10	0.89	0.88	2.96	0.02	19.26	1	135	0
11	0.89	0.89	2.87	0.01	8.88	1	134	0
12	0.9	0.89	2.78	0.01	9.87	1	133	0

3. Cluster Analysis

Cluster analysis is a statistical technique used to separate a large group of objects into sub-groups with similar characteristics. We use this technique to identify groupings of relevant peer countries.

Within each peer group, countries have a better basis for benchmarking their environmental performance because the group

members are the most homogeneous with respect to their ESI indicators and the differences across the groups are maximized.

Using the ESI indicators to determine peer groups of countries for finding common benchmarks for performance evaluation is of enormous value. Cluster analysis helps to advance this process by grouping beyond level of development alone. In doing so, it enables

countries to identify others who are similarly situated – thus providing a good place to start in the search for best practices.

We tested hierarchical agglomerative and divisive clustering methods as well as different distance metrics but found that Ward's method of agglomerative clustering consistently produced the best results.

A feature of agglomerative clustering is that it starts with as many individual clusters as there are countries. It then successively combines countries that are most similar to each other with respect to a quantitative similarity measure until all countries are joined in a single cluster. The similarity measure decreases during this process, while the within-cluster dissimilarity increases as more and more countries are added. The trade-off lies therefore in choosing a similarity measure, or

“pruning value”, that yields both a relatively small number of clusters and a high level of similarity. We determine that 7 clusters yield a reasonable division between the countries.

Another clustering method, we use the k means algorithm developed by Hartigan and Wong (Hartigan and Wong 1979) to determine cluster membership of the countries. K means is a non-hierarchical method that requires that the number of clusters, k , be specified upfront (hence the preliminary use of Ward's method). It then iteratively finds the disjoint partition of the objects into k homogeneous groups such that the sum of squares within the clusters is minimized. The algorithm converges in fewer than 1000 iterations. The cluster membership is shown in Table A.21. Table A.22 provides additional cluster information.

Table A.21: Cluster Membership for k Means Clustering

Low system and stress scores; low vulnerability and high capacity; moderate stewardship	Moderate system and stress scores; high vulnerability and low capacity; above average stewardship	Above average system score; low vulnerability; high capacity; moderate stresses and stewardship	Moderate system, stresses, and capacity scores; low vulnerability and stewardship	Above average system score, moderate stresses, vulnerability, capacity, and stewardship	Moderate system, stresses, and vulnerability scores; low capacity and stewardship	Low system score; moderate stresses, vulnerability, capacity, and stewardship
Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Austria	Angola	Australia	Bosnia & Herze.	Argentina	Algeria	Albania
Belgium	Benin	Canada	Bulgaria	Bolivia	Armenia	Bangladesh
Denmark	Bhutan	Finland	Croatia	Botswana	Azerbaijan	China
France	Burkina Faso	Iceland	Czech Rep.	Brazil	Belarus	Cuba
Germany	Burundi	New Zealand	Estonia	Chile	Iraq	Dominican Rep.
Ireland	Cambodia	Norway	Greece	Colombia	Kazakhstan	Egypt
Israel	Cameroon	Sweden	Hungary	Costa Rica	Kuwait	El Salvador
Italy	Central Afr. Rep.	United States	Jamaica	Ecuador	Kyrgyzstan	Georgia
Japan	Chad		Latvia	Gabon	Libya	India
Netherlands	Congo		Lebanon	Guatemala	Moldova	Indonesia
Portugal	Côte d'Ivoire		Lithuania	Guyana	Mongolia	Iran
Slovenia	Dem. Rep. Congo		Macedonia	Honduras	North Korea	Jordan
South Korea	Ethiopia		Poland	Namibia	Oman	Malaysia
Spain	Gambia		Romania	Nicaragua	Russia	Mexico
Switzerland	Ghana		Serbia & Montenegro	Panama	Saudi Arabia	Morocco
Taiwan	Guinea		Slovakia	Paraguay	Turkmenistan	Pakistan
United Kingdom	Guinea-Bissau		Trinidad & Tobago	Peru	Ukraine	Philippines
	Haiti		Turkey	Uruguay	United Arab Em.	South Africa
	Kenya			Venezuela	Uzbekistan	Sri Lanka
	Laos					Syria
	Liberia					Thailand
	Madagascar					Tunisia
	Malawi					Viet Nam
	Mali					Zimbabwe
	Mauritania					
	Mozambique					
	Myanmar					
	Nepal					
	Niger					
	Nigeria					
	P. N. Guinea					
	Rwanda					
	Senegal					
	Sierra Leone					
	Sudan					
	Tajikistan					
	Tanzania					
	Togo					
	Uganda					
	Yemen					
	Zambia					

Table A.22: Additional Characteristics of Clusters

		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
	Number of countries	17	41	8	18	19	19	24
	Average ESI scores	52.9	47.1	66.3	49.6	57.1	44.0	46.2
Average values of ESI Component Values	Environmental Systems	39.1	50.8	75.6	43.4	66.9	51.5	37.4
	Reducing Environmental Stresses	33.9	54.7	44.0	50.9	55.7	52.6	50.9
	Reducing Human Vulnerability	71.3	26.6	78.0	72.2	51.0	54.2	49.4
	Social and Institutional Capacity	77.7	36.1	83.5	52.3	52.1	29.6	44.4
	Global Stewardship	57.5	63.6	49.4	31.4	54.5	26.8	52.2
Average values of other characteristics	GDP/capita	\$27,480	\$420	\$29,860	\$4,390	\$2,980	\$3,810	\$1,730
	Population (million)	33.6	19.0	46.1	11.8	21.2	20.7	149
	Total Area (thousand square kilometers)	171	539	3,466	123	1,026	1,561	1,010
	Population Density (per square kilometer)	238	70.3	13.5	122	32.1	56.0	174
	Environmental Governance Indicator (z-score)	1.0	-0.5	1.0	0.2	0.1	-0.6	-0.2

The cluster analysis reveals clear linkages between group membership and the average performance along the five ESI components. It also suggests the existence of relationships between cluster membership and additional characteristics such as average income per capita, population density, and area size.

The geographic pattern of the clusters is striking, especially since no geographical data was used in the analysis. We interpret this feature as a result of the many similarities of countries in close geographical proximity in regard to environmental conditions and pressures, economic and trade linkages, as well as with respect to social and cultural communalities.

Cluster 1 and 3 represent the developed countries with 24 of 29 OECD countries present (Luxembourg is too small to be included in the ESI). Interestingly, Taiwan is a member of cluster 1, which is characterized by high population density and industrializa-

tion combined with high social and institutional capacity. With the exception of South Korea and Taiwan, these countries share high to moderately high ESI scores. Although Taiwan is likely to be seen as an outlier in the group, its cluster membership suggests that its indicator values are more similar to this group of countries than to any of the remaining six clusters.

The differentiation between cluster 1 and 3 appears to follow characteristics captured in the distribution of ESI scores between developed and developing countries and further fine-grains the results of the analysis into the relationships between economic development and environmental sustainability. Despite comparable per capita incomes and good environmental governance, the average ESI scores for cluster 1 and 3 are markedly different (excluding the low scores of South Korea and Taiwan from cluster 1 only lifts the average ESI score by 2 points). The most

prominent difference exists in the Environmental Stress component. Clearly, developed countries with large land area, low population densities – by far the lowest of all 7 clusters – and a rich natural resource base enjoy a comparative advantage because the absorptive capacity of their environments is bigger than that of smaller sized, high population density, developed countries. Although we try to correct the variables underlying the indicators for the most prevalent distortions due to size, the cluster results indicate that large area size is advantageous for environmental sustainability.

Cluster 2 is composed of the least developed countries that are characterized by weak governance and high human vulnerability. Another group of developing countries is formed by cluster 7. Cluster 2 and 7 differ in their average population size as well as their Environmental Systems and Human Vulnerability components scores. Cluster 7 includes four of the most populous countries in the world: China, India, Indonesia, and Bangladesh. Only the large geographic area of several countries in this cluster reduces their average population densities to more moderate values. This cluster's average ESI scores are only slightly higher than those of Cluster 6, which includes many of the lowest ranked countries in the ESI.

Cluster 4 includes many Eastern European countries with moderate incomes but relatively high environmental stresses, which might be a legacy of their former economic systems as well as their high average population density.

Cluster 5 comprises most of the Latin American countries, and has the second highest average ESI score and population density after Cluster 3. The good performance of the countries in this cluster has already become apparent in the high rankings of Uruguay, Guyana, Argentina, Brazil, Peru, Paraguay, and Costa Rica among the top 20 ESI countries.

Cluster 6 by contrast, has the lowest average ESI scores and is characterized by very low average scores for Social and Institutional Capacity and Global Stewardship. The countries of the Middle East and Central Asia dominate this cluster. The group is characterized by moderate environmental systems and stresses scores as well as an average human vulnerability to environmental shocks. The Social and Institutional Capacity and Global Stewardship components are the lowest across the seven clusters.

Appendix A References

- Arrow, Kenneth J. and Hervé Raynaud (1986). *Social Choice and Multicriterion Decision Making*. Cambridge: M.I.T. Press.
- Box, George, William Hunter, et al. (1978). *Statistics for Experimenters*. New York: John Wiley and Sons.
- Bratley, Paul and Bennett L. Fox (1988). "Algorithm 659 Implementing Sobel's Quasirandom Sequence Generator." *ACM Trans. Math. Software* 14: 88-100.
- Debreu, Gerard (1960). "Topological Methods in Cardinal Utility Theory". *Mathematical Methods in Social Sciences* (K. J. Arrow, S. Karlin and P. Suppes, ed.). Stanford: Stanford University Press.
- Dietz, Frank J. and Jan van der Straaten (1992). "Rethinking Environmental Economics: Missing Links Between Economic Theory and Environmental Policy." *Journal of Economic Issues*. XXVI (1): 27-51.
- Ebert, Udo and Heinz Welsch (2004). "Meaningful Environmental Indices: A Social Choice Approach." *Journal of Environmental Economics and Management*. 47: 270-283.
- Environmental Protection Agency (EPA) (2004). *Council for Regulatory Environmental Modeling, Draft Guidance on the Development, Evaluation, and Application of Regulatory Environmental Models*. (http://www.epa.gov/osp/crem/library/CREM%20Guidance%20Draft%2012_03.pdf).
- Esty, Daniel C. and Michael E. Porter (2001). "Ranking National Environmental Regulation and Performance: A Leading Indicator of Future Competitiveness?" *The Global Competitiveness Report 2001* (M. E. Porter, J. Sachs and et. al., ed.). New York: Oxford University Press.
- Funtowicz, Silvio O., Giuseppe Munda, et al. (1990). "The Aggregation of Environmental Data Using Multicriteria Methods." *Environmetrics*. Vol. 1(4): 353-360.
- Hartigan, John and M.A. Wong (1979). "A k-means Clustering Algorithm." *Journal of Applied Statistics*. 28: 100-108.
- Johnson, Richard A. and Dean W. Wichern (1998). *Applied Multivariate Statistical Analysis*. New Jersey: Prentice Hall.
- Keeney, Ralph and Howard Raiffa (1976). *Decision with Multiple Objectives: Preferences and Value Trade-offs*. New York: Wiley.
- Krantz, David H., R.Duncan Luce, et al. (1971). *Foundations of Measurement, Vol. 1, Additive and Polynomial Representations*. New York: Academic Press.
- Little, Roderick J.A. and Donald B. Rubin (1987). *Statistical Analysis with Missing Data*. New York: John Wiley.
- Munda, Giuseppe and Michela Nardo (2003a). *Methodological Modelling of Composite Indicators for Ranking Countries*, Joint Research Center, Ispra (www.lamsade.dauphine.fr/mcda/biblio/Year/2003.complete.html).
- Munda, Giuseppe and Michela Nardo (2003b) *Mathematical Modelling of Composite Indicators for Ranking Countries*, Proceedings of the First OECD/JRC Workshop on Composite Indicators of Country Performance, JRC, Ispra.

- Organisation for Economic Co-operation and Development (OECD) (2003). *Composite Indicators of Country Performance: A Critical Assessment*, DST/IND (2003):5. Paris.
- Podinovskii, Vladislav V. (1994). "Criteria Importance Theory." *Mathematical Social Science*. 27: 237-252.
- Roy, Bernard (1996). *Multicriteria Methodology for Decision Analysis*. Dordrecht: Kluwer.
- Saisana, Michaela, Stefano Tarantola, et al. (2005). "Uncertainty and Sensitivity Techniques as Tools for the Analysis and Validation of Composite Indicators." *Journal of the Royal Statistical Society A*. 168(2): 1-17.
- Saltelli, Andrea, Karen Chan, et al. (2000). *Sensitivity Analysis*. Probability and Statistics Series. New York: John Wiley & Sons.
- Saltelli, Andrea, Stefano Tarantola, et al. (2000). "Sensitivity Analysis as an Ingredient of Modelling." *Statistical Science*. 15: 377-395.
- Sobol, Ilya M. (1967). "On the Distribution of Points in a Cube and the Approximate Evaluation of Integrals." *USSR Journal of Computational Mathematics and Mathematical Physics*. 7: 86-112.
- Sobol, Ilya M. (1976). "Uniformly Distributed Sequences with an Addition Uniform Property." *USSR Journal of Computational Mathematics and Mathematical Physics*. 16: 236-242.
- Sobol, Ilya M. (1993). "Sensitivity Analysis for Non-linear Mathematical Models." *Mathematical Modelling & Computational Experiment*. 1: 407-414.
- Ting, H.M. (1971). *Aggregation of Attributes for Multiattributed Utility Assessment*. Technical Report n. 66, Operations Research Center. Cambridge: MIT.
- Young, Hobart P. (1988). "Condorcet's Theory of Voting." *American Political Science Review*. 82 (4): 1231-1244.

Endnotes

¹ For more information on the statistical analyses included in the 2005 ESI report, please contact the Project Director, Tanja Srebotnjak, at Tanja.Srebotnjak@Yale.edu.

² To identify contact addresses for environment ministries and national statistical offices we used several sources, including the database on statistical offices of the United Nations Statistics Division (UNSD) and the list of environmental ministries of the United Nations Environment Programme (UNEP). We were unable to find contact details for a small number of environmental ministries and some request were returned as undeliverable.

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2005 Environmental Sustainability Index

Benchmarking National Environmental Stewardship

Appendix B Country Profiles

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Appendix B: Country Profiles

The following pages provide country profiles of ESI, component, and indicator scores for the 146 countries in the 2005 Environmental Sustainability Index.

In the upper left, part of each page, we report the subject country's Environmental Sustainability Index score and the average Index score for the countries in the subject country's peer group as defined by GDP per capita. Peer groups were assigned by dividing the countries of the index into five equal groups, sorted by GDP per capita (PPP) (Table B.1).

We use income to assign peer groups not because we wish to privilege the view that income determines environmental performance. To the contrary, one of our conclusions is that within similar levels of economic performance countries exhibit significant variation in their levels of environmental sustainability. By comparing a country's Index score with that of others in its peer group, one can get a useful measure of how effective its environmental efforts are.

In the upper right part of each page, we show a graph that provides a snapshot of a country's performance along the five components of environmental sustainability. These graphs have five axes that begin at a single point and radiate out in opposite directions. A country's score for each component is marked on each

axis, and then the points are connected to form a closed area.

The size of the enclosed area is a measure of its overall performance. The shape of the area reflects the particular distribution of scores across the five components. These provide a useful benchmark for comparing performance in a slightly more precise manner than the single Index score.

Both the Index score and the Component scores are presented as standard normal percentiles. These have a theoretically possible range of 0-100; the actual range is determined by the shape of the distribution of scores across all the countries. In all cases higher scores represent higher measures of environmental sustainability.

Finally, we present the scores of the 21 indicators in a set of bar graphs. The shaded bars represent the scores of the country, and the empty bars show the average scores for the peer group. These scores represent the average of the standardized z-scores of the variables that comprise the indicators. Higher numbers represent higher levels of performance; scores near the central axis are closer to the mean score for that indicator; and negative scores represent below average performance for the complete set of 146 countries included in the ESI.

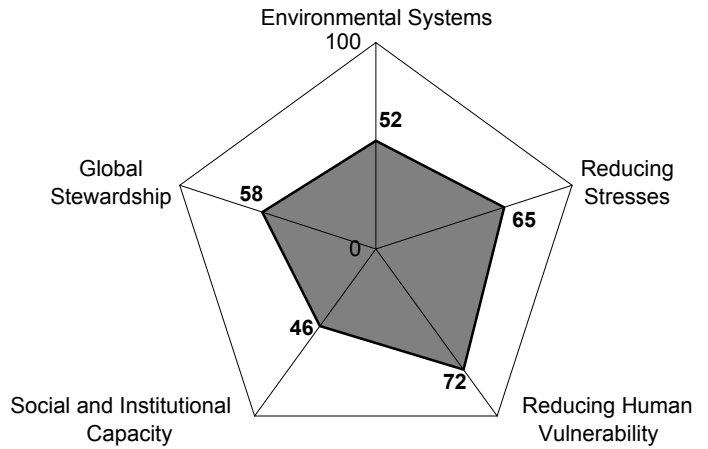
Table B.1: Peer Group average GDP per capita (PPP)

Quintile	GDP per capita (PPP)	Average ESI score
1	\$14,304 - \$32,483	55.4
2	\$5,869 - \$12,673	52.1
3	\$2,926 - \$5,829	49.0
4	\$1,328 - \$2,900	46.7
5	\$483 - \$1,308	46.4

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Albania

ESI:	58.8
Ranking:	24
GDP/Capita:	\$3,975
Peer group ESI:	48.9
Variable coverage:	62
Missing variables imputed:	10

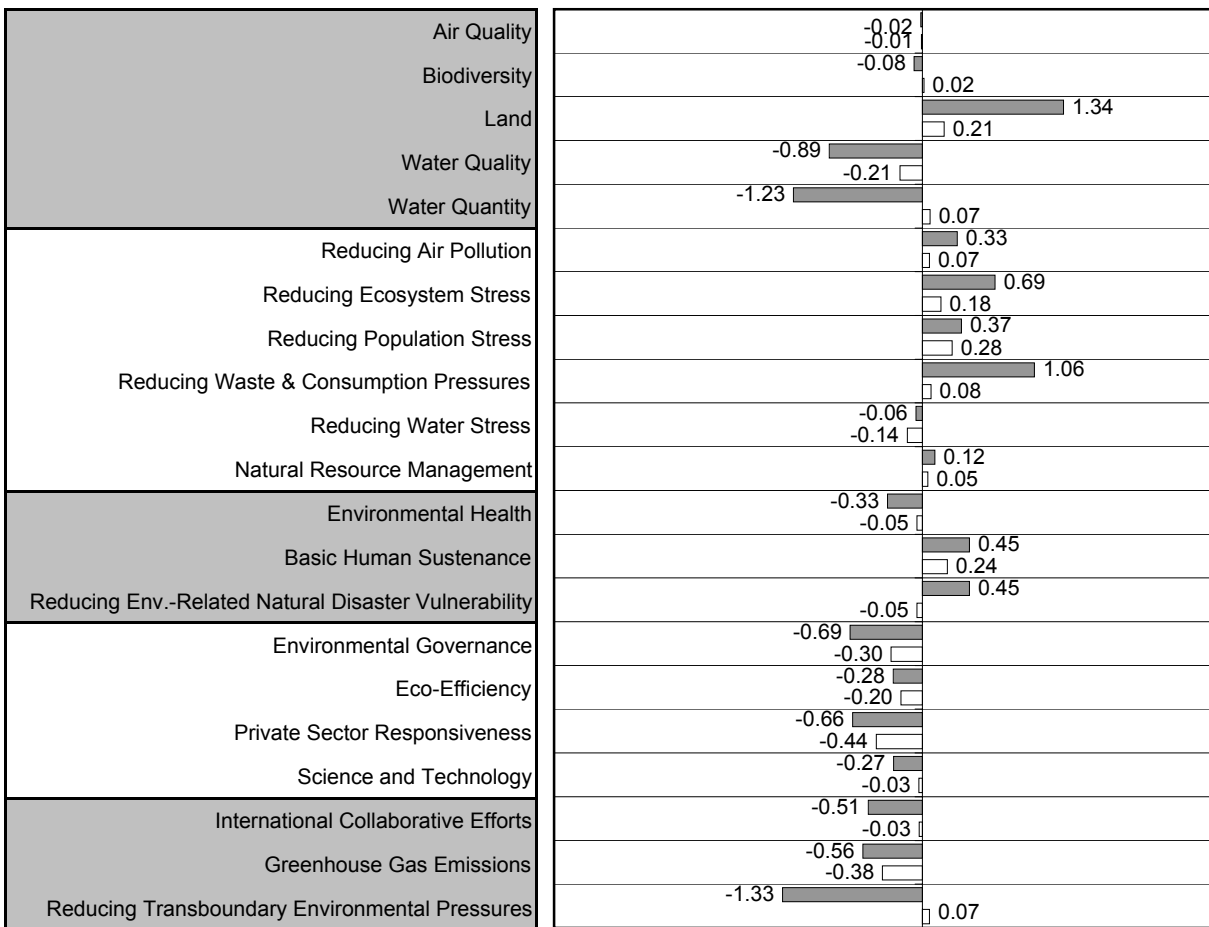
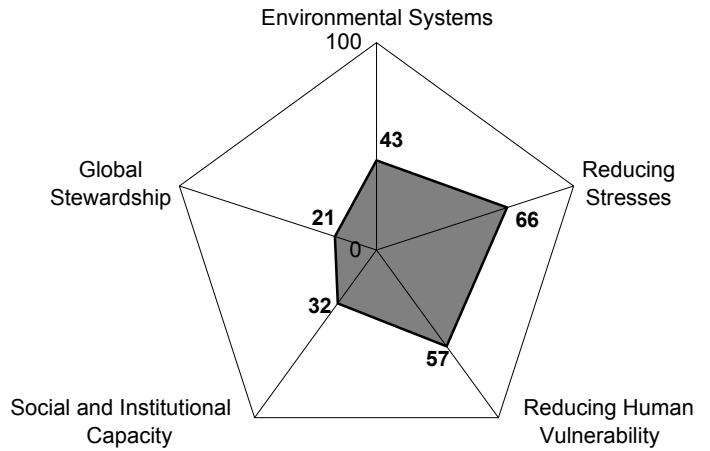


Air Quality	-0.01	0.45
Biodiversity		0.17
Land	-0.31	0.02
Water Quality		0.21
Water Quantity	-0.21	0.00
Reducing Air Pollution		0.07
Reducing Ecosystem Stress	-0.05	0.42
Reducing Population Stress		0.07
Reducing Waste & Consumption Pressures		0.18
Reducing Water Stress		0.64
Natural Resource Management		0.28
Environmental Health		0.50
Basic Human Sustenance		0.08
Reducing Env.-Related Natural Disaster Vulnerability		0.49
Environmental Governance	-0.14	
Eco-Efficiency		0.37
Private Sector Responsiveness		0.05
Science and Technology		0.32
International Collaborative Efforts		0.79
Greenhouse Gas Emissions		0.24
Reducing Transboundary Environmental Pressures		0.66
	-0.05	
	-0.32	
	-0.30	
		0.79
	-0.20	
	-0.65	
	-0.44	
	-0.20	
	-0.03	
	-0.45	
	-0.03	
		0.21
	-0.38	
		0.84
		0.07

= Indicator value
 = Reference (average value for peer group)

Algeria

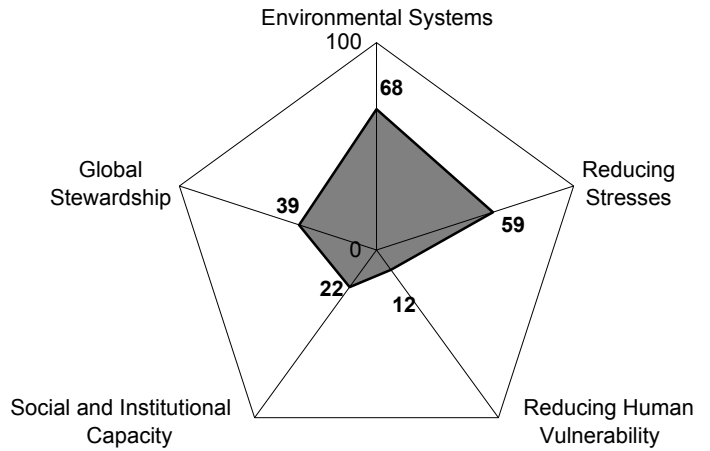
ESI:	46.0
Ranking:	96
GDP/Capita:	\$5,433
Peer group ESI:	48.9
Variable coverage:	59
Missing variables imputed:	10



= Indicator value
 = Reference (average value for peer group)

Angola

ESI:	42.9
Ranking:	123
GDP/Capita:	\$2,017
Peer group ESI:	46.7
Variable coverage:	57
Missing variables imputed:	10

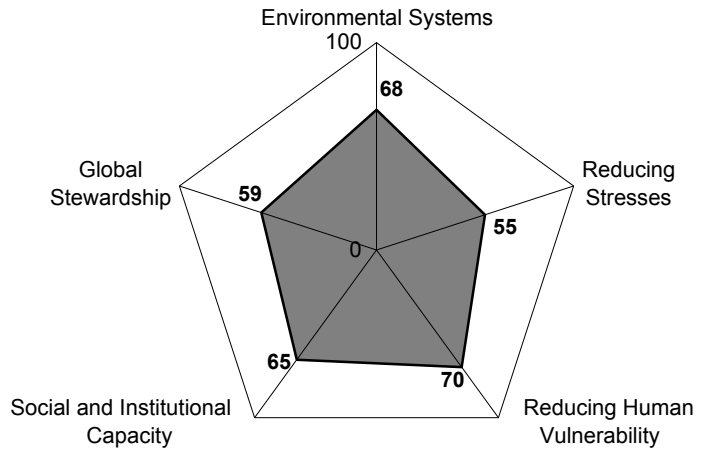


Air Quality	-0.77	-0.28
Biodiversity		0.77
Land	-0.01	0.77
Water Quality	-0.17	0.15
Water Quantity	-0.16	1.73
Reducing Air Pollution		0.10
Reducing Ecosystem Stress		0.55
Reducing Population Stress	-2.06	0.51
Reducing Waste & Consumption Pressures	-0.43	0.16
Reducing Water Stress		0.00
Natural Resource Management		0.92
Environmental Health	-1.75	0.16
Basic Human Sustenance	-1.91	0.00
Reducing Env.-Related Natural Disaster Vulnerability	-0.56	1.03
Environmental Governance	-0.24	0.38
Eco-Efficiency	-0.96	0.79
Private Sector Responsiveness	-0.52	0.19
Science and Technology	-1.08	0.11
International Collaborative Efforts	-1.16	0.12
Greenhouse Gas Emissions	-0.88	0.10
Reducing Transboundary Environmental Pressures	-0.28	0.31
	-0.26	0.23

= Indicator value
 = Reference (average value for peer group)

Argentina

ESI:	62.7
Ranking:	9
GDP/Capita:	\$10,075
Peer group ESI:	52.1
Variable coverage:	71
Missing variables imputed:	1

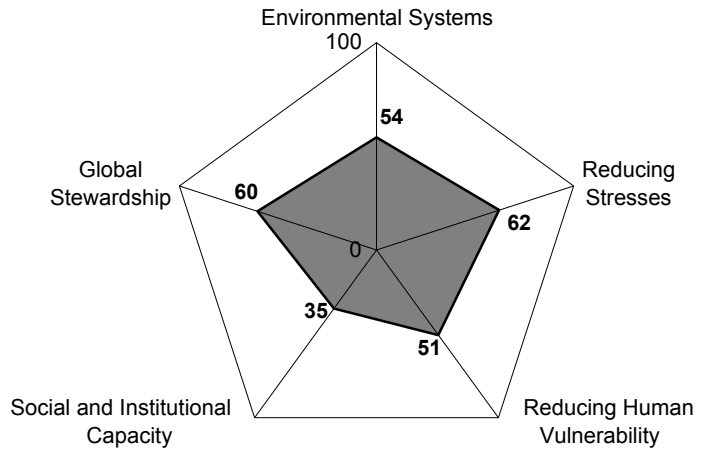


Air Quality	0.40	0.15
Biodiversity	0.10	-0.02
Land	0.66	0.02
Water Quality	0.46	0.03
Water Quantity	0.66	-0.01
Reducing Air Pollution	0.67	-0.16
Reducing Ecosystem Stress	0.03	0.18
Reducing Population Stress	0.37	0.59
Reducing Waste & Consumption Pressures	-0.53	-0.13
Reducing Water Stress	0.14	-0.20
Natural Resource Management	0.06	0.11
Environmental Health	0.85	0.53
Basic Human Sustenance	0.69	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.03	0.23
Environmental Governance	-0.34	0.15
Eco-Efficiency	0.18	-0.23
Private Sector Responsiveness	1.23	0.16
Science and Technology	0.51	0.21
International Collaborative Efforts	0.45	0.00
Greenhouse Gas Emissions	0.09	-0.50
Reducing Transboundary Environmental Pressures	0.11	-0.51

= Indicator value
 = Reference (average value for peer group)

Armenia

ESI:	53.2
Ranking:	44
GDP/Capita:	\$3,137
Peer group ESI:	48.9
Variable coverage:	62
Missing variables imputed:	9

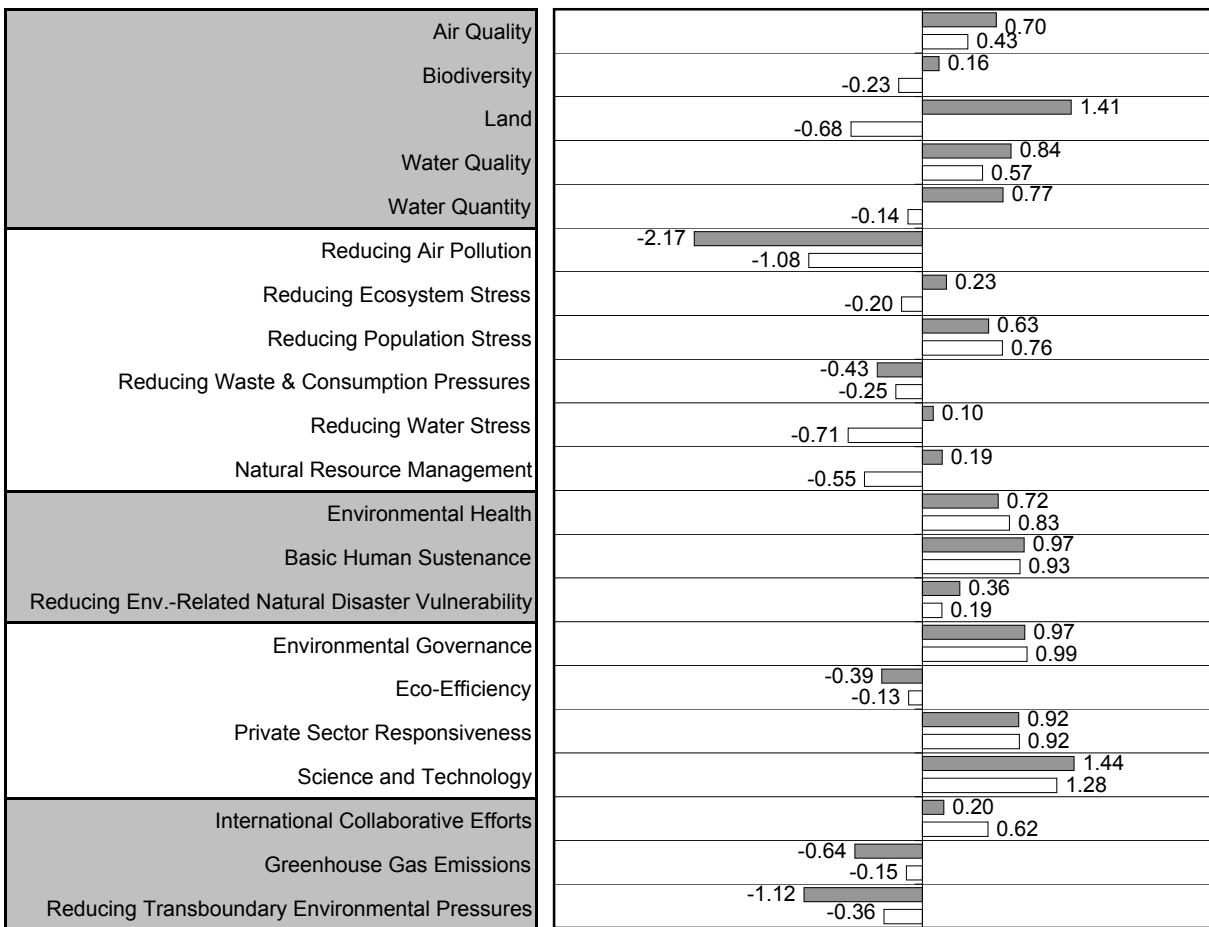
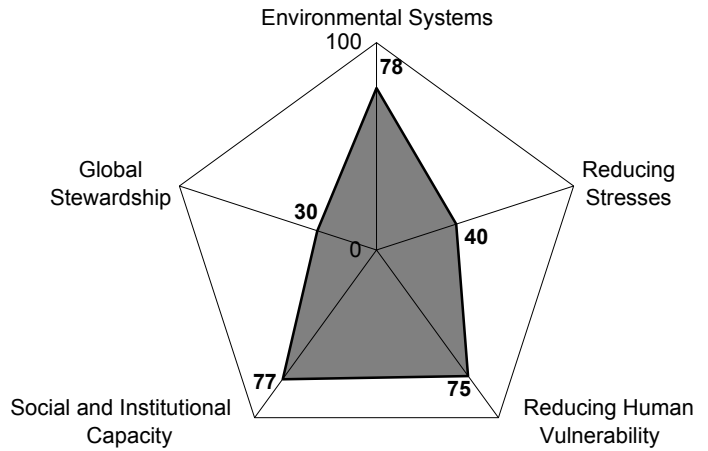


Air Quality	-0.01	1.21
Biodiversity	-0.02	0.02
Land	-0.22	0.21
Water Quality	-0.21	0.05
Water Quantity	-0.48	0.07
Reducing Air Pollution	-0.15	0.07
Reducing Ecosystem Stress		0.69
Reducing Population Stress		1.18
Reducing Waste & Consumption Pressures		0.11
Reducing Water Stress		0.08
Natural Resource Management	-0.14	0.02
Environmental Health		0.00
Basic Human Sustenance	-0.05	0.05
Reducing Env.-Related Natural Disaster Vulnerability	-0.79	0.29
Environmental Governance		0.24
Eco-Efficiency	-0.66	0.56
Private Sector Responsiveness	-0.20	-0.05
Science and Technology	-0.55	0.03
International Collaborative Efforts	-0.44	-0.03
Greenhouse Gas Emissions	-0.29	-0.03
Reducing Transboundary Environmental Pressures	-0.38	1.37

= Indicator value
 = Reference (average value for peer group)

Australia

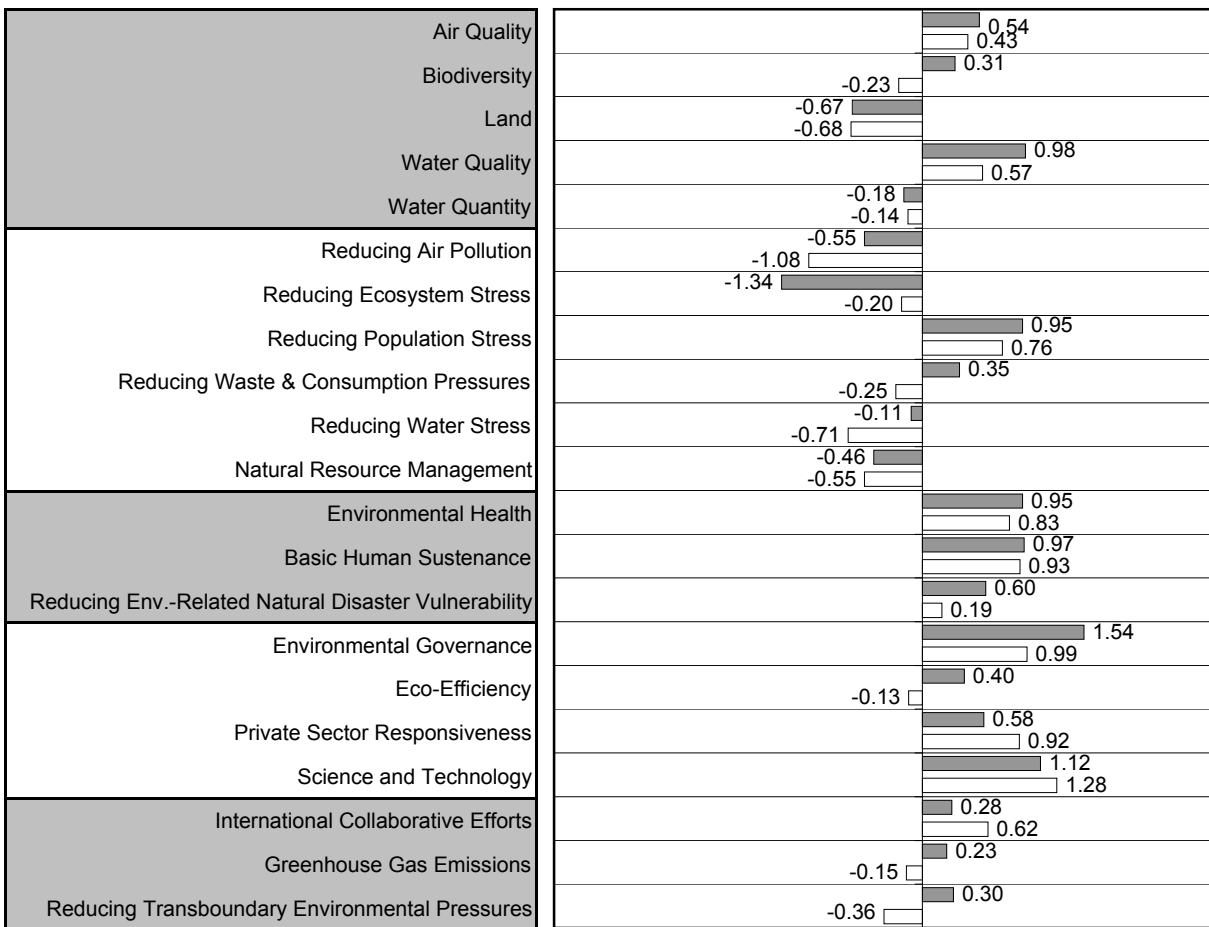
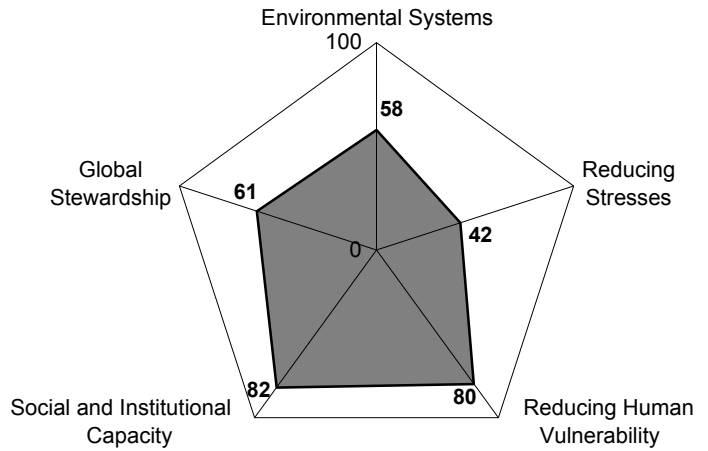
ESI:	61.0
Ranking:	13
GDP/Capita:	\$25,344
Peer group ESI:	55.4
Variable coverage:	69
Missing variables imputed:	4



= Indicator value
 = Reference (average value for peer group)

Austria

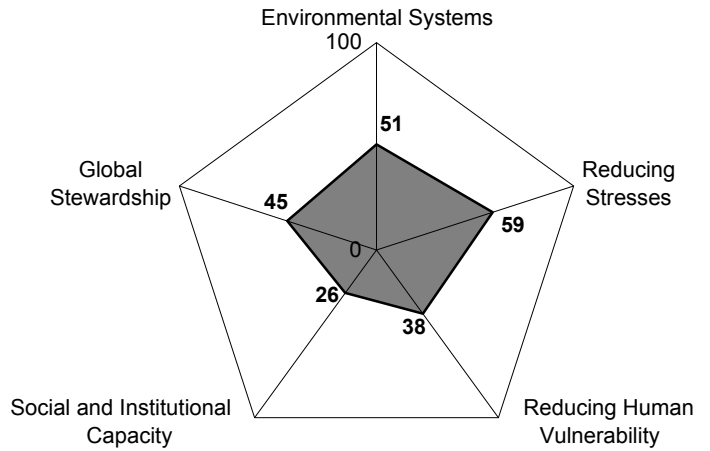
ESI:	62.7
Ranking:	10
GDP/Capita:	\$26,065
Peer group ESI:	55.4
Variable coverage:	74
Missing variables imputed:	0



= Indicator value
 = Reference (average value for peer group)

Azerbaijan

ESI:	45.4
Ranking:	99
GDP/Capita:	\$3,136
Peer group ESI:	48.9
Variable coverage:	58
Missing variables imputed:	11

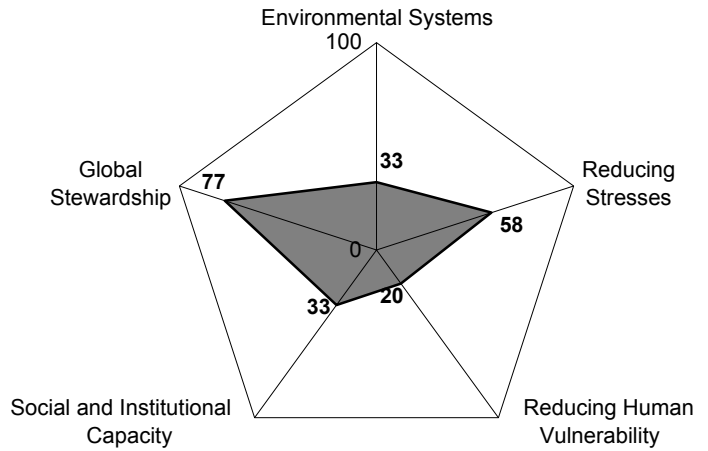


Air Quality	-0.01	0.80
Biodiversity	-0.13	0.02
Land		0.50
Water Quality	-0.56	0.21
Water Quantity	-0.21	
Reducing Air Pollution	-0.49	0.07
Reducing Ecosystem Stress	-0.05	0.07
Reducing Population Stress		0.69
Reducing Waste & Consumption Pressures		0.18
Reducing Water Stress		0.54
Natural Resource Management		0.28
Environmental Health		0.34
Basic Human Sustenance	-0.21	0.08
Reducing Env.-Related Natural Disaster Vulnerability	-0.14	0.06
Environmental Governance		0.05
Eco-Efficiency	-1.17	
Private Sector Responsiveness	-0.05	
Science and Technology	-0.29	0.24
International Collaborative Efforts		0.55
Greenhouse Gas Emissions	-0.80	
Reducing Transboundary Environmental Pressures	-1.30	
	-0.20	
	-0.46	
	-0.44	
	-0.07	
	-0.03	
	-0.13	
	-0.03	
	-1.31	
	-0.38	
		1.08
		0.07

= Indicator value
 = Reference (average value for peer group)

Bangladesh

ESI:	44.1
Ranking:	114
GDP/Capita:	\$1,553
Peer group ESI:	46.7
Variable coverage:	64
Missing variables imputed:	8

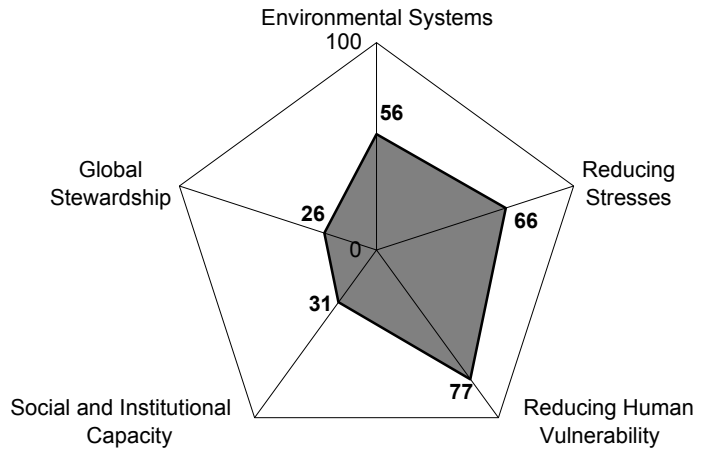


Air Quality	-0.42	-0.28
Biodiversity	-0.48	-0.01
Land	-0.43	0.15
Water Quality	-0.35	-0.16
Water Quantity	-0.56	0.10
Reducing Air Pollution	-0.01	0.51
Reducing Ecosystem Stress		0.69
Reducing Population Stress	-0.30	0.00
Reducing Waste & Consumption Pressures	-0.43	0.78
Reducing Water Stress		0.07
Natural Resource Management		0.38
Environmental Health		0.03
Basic Human Sustenance	-0.34	0.19
Reducing Env.-Related Natural Disaster Vulnerability	-0.69	0.08
Environmental Governance	-1.92	-0.24
Eco-Efficiency	-0.52	-0.52
Private Sector Responsiveness		0.09
Science and Technology	-0.78	0.10
International Collaborative Efforts	-0.59	
Greenhouse Gas Emissions	-0.58	
Reducing Transboundary Environmental Pressures	-0.50	0.23
	-0.28	0.81
		0.23
		1.16
		0.23

= Indicator value
 = Reference (average value for peer group)

Belarus

ESI:	52.8
Ranking:	47
GDP/Capita:	\$5,228
Peer group ESI:	48.9
Variable coverage:	61
Missing variables imputed:	10

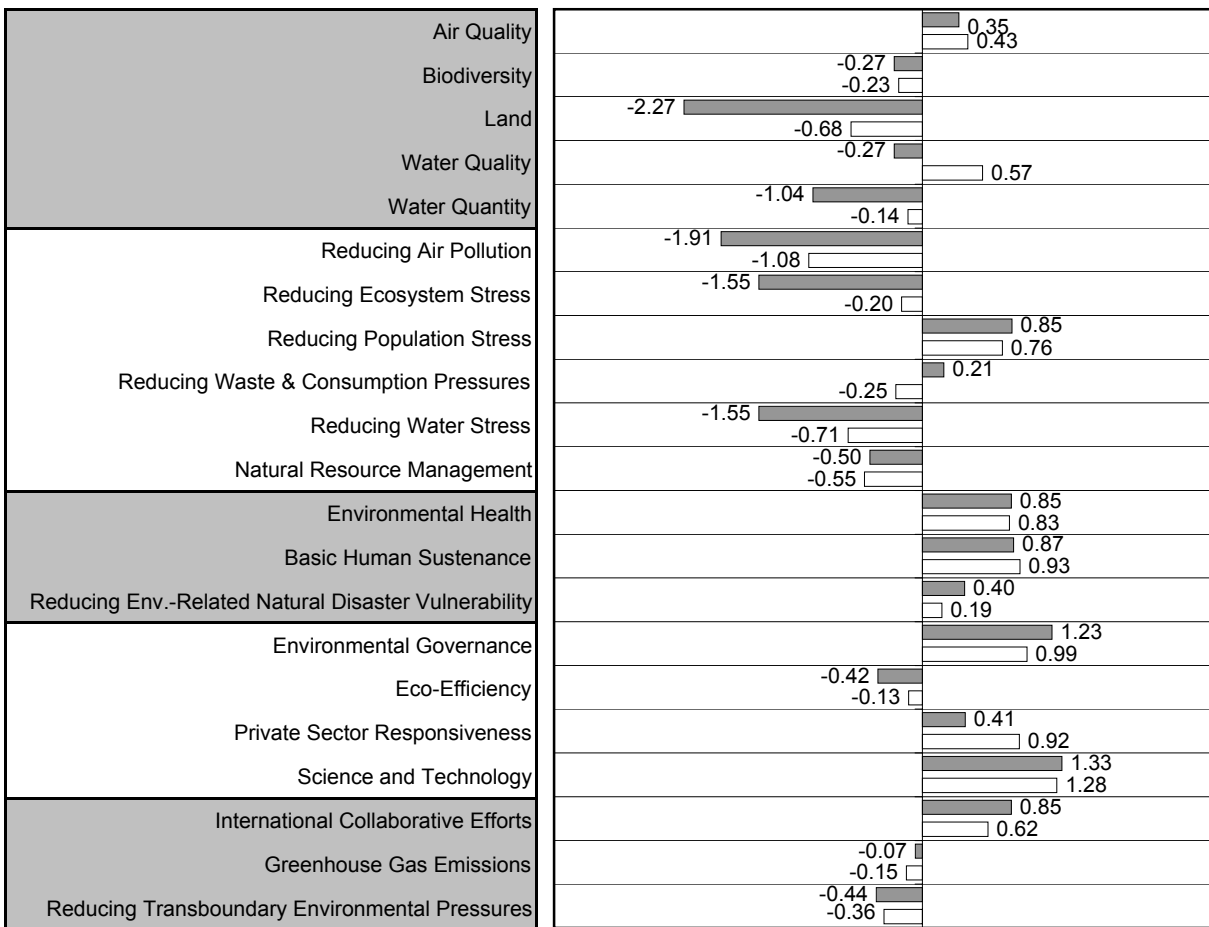
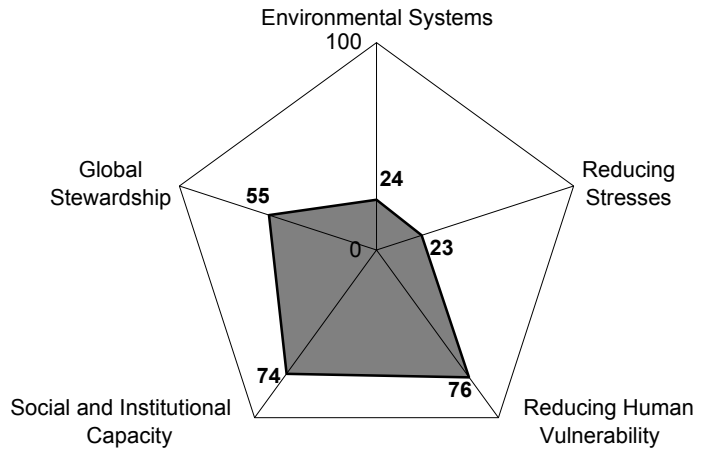


Indicator	Indicator Value	Reference Value (Peer Group)
Air Quality	-0.01	1.46
Biodiversity	-0.15	0.02
Land	-0.41	0.21
Water Quality	-0.03	0.07
Water Quantity	-0.21	0.21
Reducing Air Pollution	-0.14	0.07
Reducing Ecosystem Stress	0.21	1.12
Reducing Population Stress	0.07	0.18
Reducing Waste & Consumption Pressures	1.09	0.28
Reducing Water Stress	-0.49	0.08
Natural Resource Management	-0.14	0.09
Environmental Health	0.38	0.05
Basic Human Sustenance	-0.05	0.56
Reducing Env.-Related Natural Disaster Vulnerability	0.91	0.24
Environmental Governance	-0.05	0.75
Eco-Efficiency	-0.72	-0.30
Private Sector Responsiveness	-1.22	-0.20
Science and Technology	-0.54	-0.44
International Collaborative Efforts	-0.03	0.51
Greenhouse Gas Emissions	-1.05	-0.03
Reducing Transboundary Environmental Pressures	-1.05	-0.38
	0.21	0.07

= Indicator value
 = Reference (average value for peer group)

Belgium

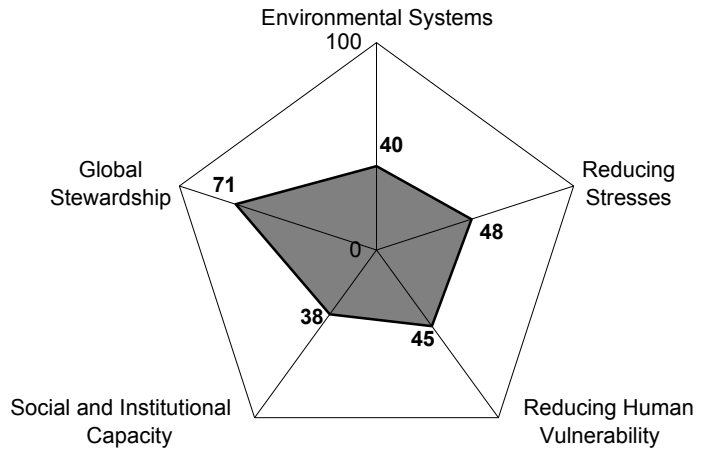
ESI:	44.4
Ranking:	112
GDP/Capita:	\$24,694
Peer group ESI:	55.4
Variable coverage:	74
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Benin

ESI:	47.5
Ranking:	86
GDP/Capita:	\$978
Peer group ESI:	46.4
Variable coverage:	56
Missing variables imputed:	15

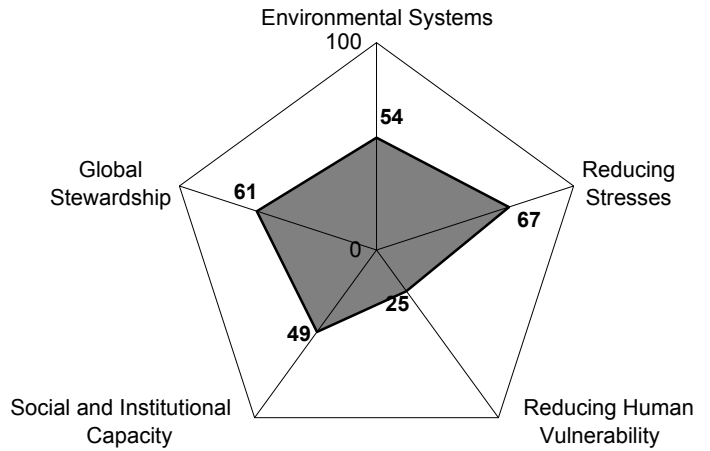


Air Quality	-0.56	0.29
Biodiversity	0.43	0.23
Land	-0.07	0.30
Water Quality	-0.48	-0.19
Water Quantity	-0.53	0.02
Reducing Air Pollution	0.33	0.67
Reducing Ecosystem Stress	-0.43	-0.16
Reducing Population Stress	-1.31	-1.22
Reducing Waste & Consumption Pressures	0.40	0.40
Reducing Water Stress	0.84	0.68
Natural Resource Management	-0.10	0.22
Environmental Health	-0.46	-0.96
Basic Human Sustenance	-0.39	-1.17
Reducing Env.-Related Natural Disaster Vulnerability	0.50	-0.05
Environmental Governance	-0.11	-0.47
Eco-Efficiency	0.15	0.47
Private Sector Responsiveness	-0.50	-0.62
Science and Technology	-0.71	-0.95
International Collaborative Efforts	0.37	-0.27
Greenhouse Gas Emissions	0.73	0.82
Reducing Transboundary Environmental Pressures	0.60	0.55

= Indicator value
 = Reference (average value for peer group)

Bhutan

ESI:	53.5
Ranking:	43
GDP/Capita:	\$1,300
Peer group ESI:	46.4
Variable coverage:	45
Missing variables imputed:	21

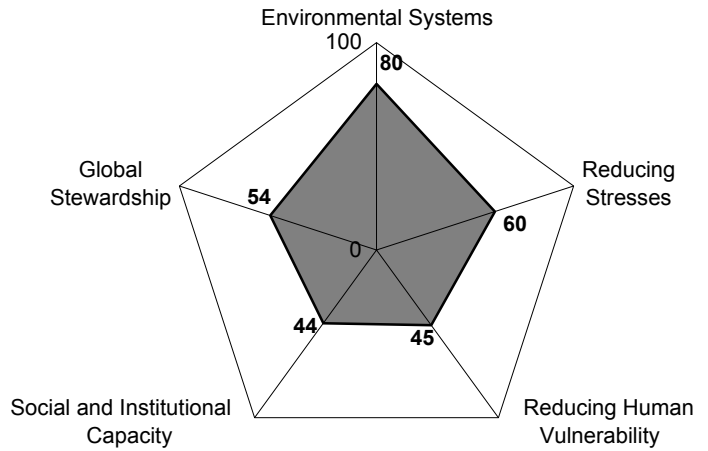


Air Quality	-0.02	
Biodiversity	-0.29	
Land	-0.12	0.23
Water Quality	-0.03	0.30
Water Quantity	-0.19	0.22
Reducing Air Pollution		0.48
Reducing Ecosystem Stress		0.02
Reducing Population Stress		1.55
Reducing Waste & Consumption Pressures		0.67
Reducing Water Stress		0.28
Natural Resource Management	-0.16	
Environmental Health	-0.80	
Basic Human Sustenance	-1.22	
Reducing Env.-Related Natural Disaster Vulnerability		0.36
Environmental Governance		0.40
Eco-Efficiency		1.03
Private Sector Responsiveness		0.68
Science and Technology		0.23
International Collaborative Efforts		0.22
Greenhouse Gas Emissions	-0.47	
Reducing Transboundary Environmental Pressures	-0.96	
	-1.06	
	-1.17	
	-0.53	
	-0.05	
	-0.07	
	-0.47	
		1.89
		0.47
	-0.59	
	-0.62	
	-1.34	
	-0.95	
	-0.53	
	-0.27	
		0.61
		0.82
		0.74
		0.55

= Indicator value
 = Reference (average value for peer group)

Bolivia

ESI:	59.5
Ranking:	20
GDP/Capita:	\$2,215
Peer group ESI:	46.7
Variable coverage:	61
Missing variables imputed:	8

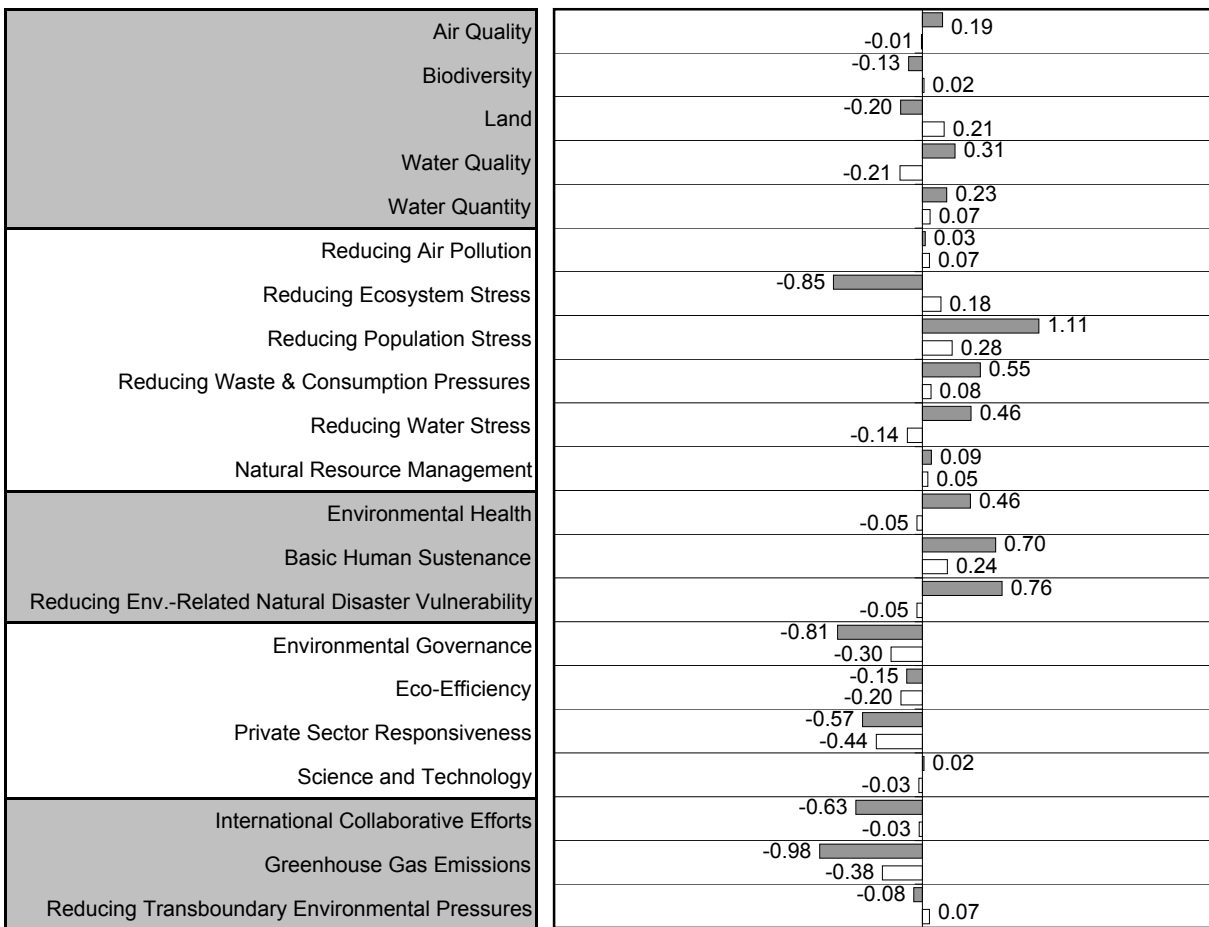
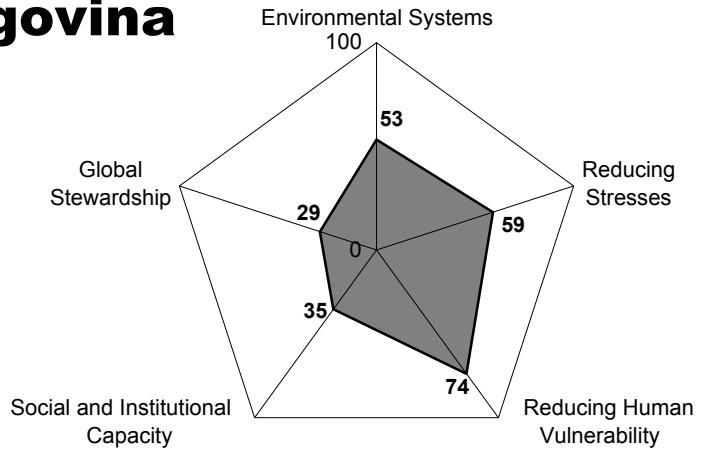


Air Quality	-0.23	0.79
Biodiversity	-0.28	1.07
Land	-0.01	0.70
Water Quality	0.15	1.89
Water Quantity	-0.16	0.10
Reducing Air Pollution	0.85	0.51
Reducing Ecosystem Stress	0.19	0.00
Reducing Population Stress	-0.28	0.16
Reducing Waste & Consumption Pressures	-0.43	0.39
Reducing Water Stress	-0.12	0.38
Natural Resource Management	0.50	0.19
Environmental Health	-0.32	0.04
Basic Human Sustenance	-0.34	0.05
Reducing Env.-Related Natural Disaster Vulnerability	-0.10	0.11
Environmental Governance	-0.56	0.10
Eco-Efficiency	-0.52	0.11
Private Sector Responsiveness	-0.83	0.10
Science and Technology	-0.59	0.04
International Collaborative Efforts	-0.50	0.89
Greenhouse Gas Emissions	-0.28	0.23
Reducing Transboundary Environmental Pressures	-0.18	0.23
	-0.42	0.23

= Indicator value
 = Reference (average value for peer group)

Bosnia and Herzegovina

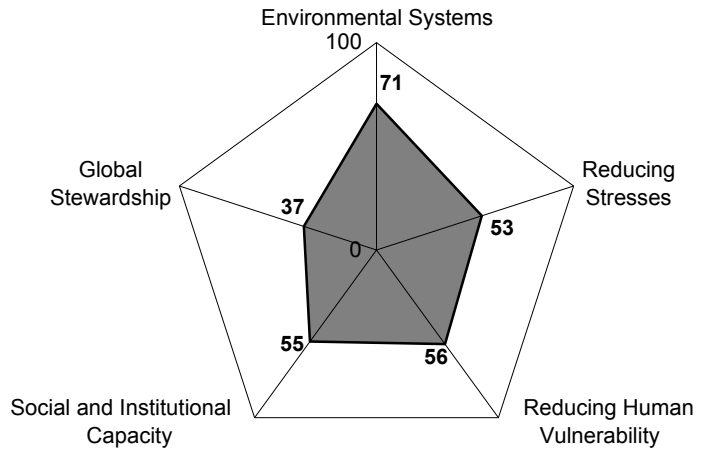
ESI:	51.0
Ranking:	61
GDP/Capita:	\$5,243
Peer group ESI:	48.9
Variable coverage:	52
Missing variables imputed:	15



= Indicator value
 = Reference (average value for peer group)

Botswana

ESI:	55.9
Ranking:	34
GDP/Capita:	\$7,269
Peer group ESI:	52.1
Variable coverage:	57
Missing variables imputed:	11

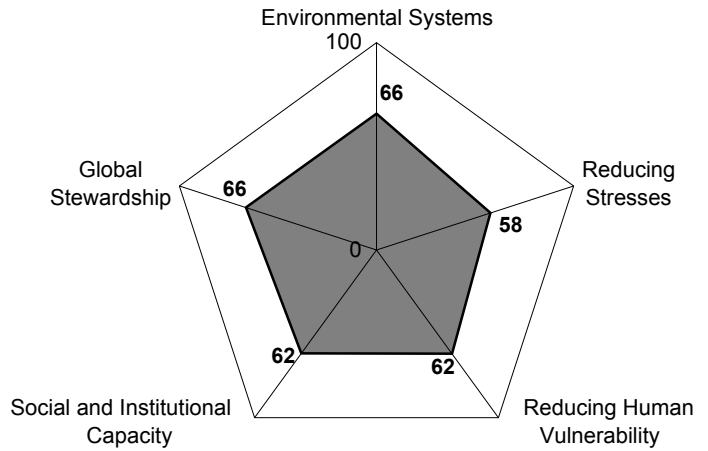


Air Quality	0.26	0.15
Biodiversity	0.68	-0.02
Land	1.26	0.02
Water Quality	0.38	0.03
Water Quantity	0.12	-0.01
Reducing Air Pollution	-0.49	-0.16
Reducing Ecosystem Stress	0.00	0.18
Reducing Population Stress	0.57	0.59
Reducing Waste & Consumption Pressures	0.14	-0.13
Reducing Water Stress	0.52	-0.20
Natural Resource Management	-0.24	0.11
Environmental Health	0.01	0.53
Basic Human Sustenance	0.12	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.33	0.23
Environmental Governance	0.84	0.15
Eco-Efficiency	-0.04	-0.23
Private Sector Responsiveness	-0.16	0.16
Science and Technology	-0.18	0.21
International Collaborative Efforts	-0.60	0.00
Greenhouse Gas Emissions	0.11	-0.50
Reducing Transboundary Environmental Pressures	-0.52	-0.51

= Indicator value
 = Reference (average value for peer group)

Brazil

ESI:	62.2
Ranking:	11
GDP/Capita:	\$6,755
Peer group ESI:	52.1
Variable coverage:	70
Missing variables imputed:	3

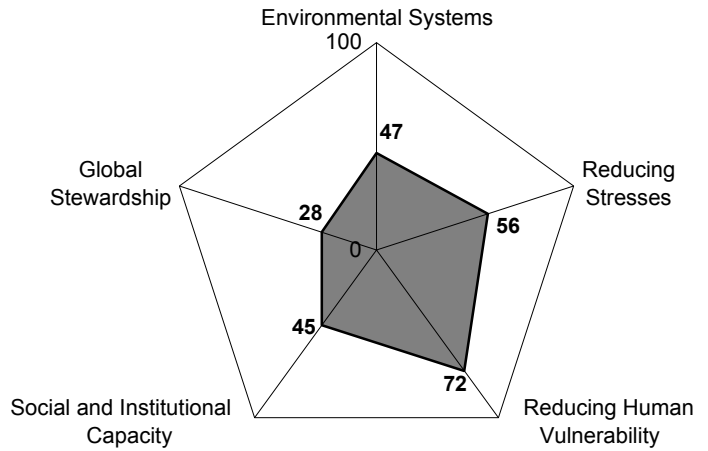


Air Quality	-0.53	0.15
Biodiversity		0.09
Land	-0.02	0.76
Water Quality		0.25
Water Quantity		0.03
		1.47
Reducing Air Pollution	-0.01	0.25
Reducing Ecosystem Stress	-0.16	0.16
Reducing Population Stress		0.18
Reducing Waste & Consumption Pressures		0.56
Reducing Water Stress		0.59
Natural Resource Management	-0.13	0.08
	-0.20	0.15
	-0.02	
Environmental Health		0.11
Basic Human Sustenance		0.56
		0.53
		0.41
Reducing Env.-Related Natural Disaster Vulnerability	-0.06	0.55
Environmental Governance		0.23
		0.02
Eco-Efficiency		0.15
Private Sector Responsiveness	-0.23	0.67
Science and Technology		0.50
	-0.01	0.16
International Collaborative Efforts		0.21
Greenhouse Gas Emissions		0.76
		0.00
Reducing Transboundary Environmental Pressures	-0.50	0.40
		0.09
	-0.51	

= Indicator value
 = Reference (average value for peer group)

Bulgaria

ESI:	50.0
Ranking:	70
GDP/Capita:	\$6,789
Peer group ESI:	52.1
Variable coverage:	71
Missing variables imputed:	2

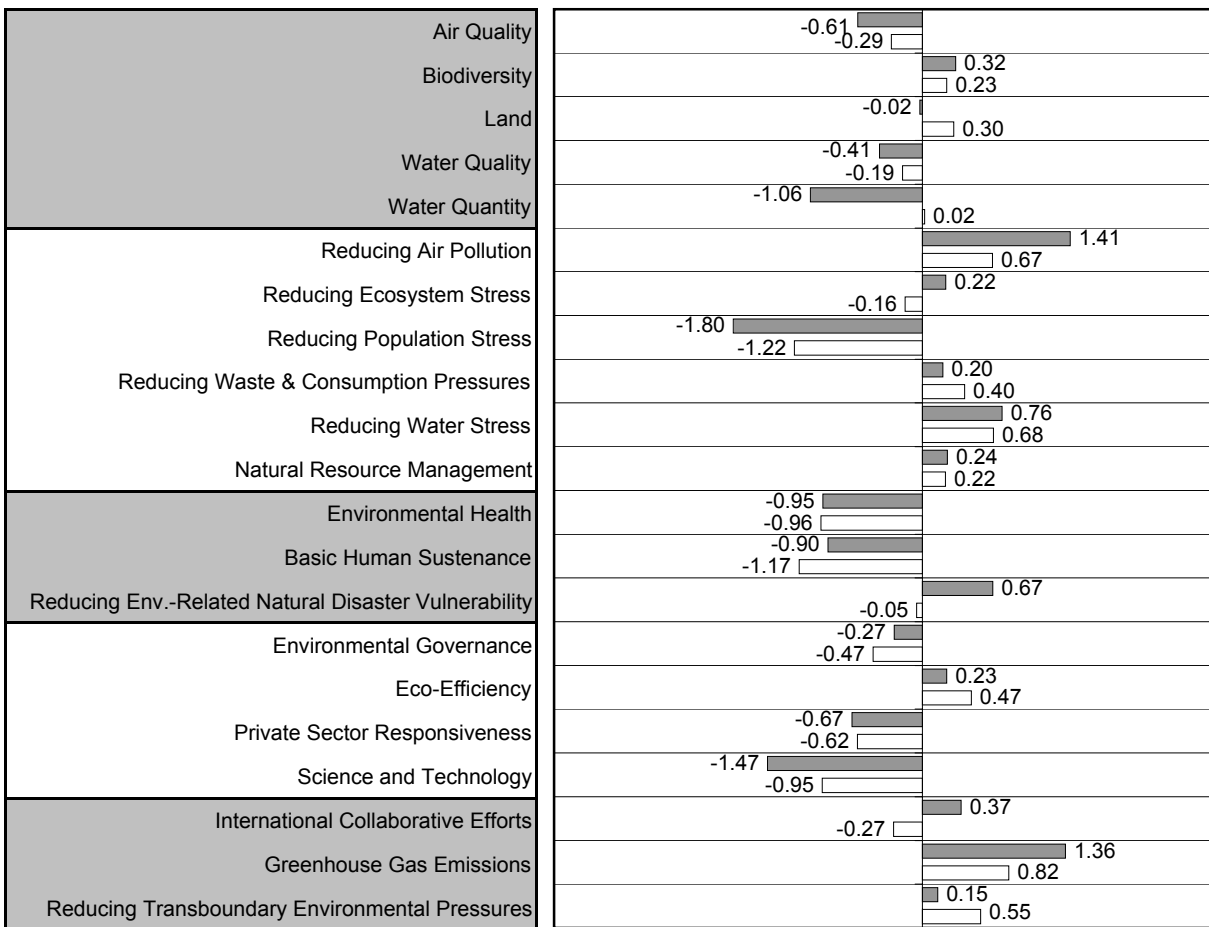
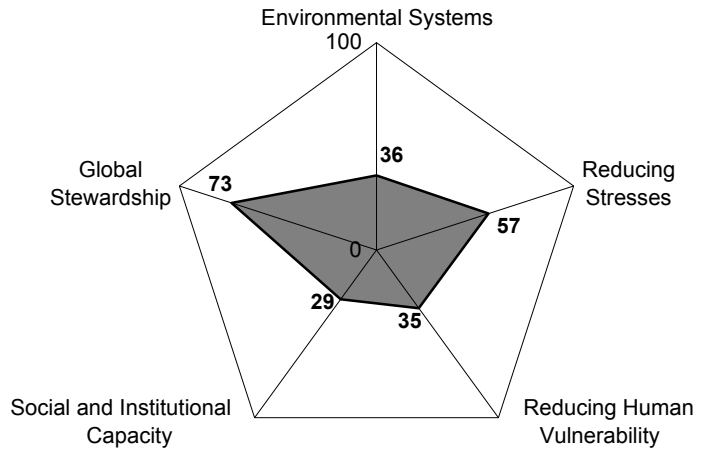


Air Quality	0.67	0.15
Biodiversity	-0.32	-0.02
Land	-0.58	0.02
Water Quality	-0.31	0.03
Water Quantity	-0.01	0.13
Reducing Air Pollution	-0.42	-0.16
Reducing Ecosystem Stress	0.00	0.18
Reducing Population Stress	1.20	0.59
Reducing Waste & Consumption Pressures	0.00	-0.13
Reducing Water Stress	-0.07	-0.20
Natural Resource Management	0.26	0.11
Environmental Health	0.47	0.53
Basic Human Sustenance	0.51	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.77	0.23
Environmental Governance	0.34	0.15
Eco-Efficiency	-0.74	-0.23
Private Sector Responsiveness	-0.53	0.16
Science and Technology	0.42	0.21
International Collaborative Efforts	0.06	0.00
Greenhouse Gas Emissions	-1.10	-0.50
Reducing Transboundary Environmental Pressures	-0.73	-0.51

= Indicator value
 = Reference (average value for peer group)

Burkina Faso

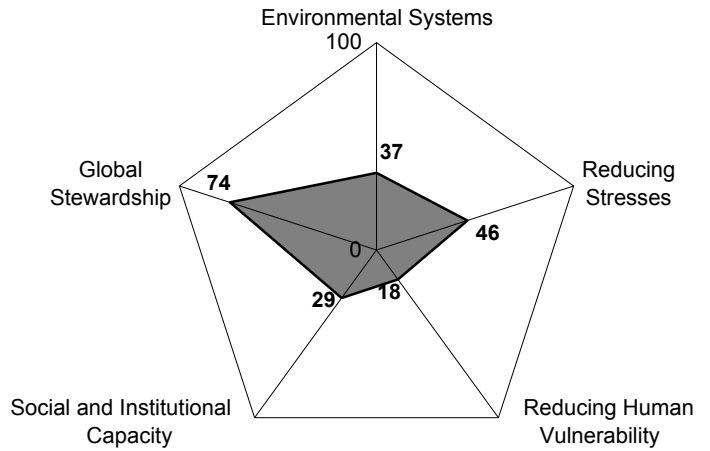
ESI:	45.7
Ranking:	97
GDP/Capita:	\$1,023
Peer group ESI:	46.4
Variable coverage:	54
Missing variables imputed:	13



= Indicator value
 = Reference (average value for peer group)

Burundi

ESI:	40.0
Ranking:	130
GDP/Capita:	\$545
Peer group ESI:	46.4
Variable coverage:	54
Missing variables imputed:	14

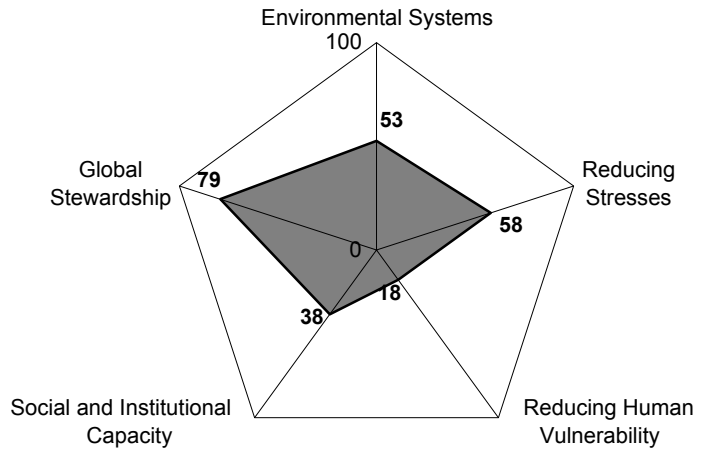


Air Quality	-0.57	-0.29
Biodiversity	0.60	0.23
Land	-0.05	0.30
Water Quality	-0.86	-0.19
Water Quantity	-0.75	0.02
Reducing Air Pollution	0.56	0.67
Reducing Ecosystem Stress	-1.07	-0.16
Reducing Population Stress	-1.46	-1.22
Reducing Waste & Consumption Pressures	0.11	0.40
Reducing Water Stress	0.93	0.68
Natural Resource Management	0.35	0.22
Environmental Health	-1.39	-0.96
Basic Human Sustenance	-1.74	-1.17
Reducing Env.-Related Natural Disaster Vulnerability	0.33	-0.05
Environmental Governance	-0.86	-0.47
Eco-Efficiency	0.54	0.47
Private Sector Responsiveness	-0.80	-0.62
Science and Technology	-1.13	-0.95
International Collaborative Efforts	-0.56	-0.27
Greenhouse Gas Emissions	1.65	0.82
Reducing Transboundary Environmental Pressures	0.87	0.55

= Indicator value
 = Reference (average value for peer group)

Cambodia

ESI:	50.1
Ranking:	68
GDP/Capita:	\$1,904
Peer group ESI:	46.7
Variable coverage:	57
Missing variables imputed:	13

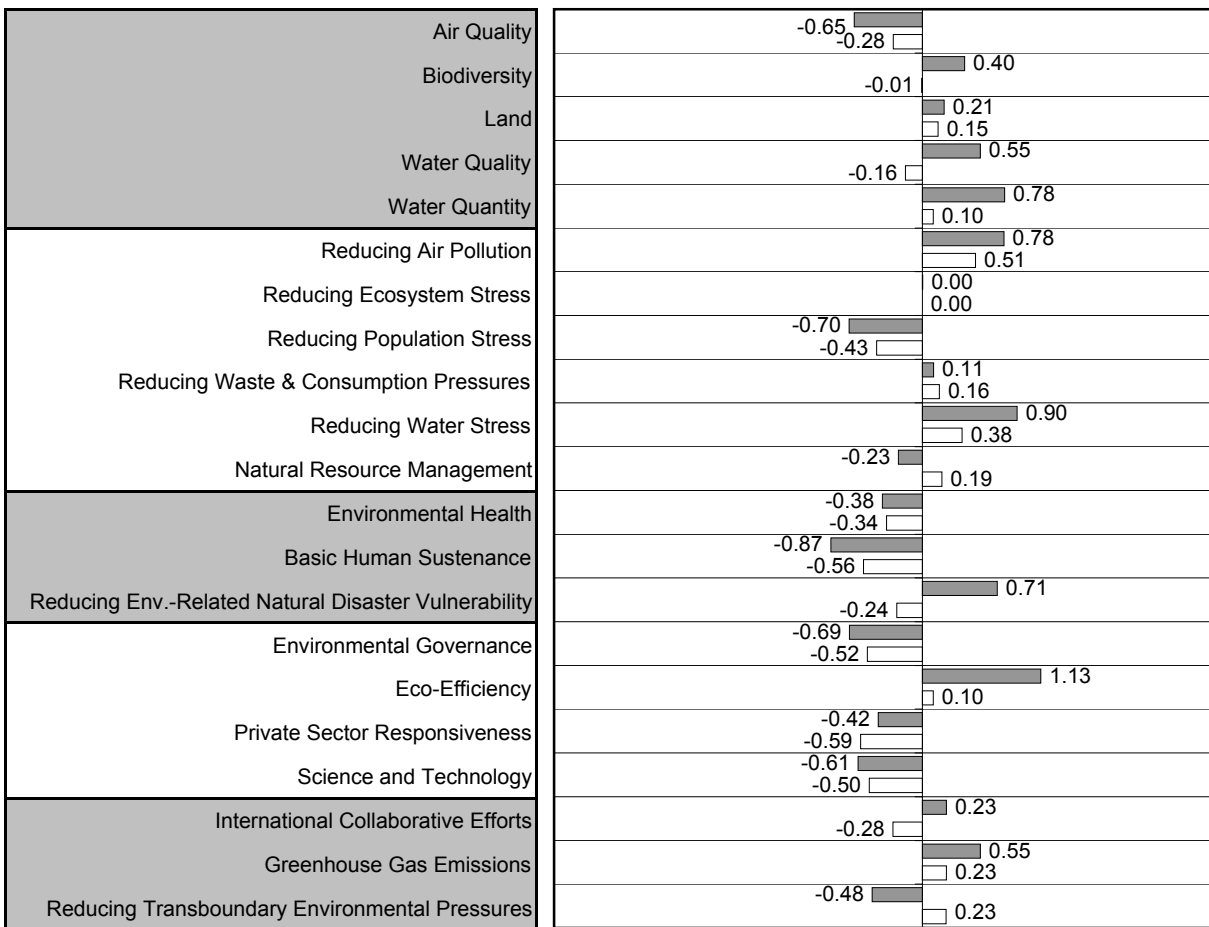
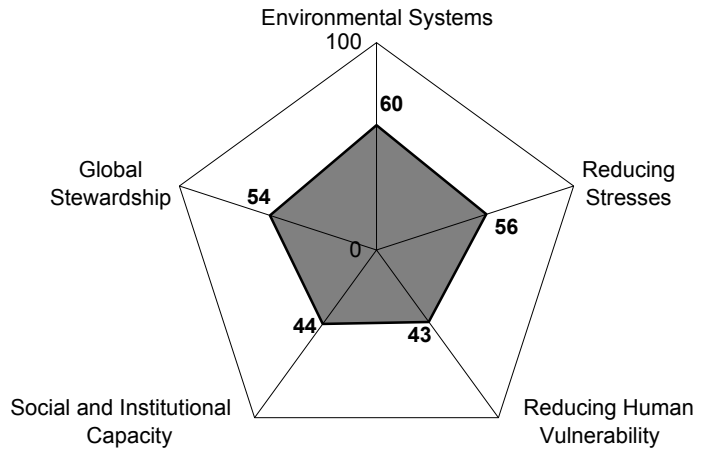


Air Quality	-0.39	0.15
Biodiversity	-0.28	0.15
Land	-0.35	0.33
Water Quality	-0.16	0.58
Water Quantity		0.10
Reducing Air Pollution		0.51
Reducing Ecosystem Stress		0.51
Reducing Population Stress	0.10	0.00
Reducing Waste & Consumption Pressures	-0.68	0.29
Reducing Water Stress	-0.43	0.16
Natural Resource Management		0.95
Environmental Health		0.38
Basic Human Sustenance	-0.27	0.02
Reducing Env.-Related Natural Disaster Vulnerability	-0.34	0.19
Environmental Governance	-1.96	
Eco-Efficiency	-0.56	0.25
Private Sector Responsiveness	-0.55	0.10
Science and Technology	-0.41	
International Collaborative Efforts	-0.59	
Greenhouse Gas Emissions	-0.63	1.97
Reducing Transboundary Environmental Pressures	-0.50	0.23
	-0.44	0.91
	-0.28	0.23

= Indicator value
 = Reference (average value for peer group)

Cameroon

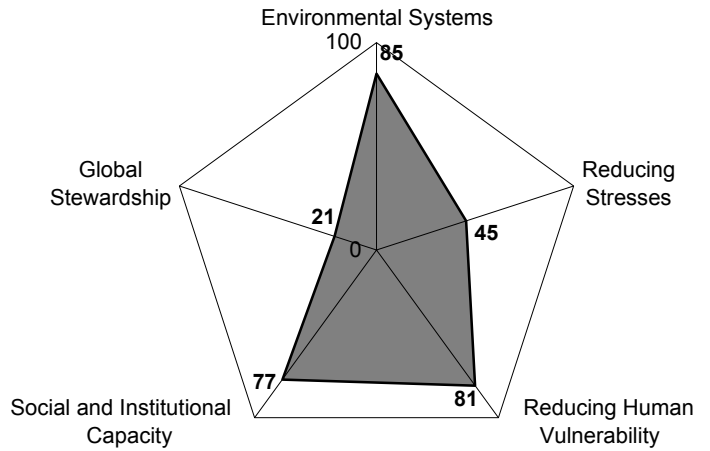
ESI:	52.5
Ranking:	50
GDP/Capita:	\$1,799
Peer group ESI:	46.7
Variable coverage:	59
Missing variables imputed:	10



= Indicator value
 = Reference (average value for peer group)

Canada

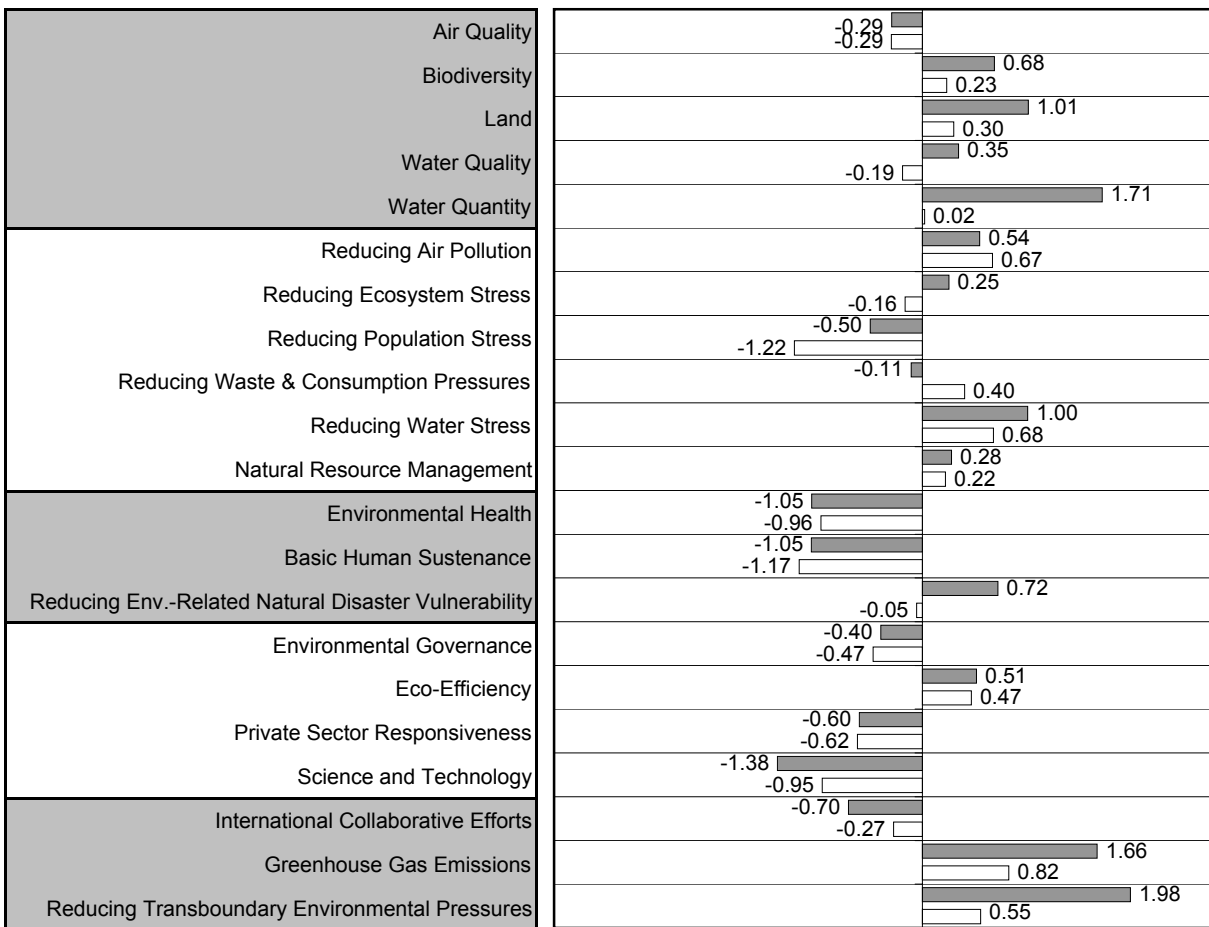
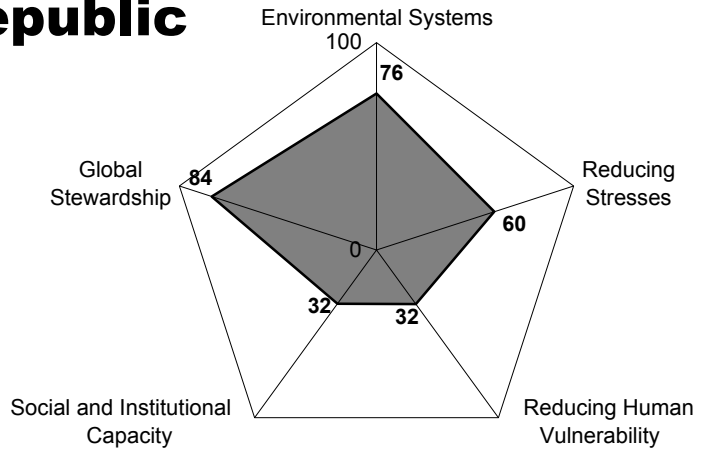
ESI:	64.4
Ranking:	6
GDP/Capita:	\$26,492
Peer group ESI:	55.4
Variable coverage:	73
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Central African Republic

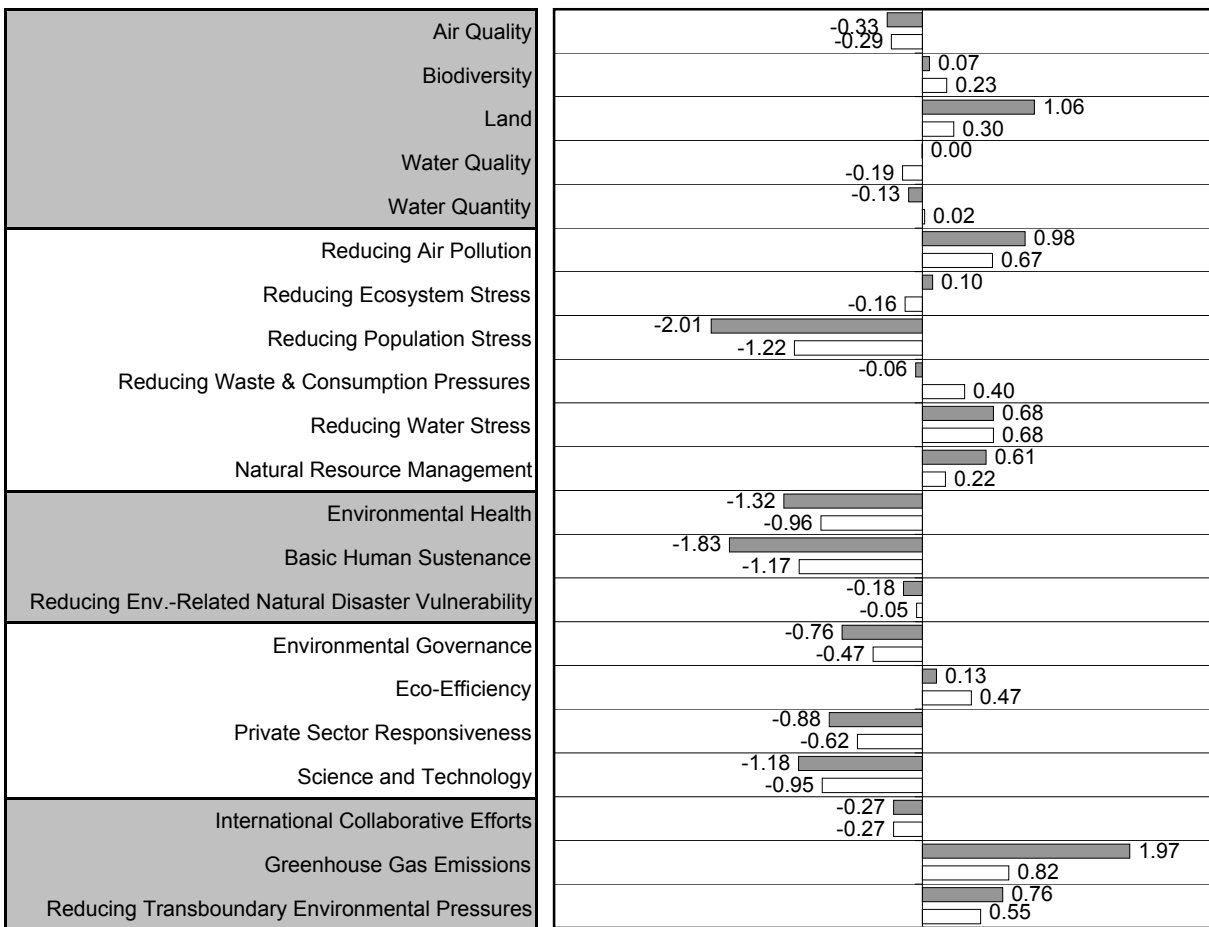
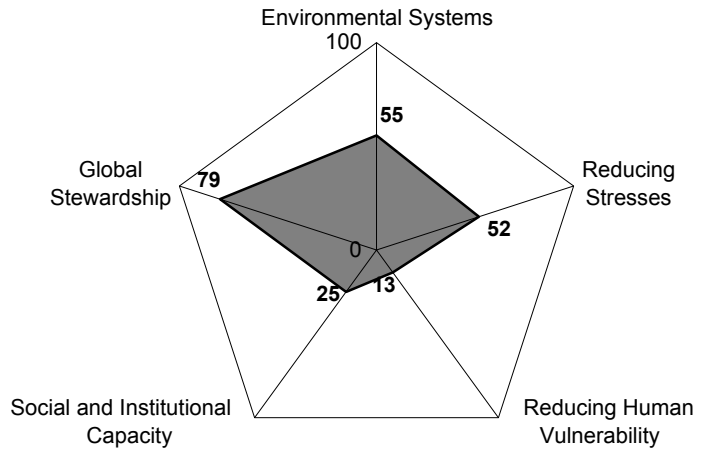
ESI:	58.7
Ranking:	25
GDP/Capita:	\$943
Peer group ESI:	46.4
Variable coverage:	53
Missing variables imputed:	14



= Indicator value
 = Reference (average value for peer group)

Chad

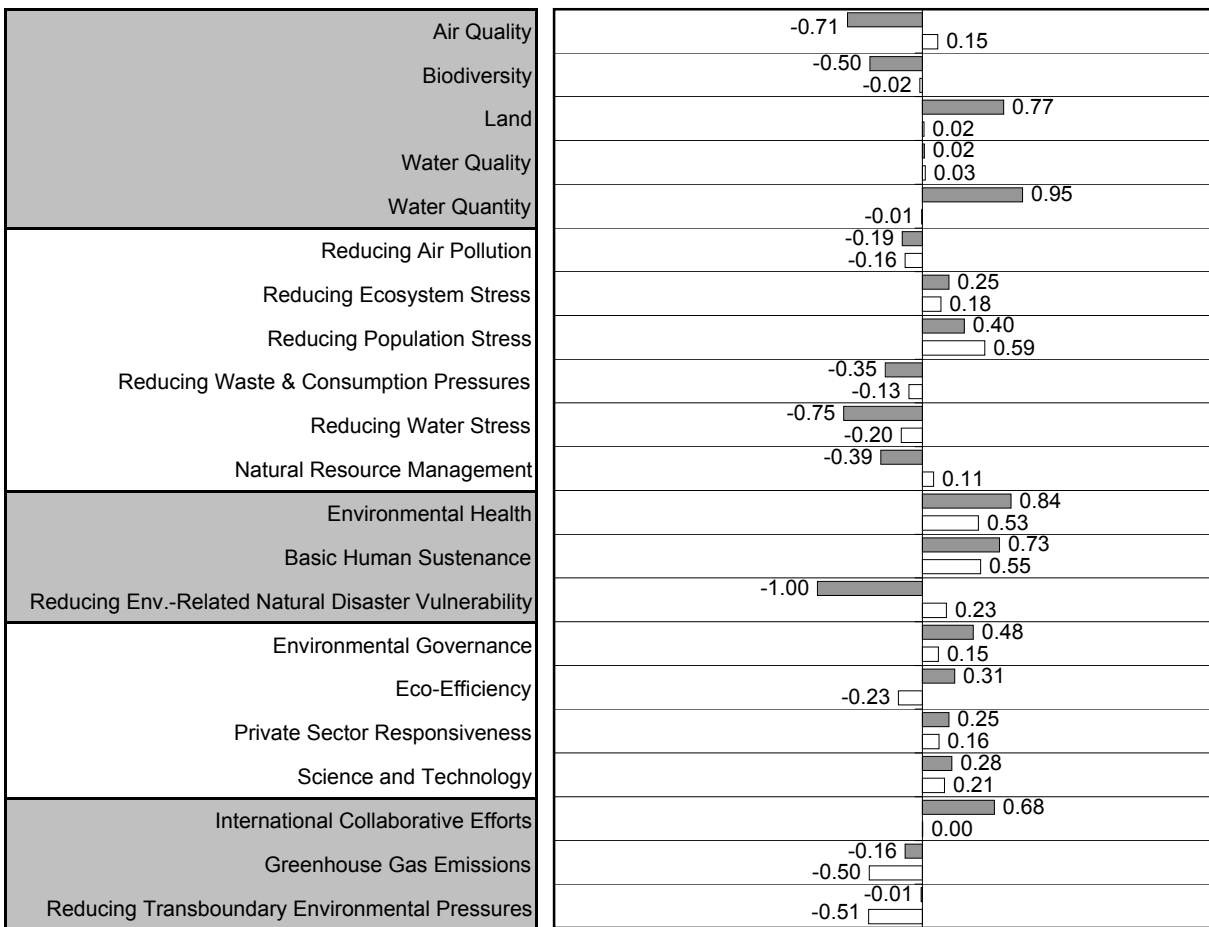
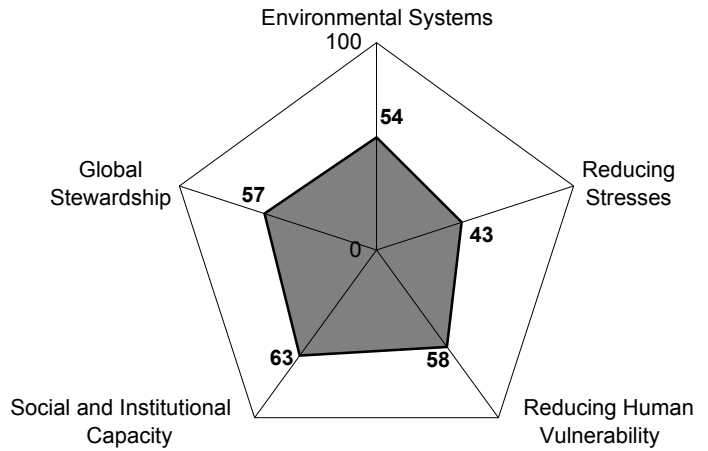
ESI:	45.0
Ranking:	104
GDP/Capita:	\$1,049
Peer group ESI:	46.4
Variable coverage:	55
Missing variables imputed:	12



= Indicator value
 = Reference (average value for peer group)

Chile

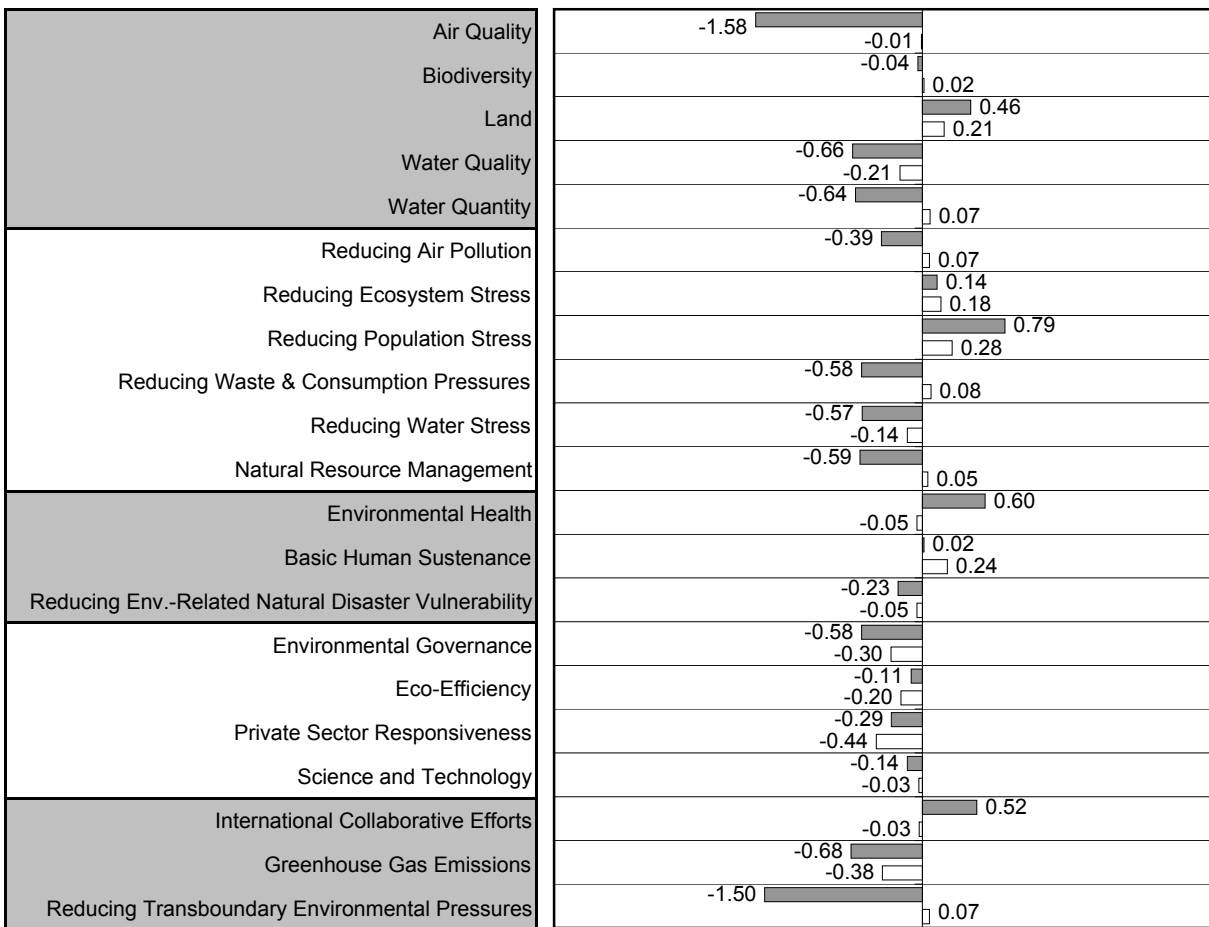
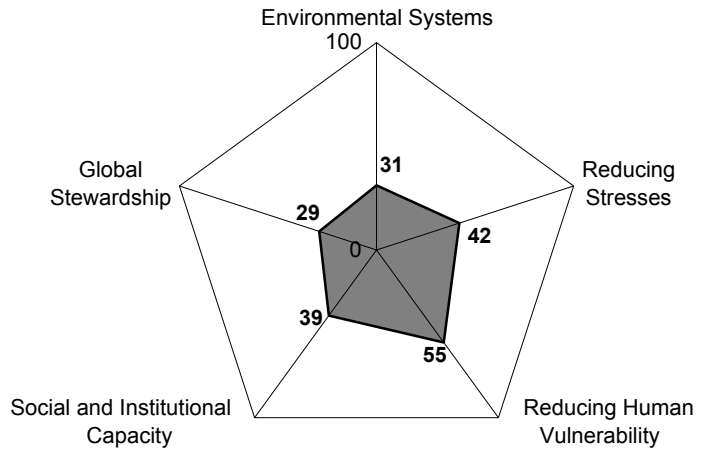
ESI:	53.6
Ranking:	42
GDP/Capita:	\$8,875
Peer group ESI:	52.1
Variable coverage:	68
Missing variables imputed:	4



= Indicator value
 = Reference (average value for peer group)

China

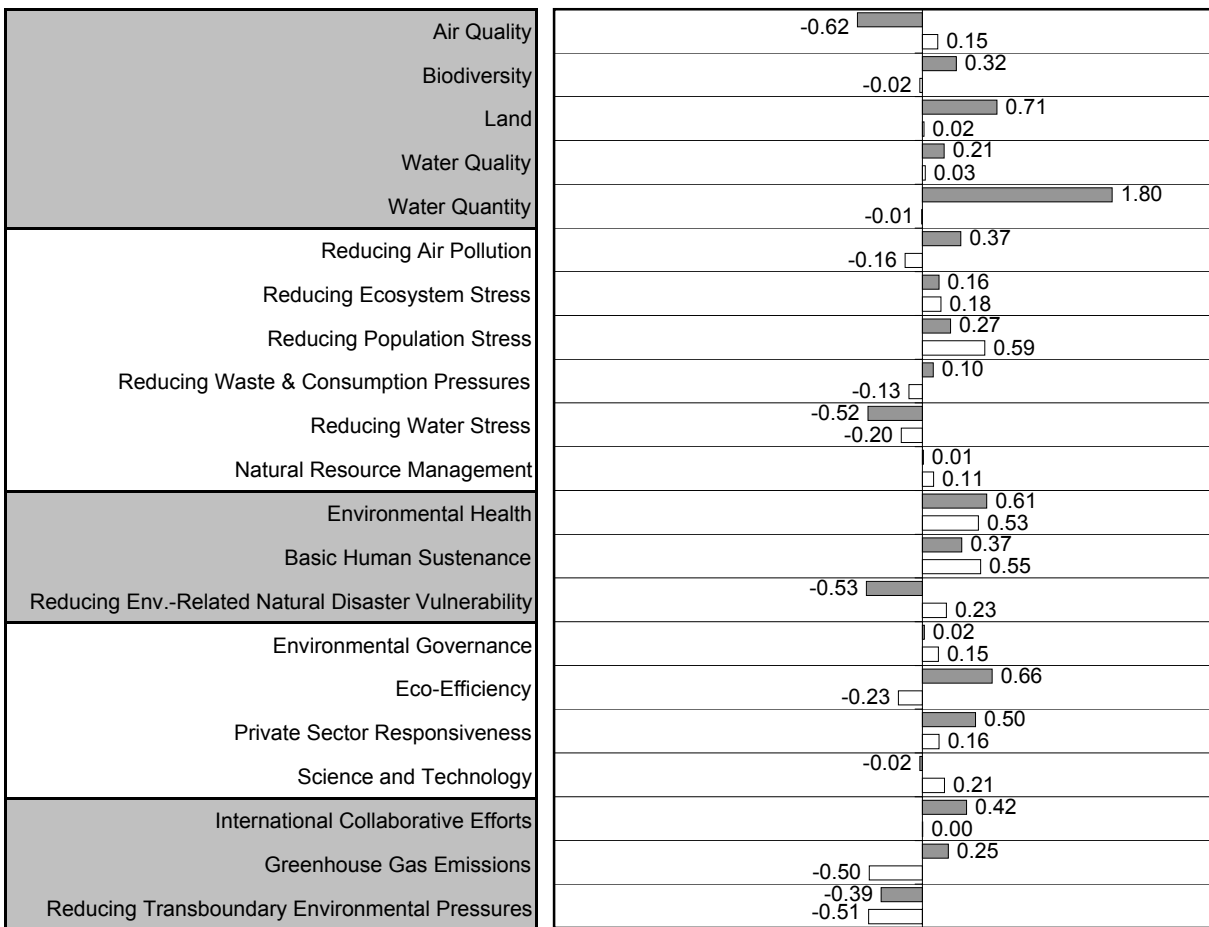
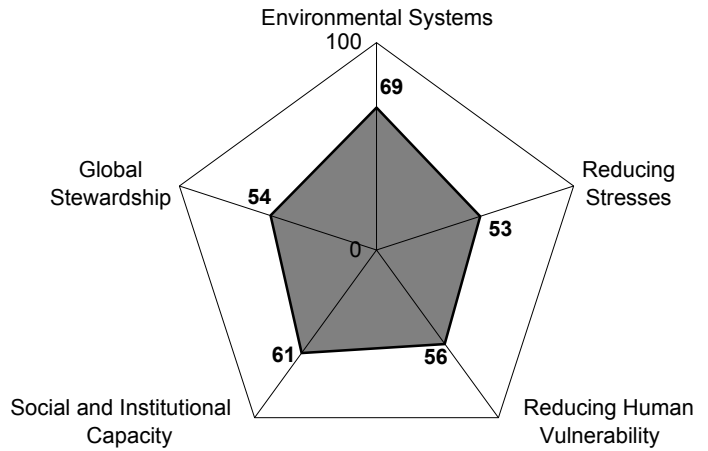
ESI:	38.6
Ranking:	133
GDP/Capita:	\$4,344
Peer group ESI:	48.9
Variable coverage:	72
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Colombia

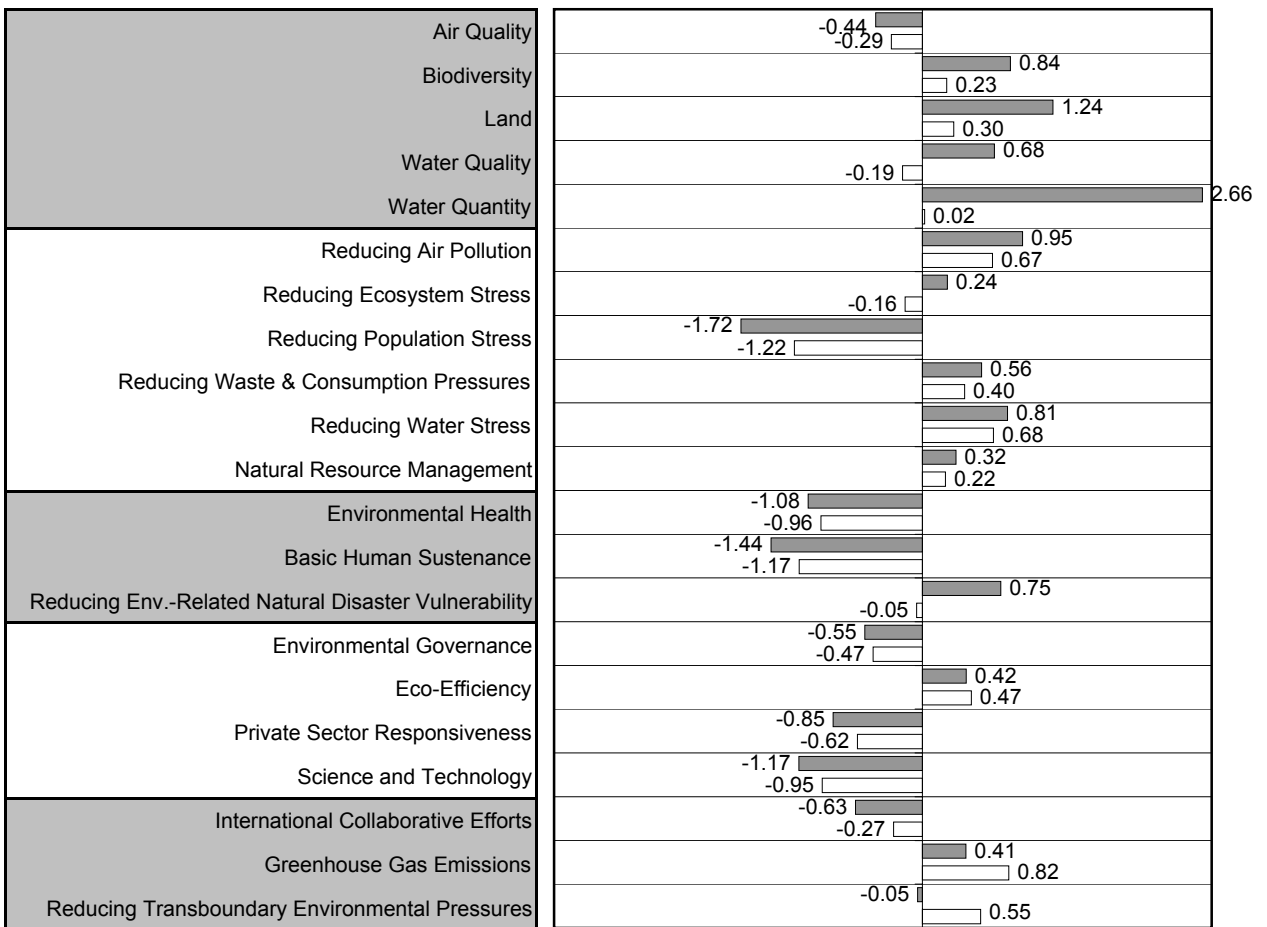
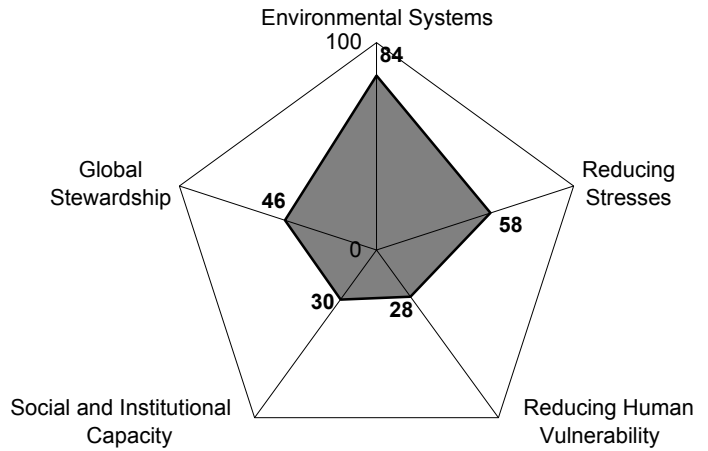
ESI:	58.9
Ranking:	23
GDP/Capita:	\$5,899
Peer group ESI:	52.1
Variable coverage:	65
Missing variables imputed:	5



= Indicator value
 = Reference (average value for peer group)

Congo

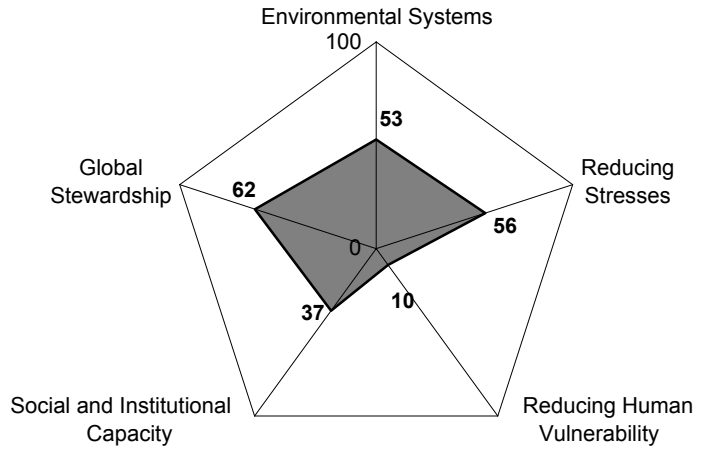
ESI:	53.8
Ranking:	39
GDP/Capita:	\$824
Peer group ESI:	46.4
Variable coverage:	54
Missing variables imputed:	15



= Indicator value
 = Reference (average value for peer group)

Congo, Dem. Rep.

ESI:	44.1
Ranking:	113
GDP/Capita:	\$586
Peer group ESI:	46.4
Variable coverage:	51
Missing variables imputed:	17

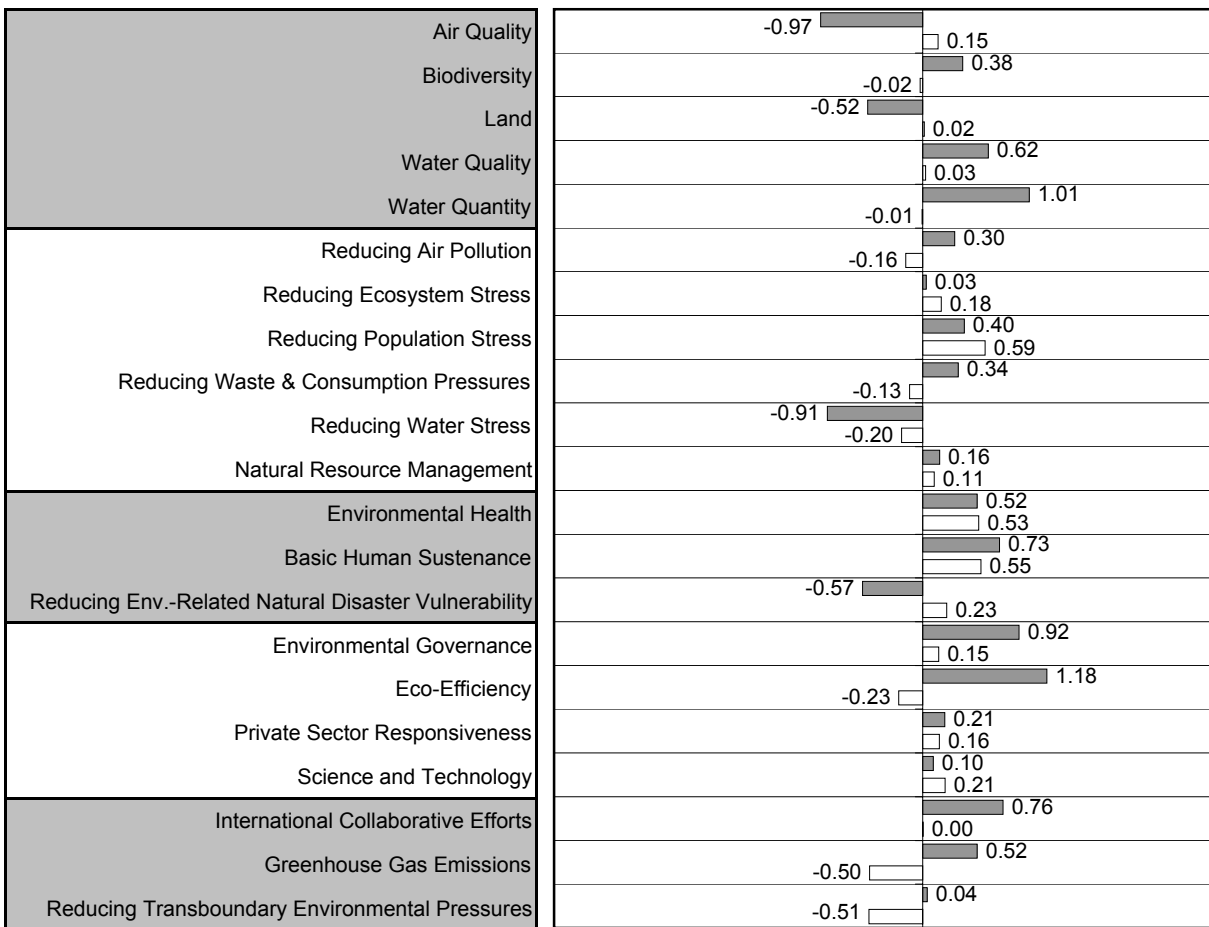
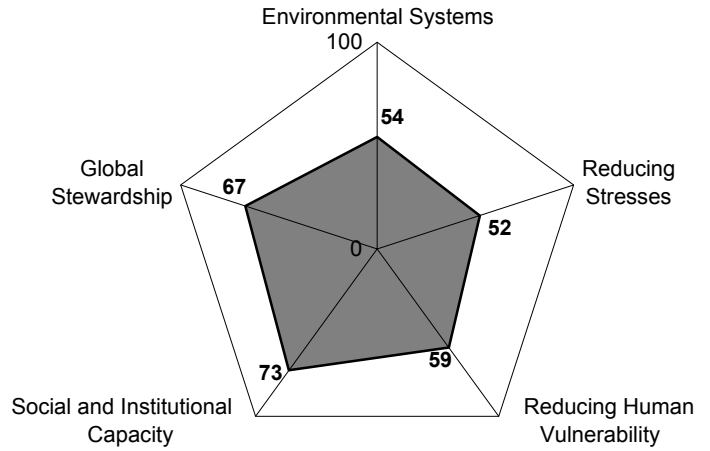


Air Quality	-0.53	0.29
Biodiversity	0.60	0.23
Land	0.37	0.30
Water Quality	-0.03	-0.19
Water Quantity	-0.05	0.02
Reducing Air Pollution	1.56	0.67
Reducing Ecosystem Stress	0.16	-0.16
Reducing Population Stress	-2.11	-1.22
Reducing Waste & Consumption Pressures	0.21	0.40
Reducing Water Stress	0.89	0.68
Natural Resource Management	0.14	0.22
Environmental Health	-1.84	-0.96
Basic Human Sustenance	-2.66	-1.17
Reducing Env.-Related Natural Disaster Vulnerability	0.60	-0.05
Environmental Governance	-0.87	-0.47
Eco-Efficiency	1.92	0.47
Private Sector Responsiveness	-0.97	-0.62
Science and Technology	-1.38	-0.95
International Collaborative Efforts	-0.72	-0.27
Greenhouse Gas Emissions	1.20	0.82
Reducing Transboundary Environmental Pressures	0.40	0.55

= Indicator value
 = Reference (average value for peer group)

Costa Rica

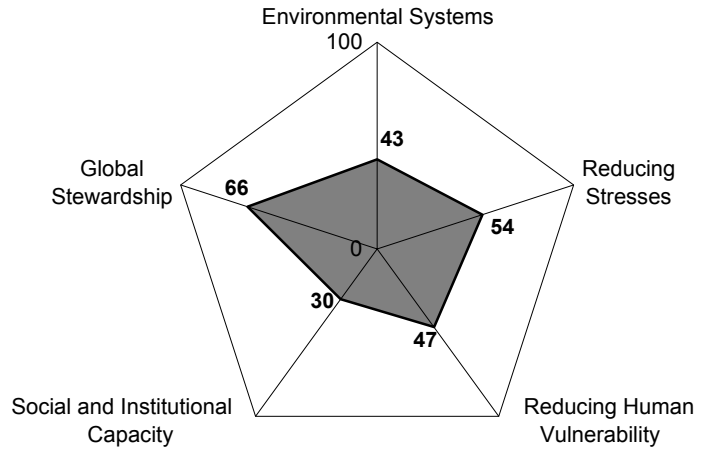
ESI:	59.6
Ranking:	18
GDP/Capita:	\$8,252
Peer group ESI:	52.1
Variable coverage:	65
Missing variables imputed:	4



= Indicator value
 = Reference (average value for peer group)

Côte d'Ivoire

ESI:	47.3
Ranking:	88
GDP/Capita:	\$1,277
Peer group ESI:	46.4
Variable coverage:	53
Missing variables imputed:	15

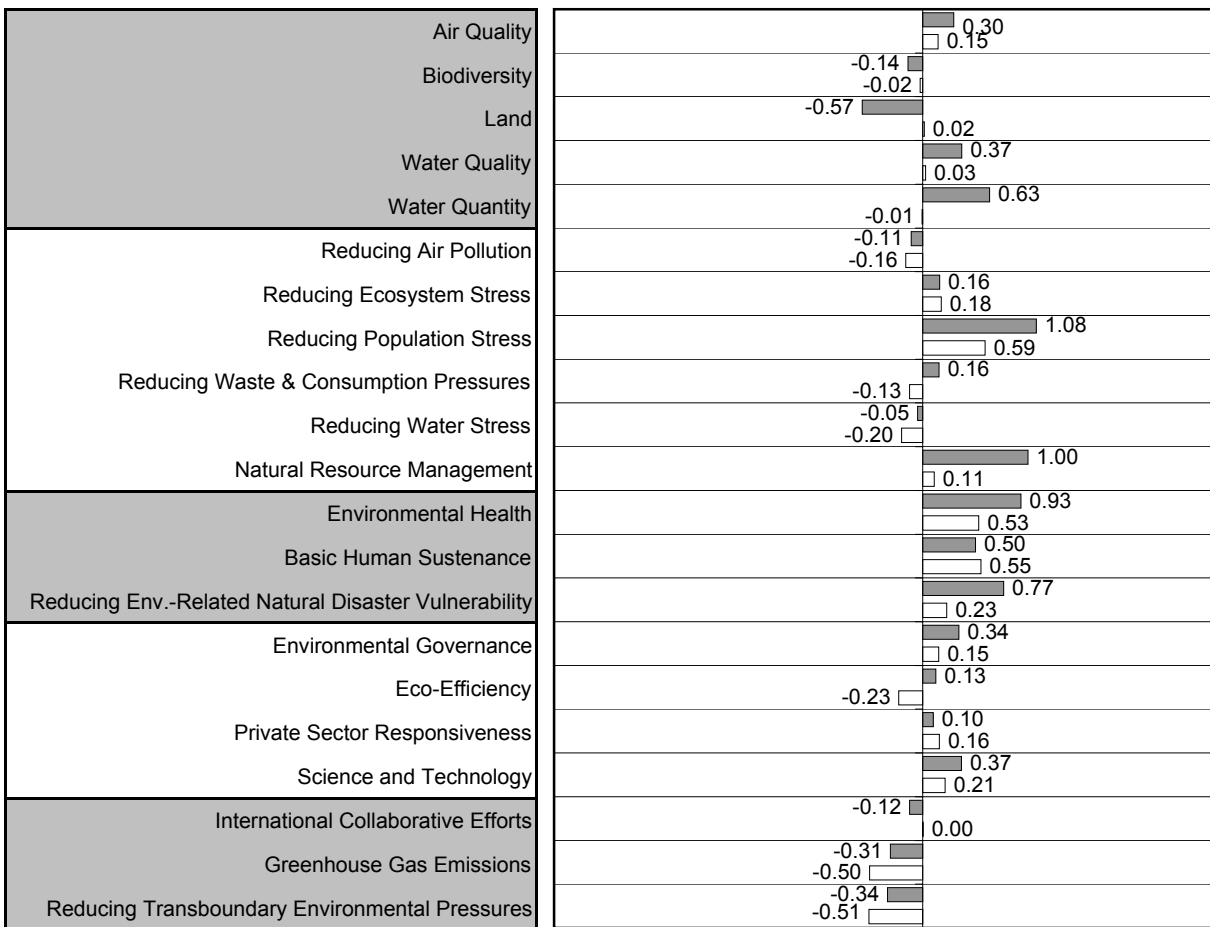
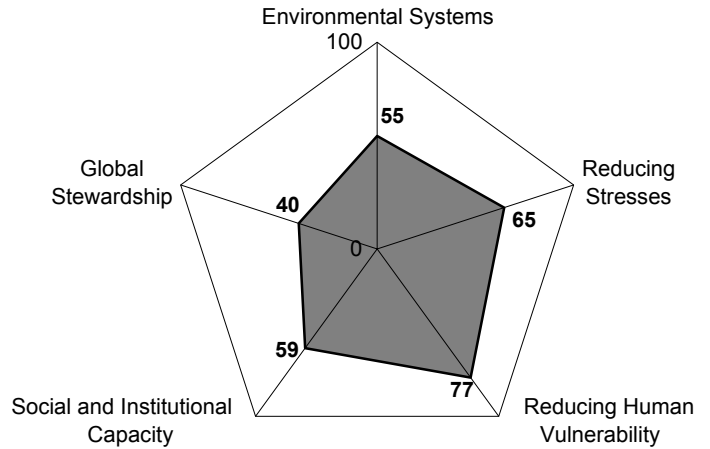


Air Quality	-0.63	0.01
Biodiversity	-0.29	0.23
Land	-0.03	0.30
Water Quality	-0.27	0.08
Water Quantity	-0.19	0.02
Reducing Air Pollution		1.06
Reducing Ecosystem Stress	-0.68	0.67
Reducing Population Stress	-0.58	
Reducing Waste & Consumption Pressures	-1.22	-0.08
Reducing Water Stress		0.40
Natural Resource Management		0.66
Environmental Health		0.68
Basic Human Sustenance	-0.69	0.16
Reducing Env.-Related Natural Disaster Vulnerability	-0.96	0.22
Environmental Governance		0.09
Eco-Efficiency	-1.17	0.36
Private Sector Responsiveness	-0.05	0.37
Science and Technology	-0.46	0.47
International Collaborative Efforts	-0.47	
Greenhouse Gas Emissions	-0.82	0.42
Reducing Transboundary Environmental Pressures	-0.62	0.55
	-1.19	0.50
	-0.95	-0.27
		0.31
		0.82
		0.42
		0.55

= Indicator value
 = Reference (average value for peer group)

Croatia

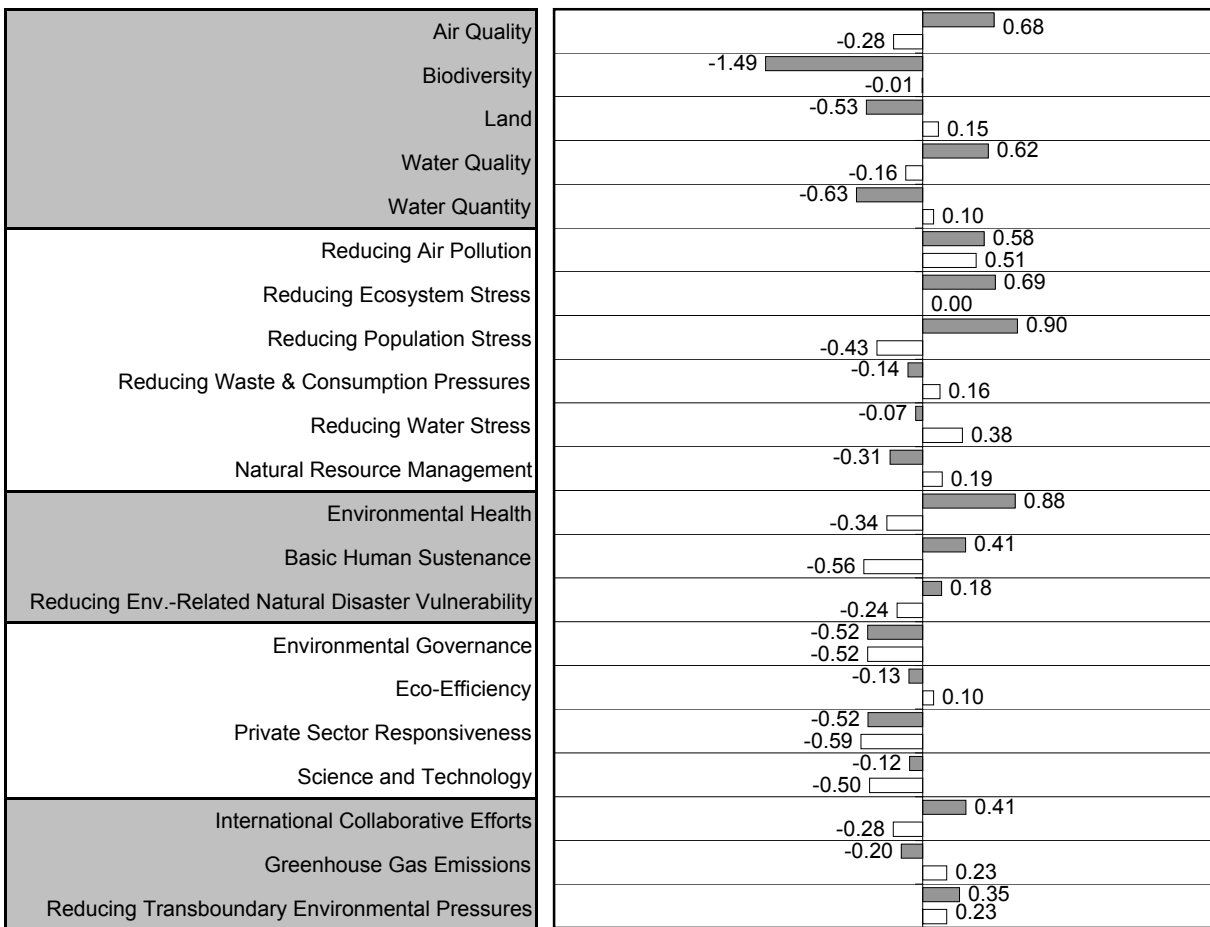
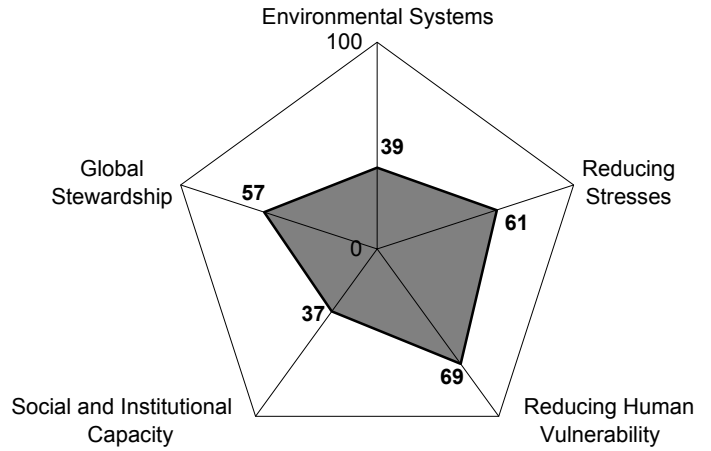
ESI:	59.5
Ranking:	19
GDP/Capita:	\$9,687
Peer group ESI:	52.1
Variable coverage:	67
Missing variables imputed:	6



= Indicator value
 = Reference (average value for peer group)

Cuba

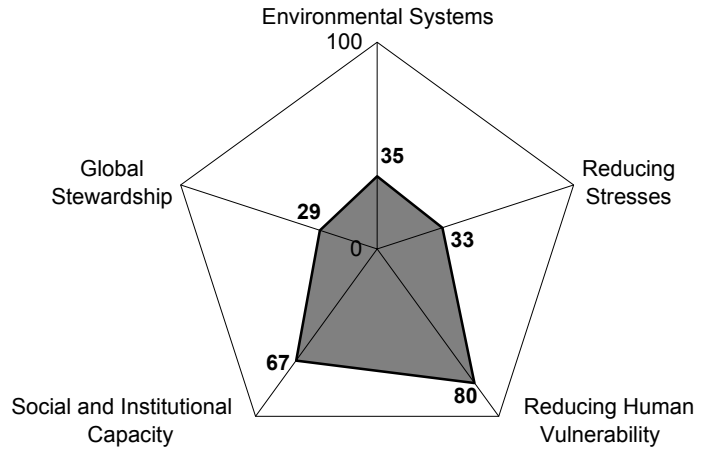
ESI:	52.3
Ranking:	53
GDP/Capita:	\$2,900
Peer group ESI:	46.7
Variable coverage:	63
Missing variables imputed:	9



= Indicator value
 = Reference (average value for peer group)

Czech Republic

ESI:	46.6
Ranking:	92
GDP/Capita:	\$14,304
Peer group ESI:	55.4
Variable coverage:	69
Missing variables imputed:	3

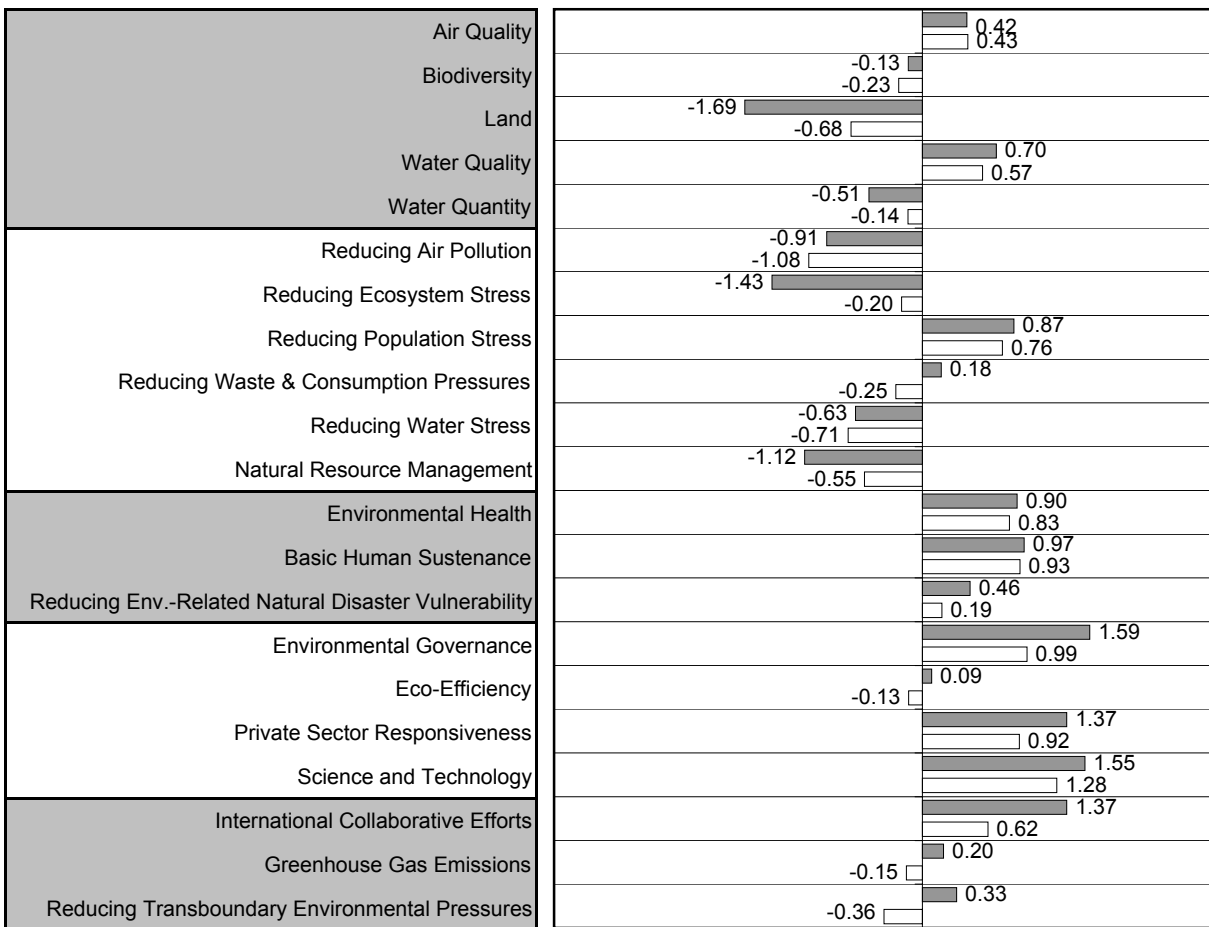
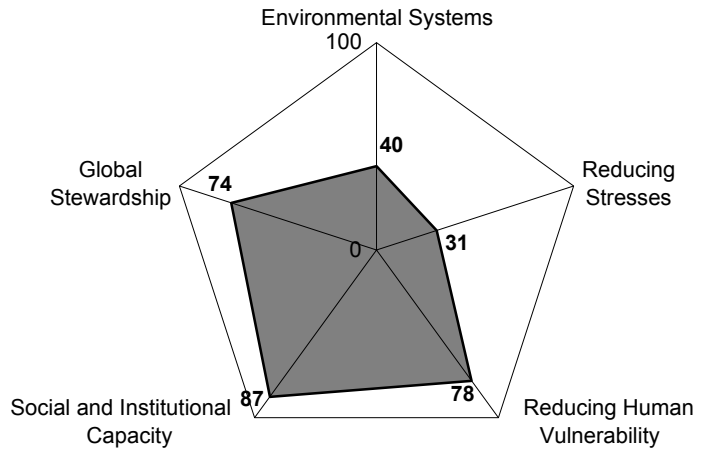


Air Quality	0.51	0.43
Biodiversity	0.02	-0.23
Land	-0.96	-0.68
Water Quality	-0.54	0.57
Water Quantity	-0.95	-0.14
Reducing Air Pollution	-1.31	-1.08
Reducing Ecosystem Stress	-1.53	-0.20
Reducing Population Stress	1.08	0.76
Reducing Waste & Consumption Pressures	-0.28	-0.25
Reducing Water Stress	-1.09	-0.71
Natural Resource Management	0.53	-0.55
Environmental Health	0.95	0.83
Basic Human Sustenance	0.91	0.93
Reducing Env.-Related Natural Disaster Vulnerability	0.69	0.19
Environmental Governance	0.76	0.99
Eco-Efficiency	-0.41	-0.13
Private Sector Responsiveness	0.88	0.92
Science and Technology	0.50	1.28
International Collaborative Efforts	0.09	0.62
Greenhouse Gas Emissions	-1.07	-0.15
Reducing Transboundary Environmental Pressures	-0.68	-0.36

= Indicator value
 = Reference (average value for peer group)

Denmark

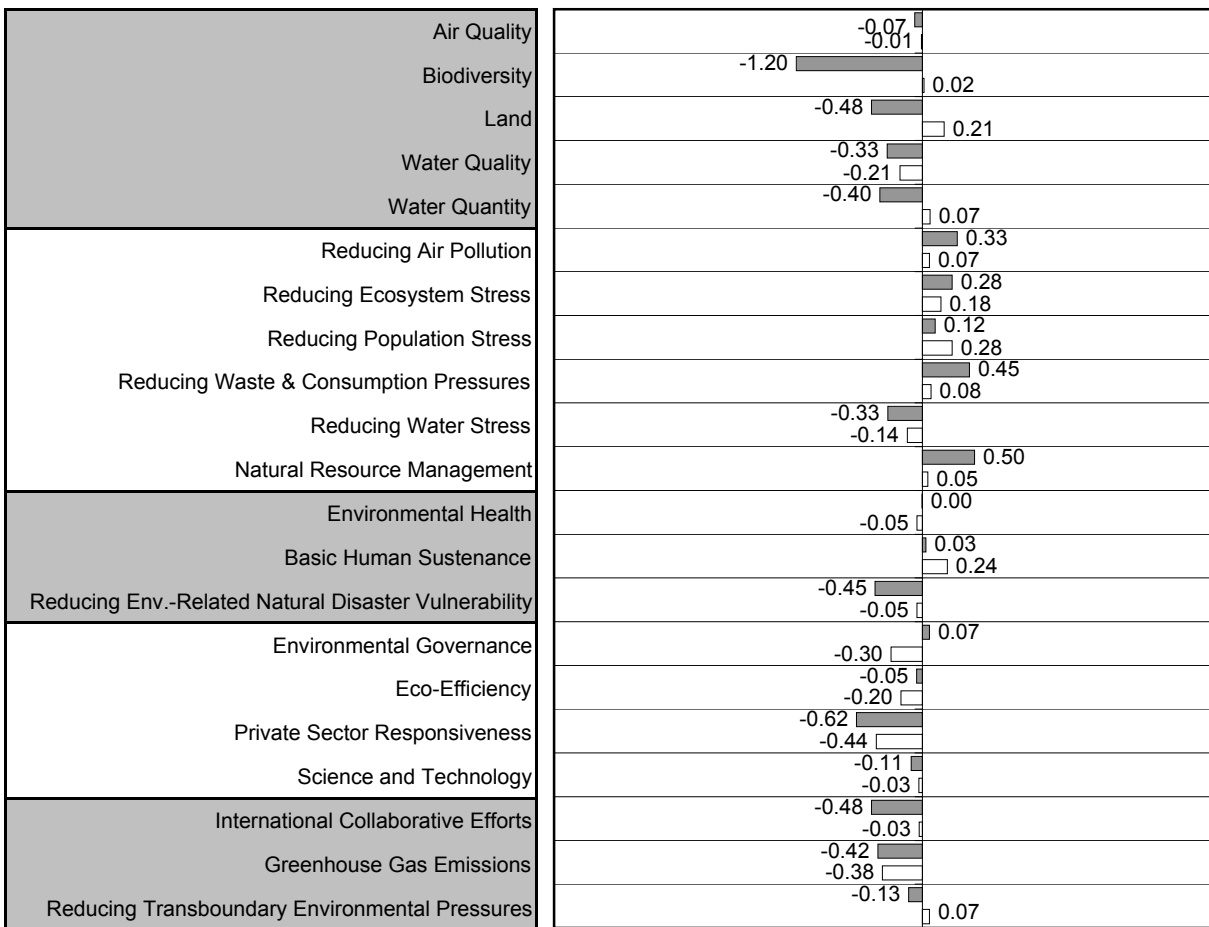
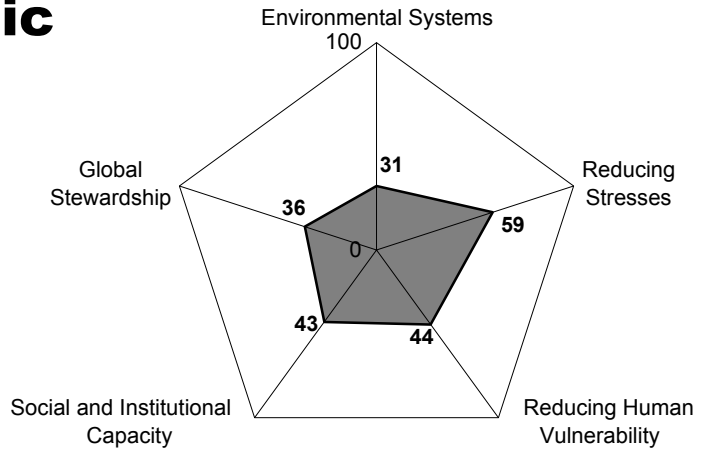
ESI:	58.2
Ranking:	26
GDP/Capita:	\$27,507
Peer group ESI:	55.4
Variable coverage:	73
Missing variables imputed:	0



= Indicator value
 = Reference (average value for peer group)

Dominican Republic

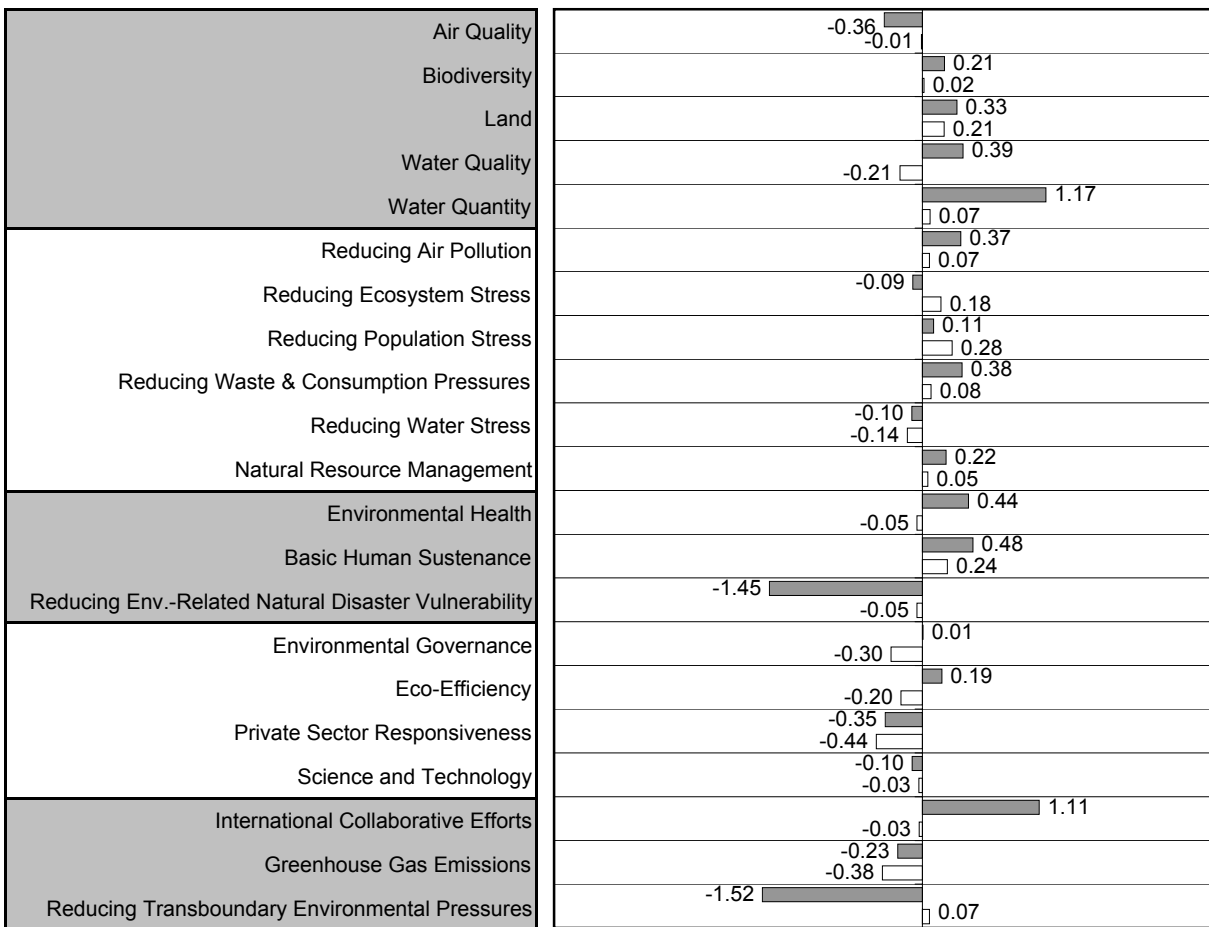
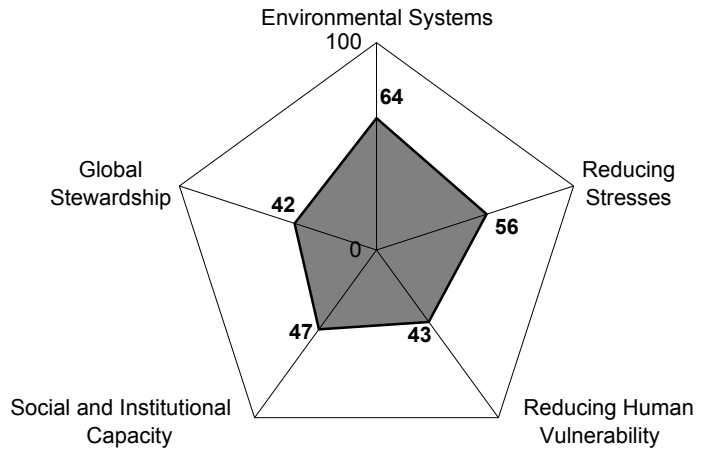
ESI:	43.7
Ranking:	119
GDP/Capita:	\$5,829
Peer group ESI:	48.9
Variable coverage:	58
Missing variables imputed:	10



= Indicator value
 = Reference (average value for peer group)

Ecuador

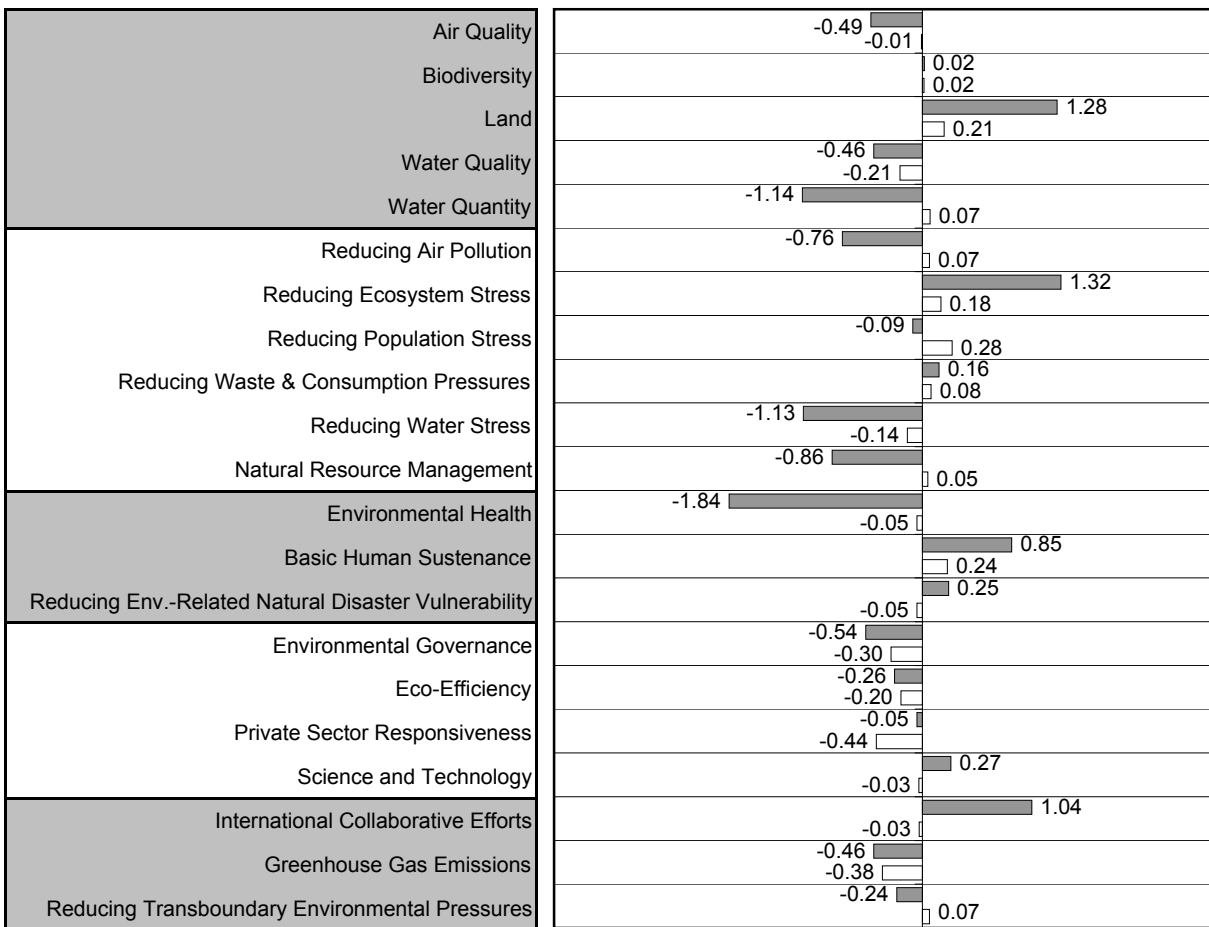
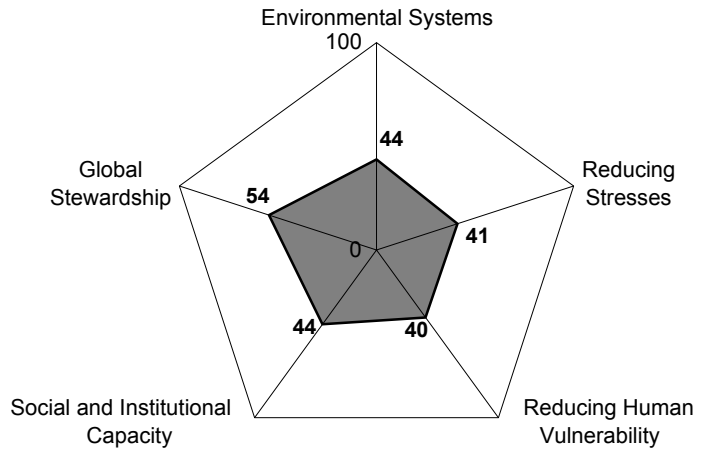
ESI:	52.4
Ranking:	51
GDP/Capita:	\$3,203
Peer group ESI:	48.9
Variable coverage:	66
Missing variables imputed:	5



= Indicator value
 = Reference (average value for peer group)

Egypt

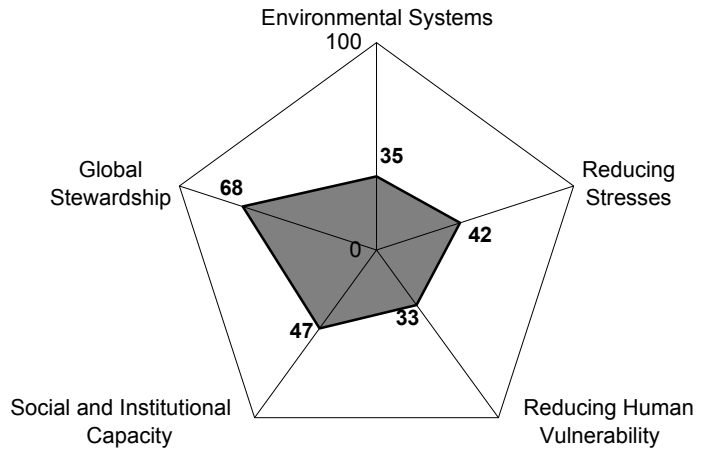
ESI:	44.0
Ranking:	115
GDP/Capita:	\$3,435
Peer group ESI:	48.9
Variable coverage:	63
Missing variables imputed:	7



= Indicator value
 = Reference (average value for peer group)

El Salvador

ESI:	43.8
Ranking:	118
GDP/Capita:	\$4,343
Peer group ESI:	48.9
Variable coverage:	65
Missing variables imputed:	5

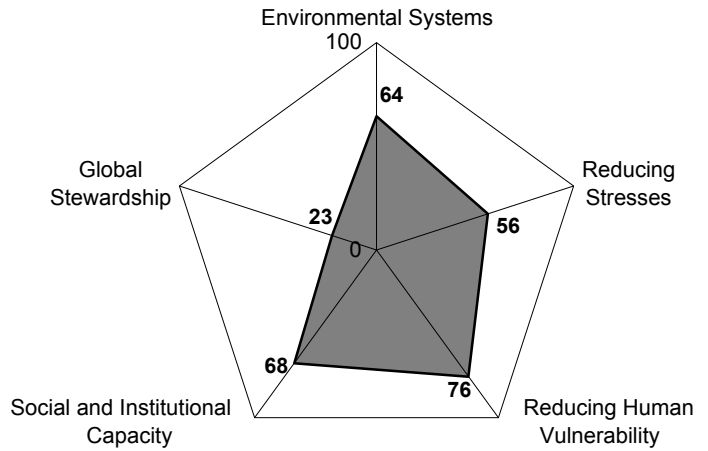


Air Quality	-0.86	-0.01
Biodiversity		0.36
Land	-0.93	0.21
Water Quality	-0.01	
Water Quantity	-0.21	
Reducing Air Pollution	-0.43	0.07
Reducing Ecosystem Stress		0.06
Reducing Population Stress	-1.07	0.07
Reducing Waste & Consumption Pressures		0.18
Reducing Water Stress	-0.17	0.16
Natural Resource Management	-0.21	0.28
Environmental Health	-0.14	0.08
Basic Human Sustenance		0.07
Reducing Env.-Related Natural Disaster Vulnerability	-0.36	0.05
Environmental Governance	-0.05	0.24
Eco-Efficiency	-1.04	0.01
Private Sector Responsiveness	-0.30	0.75
Science and Technology	-0.20	
International Collaborative Efforts	-0.89	
Greenhouse Gas Emissions	-0.44	
Reducing Transboundary Environmental Pressures	-0.20	
	-0.03	
	-0.06	
	-0.03	
		0.32
	-0.38	1.12
		0.07

= Indicator value
 = Reference (average value for peer group)

Estonia

ESI:	58.2
Ranking:	27
GDP/Capita:	\$11,608
Peer group ESI:	52.1
Variable coverage:	69
Missing variables imputed:	3

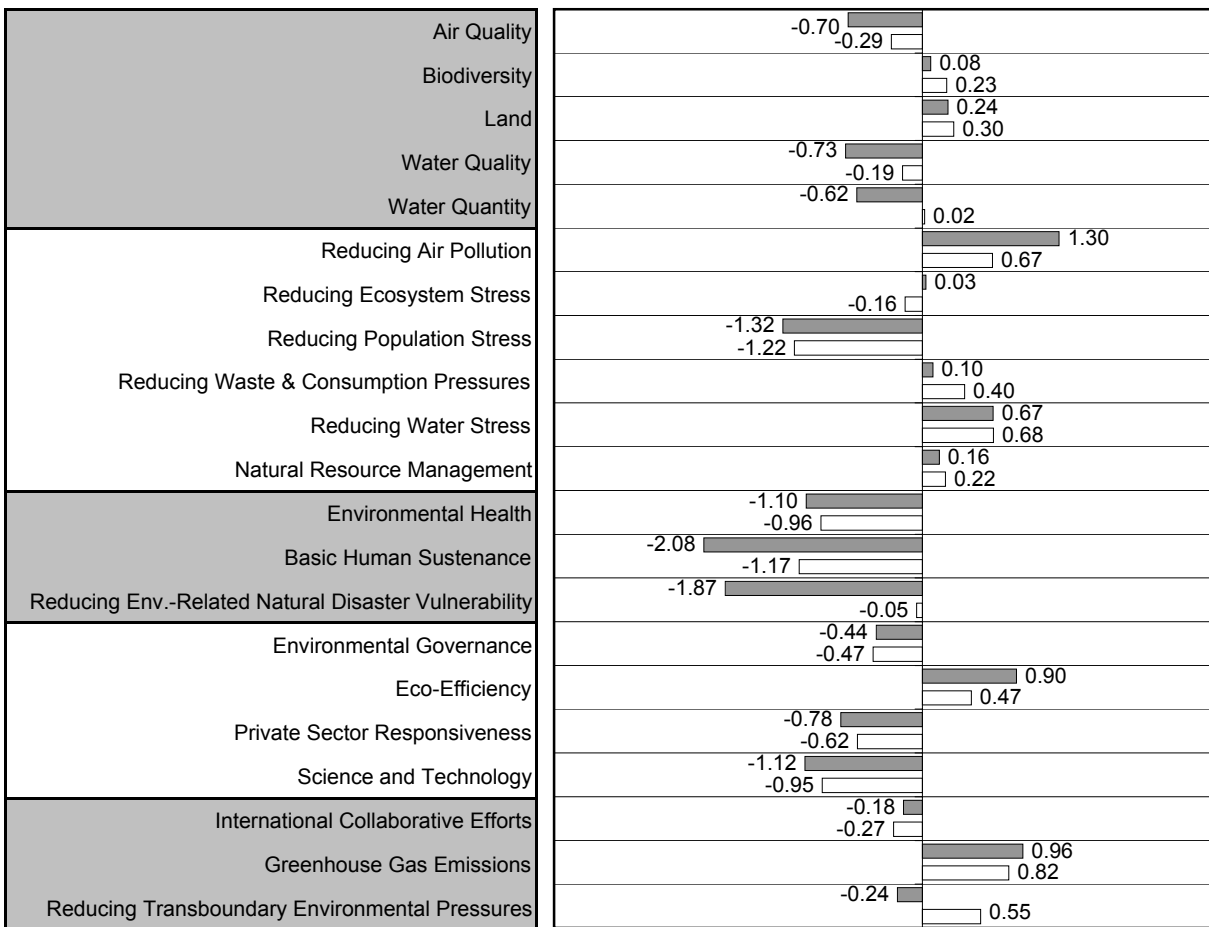
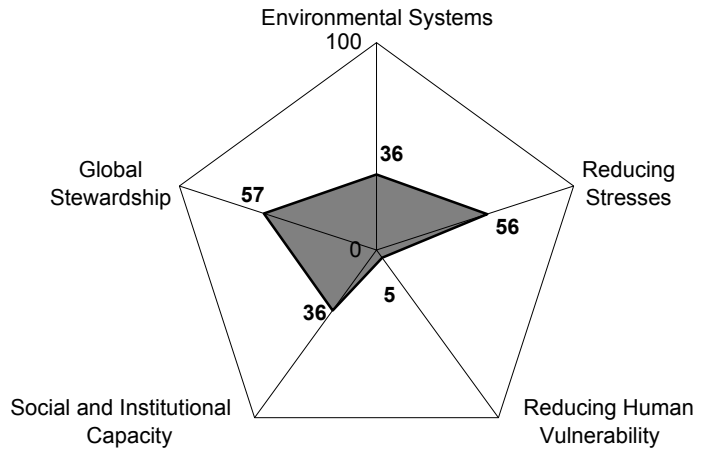


Air Quality	0.15	0.87
Biodiversity	0.00	
Land	-0.02	
Water Quality	-0.30	0.02
Water Quantity		0.03
Reducing Air Pollution	-0.01	0.32
Reducing Ecosystem Stress	-0.13	
Reducing Population Stress	-0.16	
Reducing Waste & Consumption Pressures		0.47
Reducing Water Stress		0.18
Natural Resource Management		1.11
Environmental Health	-1.25	0.59
Basic Human Sustenance	-0.13	
Reducing Env.-Related Natural Disaster Vulnerability	-0.20	0.18
Environmental Governance		0.60
Eco-Efficiency		0.11
Private Sector Responsiveness		0.74
Science and Technology		0.53
International Collaborative Efforts		0.87
Greenhouse Gas Emissions		0.55
Reducing Transboundary Environmental Pressures		0.46
		0.23
		0.78
	-0.50	0.15
	-0.23	
		0.59
		0.16
		0.94
		0.21
	-0.73	0.00
	-1.27	
	-0.50	
	-0.27	
	-0.51	

= Indicator value
 = Reference (average value for peer group)

Ethiopia

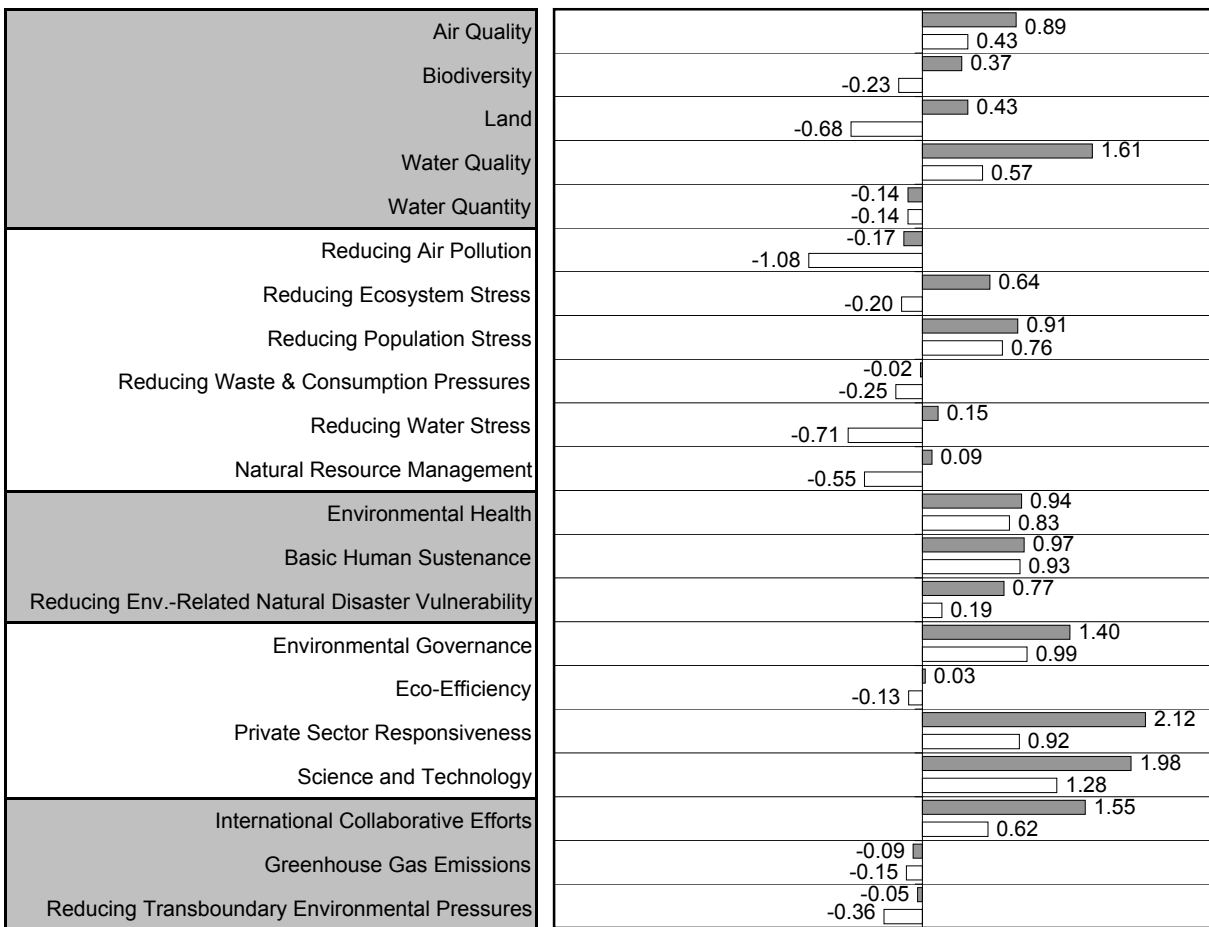
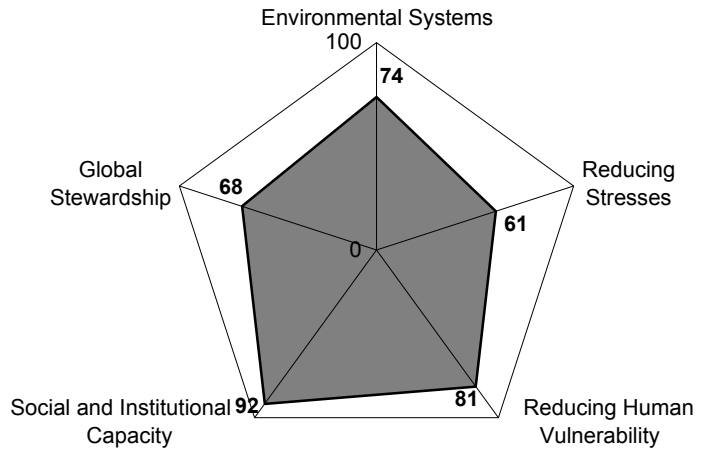
ESI:	37.8
Ranking:	135
GDP/Capita:	\$622
Peer group ESI:	46.4
Variable coverage:	58
Missing variables imputed:	9



= Indicator value
 = Reference (average value for peer group)

Finland

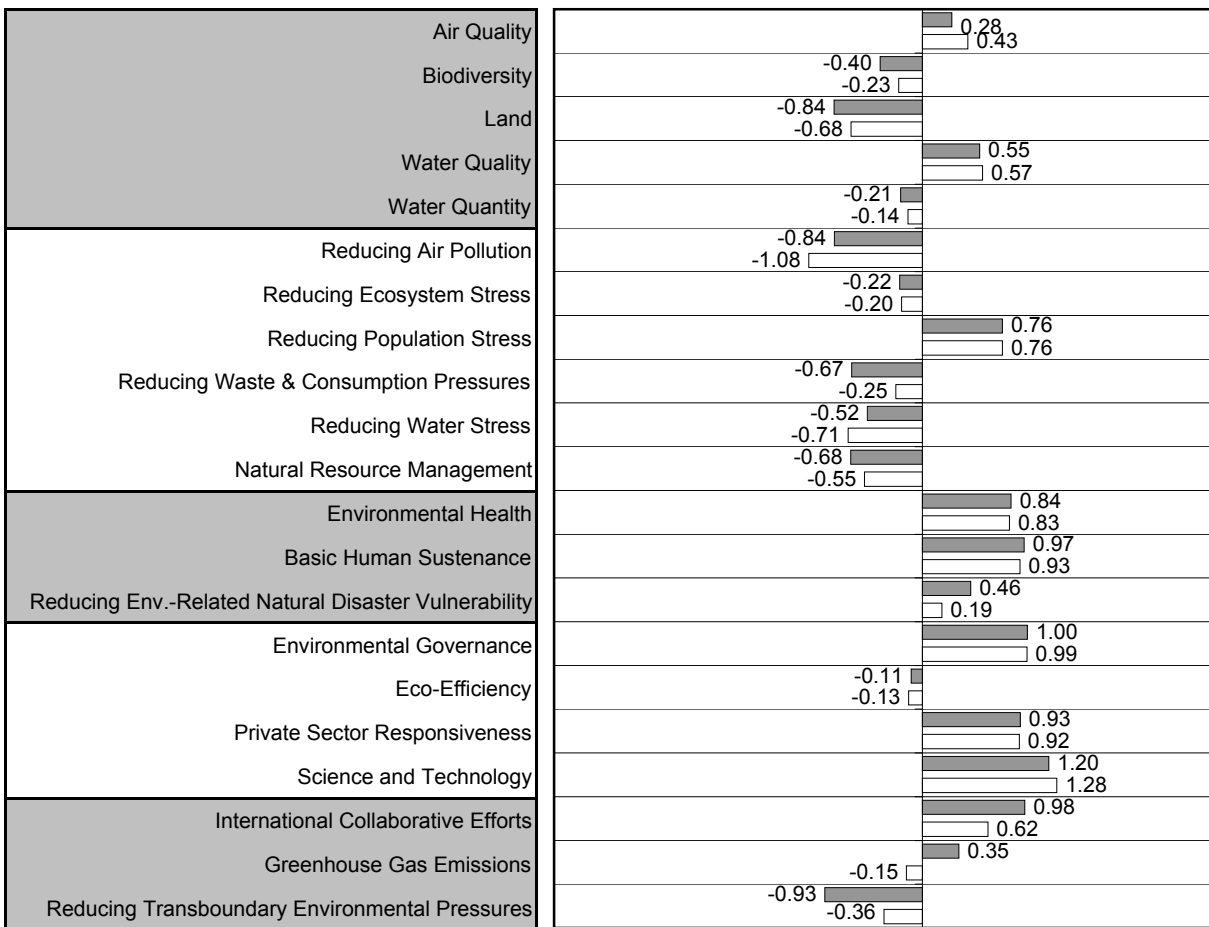
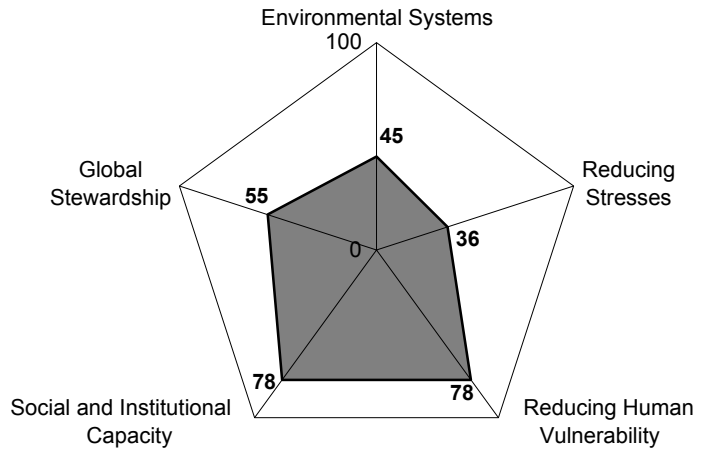
ESI:	75.1
Ranking:	1
GDP/Capita:	\$23,700
Peer group ESI:	55.4
Variable coverage:	75
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

France

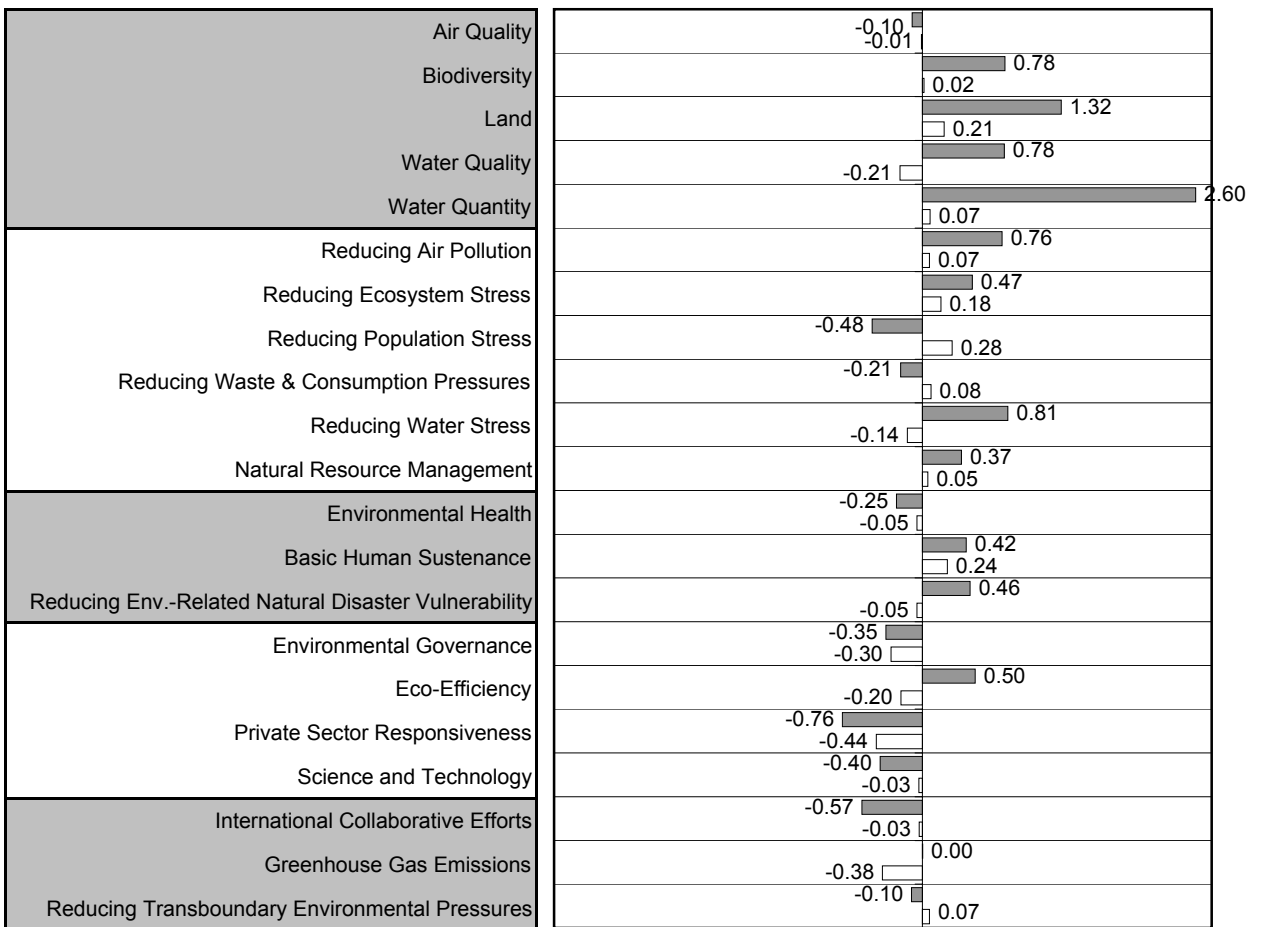
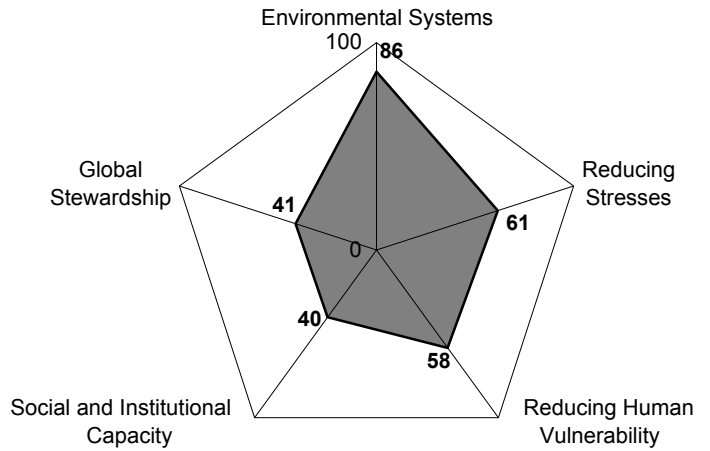
ESI:	55.2
Ranking:	36
GDP/Capita:	\$23,765
Peer group ESI:	55.4
Variable coverage:	74
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Gabon

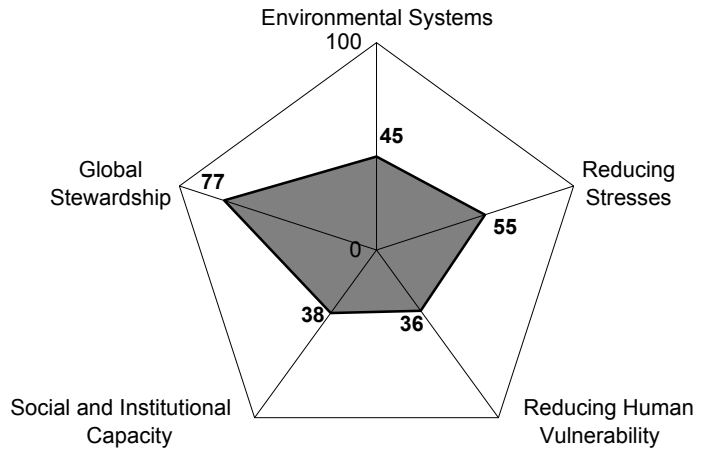
ESI:	61.7
Ranking:	12
GDP/Capita:	\$5,335
Peer group ESI:	48.9
Variable coverage:	52
Missing variables imputed:	16



= Indicator value
 = Reference (average value for peer group)

Gambia

ESI:	50.0
Ranking:	72
GDP/Capita:	\$1,491
Peer group ESI:	46.7
Variable coverage:	55
Missing variables imputed:	12

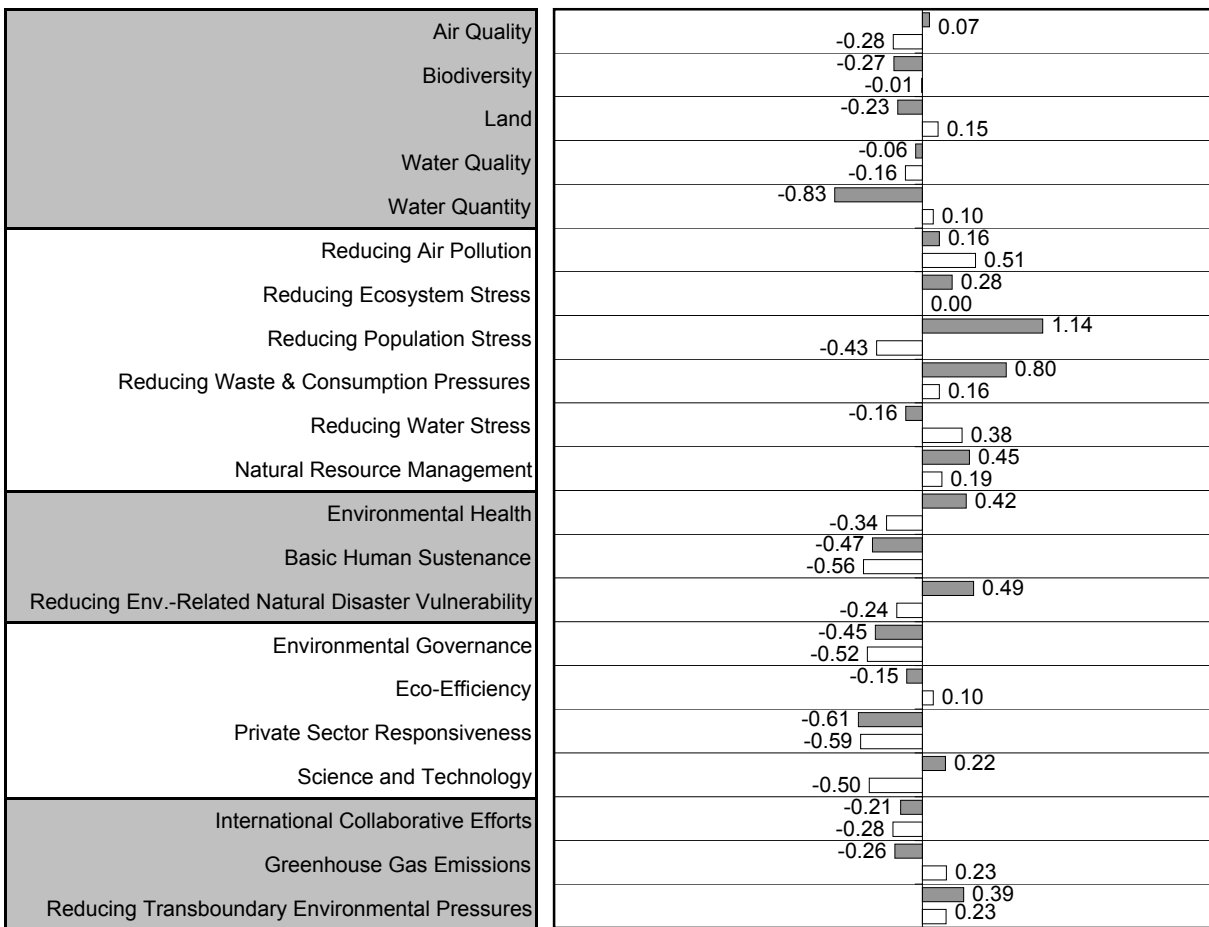
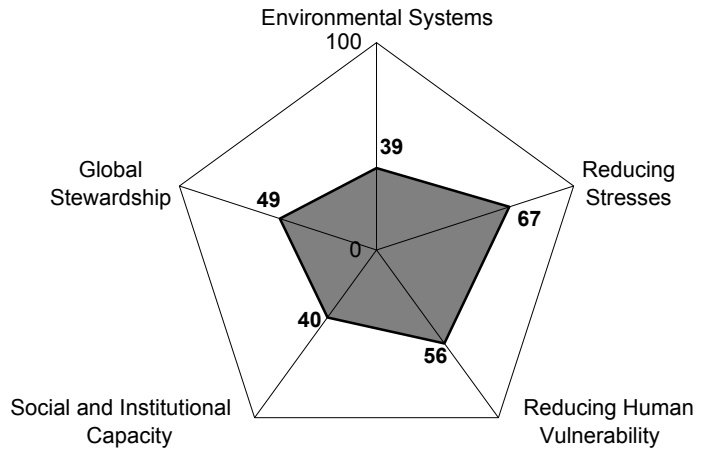


Air Quality	-0.08	
Biodiversity	-0.28	0.59
Land	-0.01	
Water Quality	-0.39	0.15
Water Quantity	-0.27	
Reducing Air Pollution	-0.47	0.10
Reducing Ecosystem Stress		0.58
Reducing Population Stress		0.51
Reducing Waste & Consumption Pressures		0.60
Reducing Water Stress	-1.46	0.00
Natural Resource Management	-0.43	
Environmental Health		0.17
Basic Human Sustenance		0.16
Reducing Env.-Related Natural Disaster Vulnerability		0.94
Environmental Governance	-0.07	0.38
Eco-Efficiency	-0.74	0.19
Private Sector Responsiveness	-0.34	
Science and Technology	-0.34	
International Collaborative Efforts	-0.56	0.03
Greenhouse Gas Emissions	-0.24	
Reducing Transboundary Environmental Pressures	-0.43	
	-0.52	
		0.09
		0.10
	-0.16	
	-0.59	
	-0.78	
	-0.50	
	-0.34	
	-0.28	
		0.85
		0.23
		1.73
		0.23

= Indicator value
 = Reference (average value for peer group)

Georgia

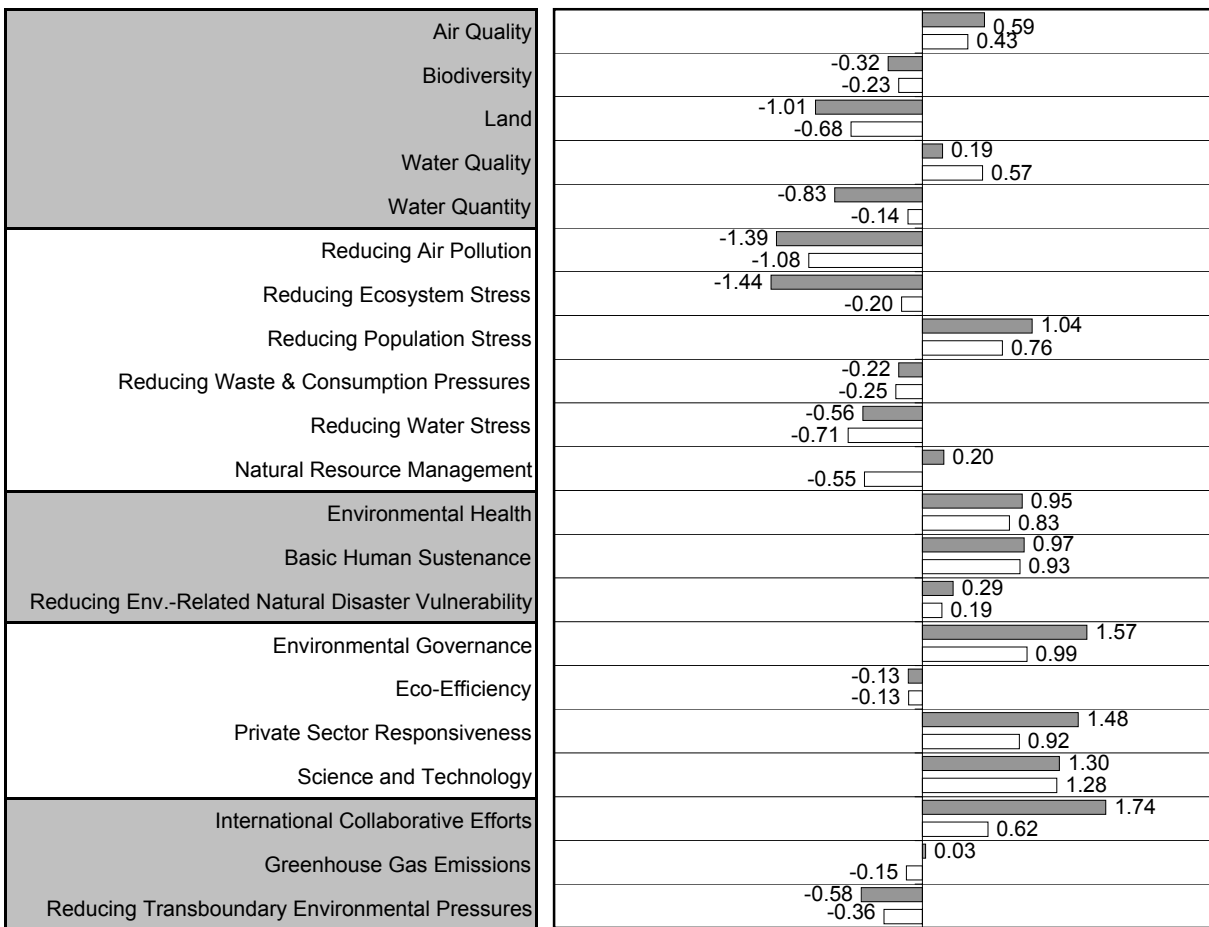
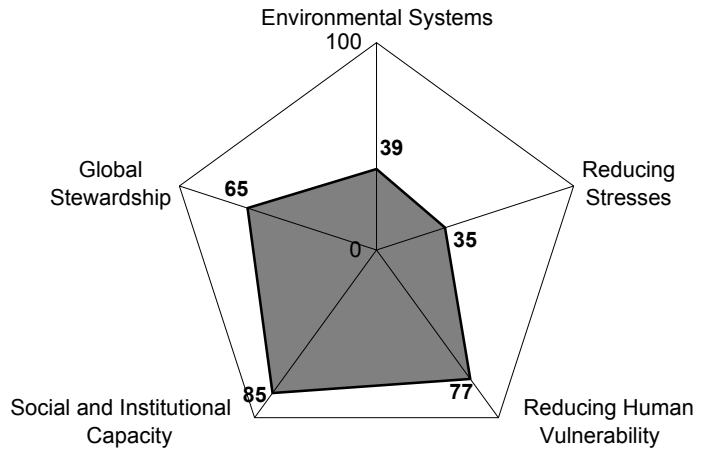
ESI:	51.5
Ranking:	56
GDP/Capita:	\$2,234
Peer group ESI:	46.7
Variable coverage:	56
Missing variables imputed:	13



= Indicator value
 = Reference (average value for peer group)

Germany

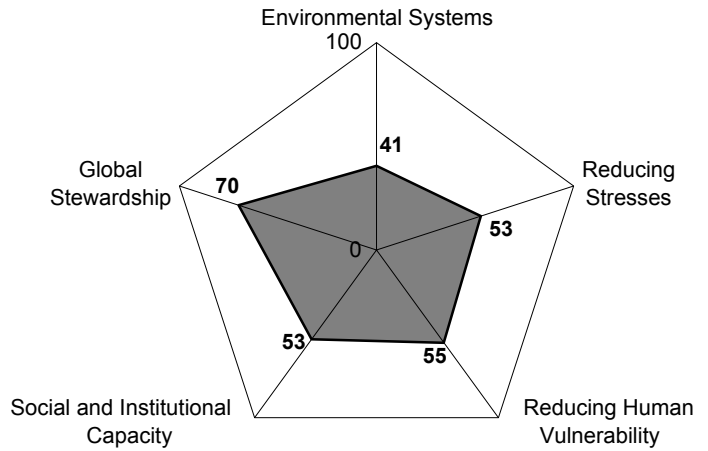
ESI:	57.0
Ranking:	31
GDP/Capita:	\$24,010
Peer group ESI:	55.4
Variable coverage:	75
Missing variables imputed:	0



= Indicator value
 = Reference (average value for peer group)

Ghana

ESI:	52.8
Ranking:	49
GDP/Capita:	\$1,943
Peer group ESI:	46.7
Variable coverage:	63
Missing variables imputed:	8

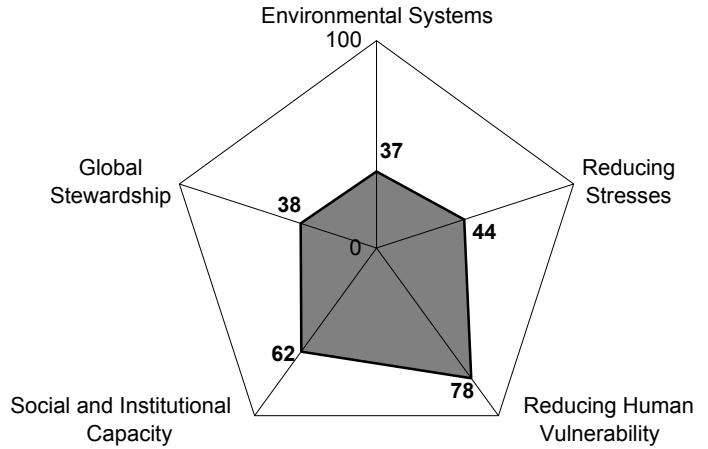


Air Quality	-0.45	0.18
Biodiversity	-0.28	-0.01
Land	-0.13	0.15
Water Quality	-0.61	-0.16
Water Quantity	-0.19	0.10
Reducing Air Pollution	0.48	0.51
Reducing Ecosystem Stress	-0.25	0.00
Reducing Population Stress	-0.52	-0.43
Reducing Waste & Consumption Pressures	-0.04	0.16
Reducing Water Stress	0.93	0.38
Natural Resource Management	-0.15	0.19
Environmental Health	-0.07	-0.34
Basic Human Sustenance	0.04	-0.56
Reducing Env.-Related Natural Disaster Vulnerability	0.43	-0.24
Environmental Governance	-0.10	-0.52
Eco-Efficiency	1.19	0.10
Private Sector Responsiveness	-0.01	-0.59
Science and Technology	-0.75	-0.50
International Collaborative Efforts	0.48	-0.28
Greenhouse Gas Emissions	0.59	0.23
Reducing Transboundary Environmental Pressures	0.49	0.23

= Indicator value
 = Reference (average value for peer group)

Greece

ESI:	50.1
Ranking:	67
GDP/Capita:	\$17,370
Peer group ESI:	55.4
Variable coverage:	72
Missing variables imputed:	2

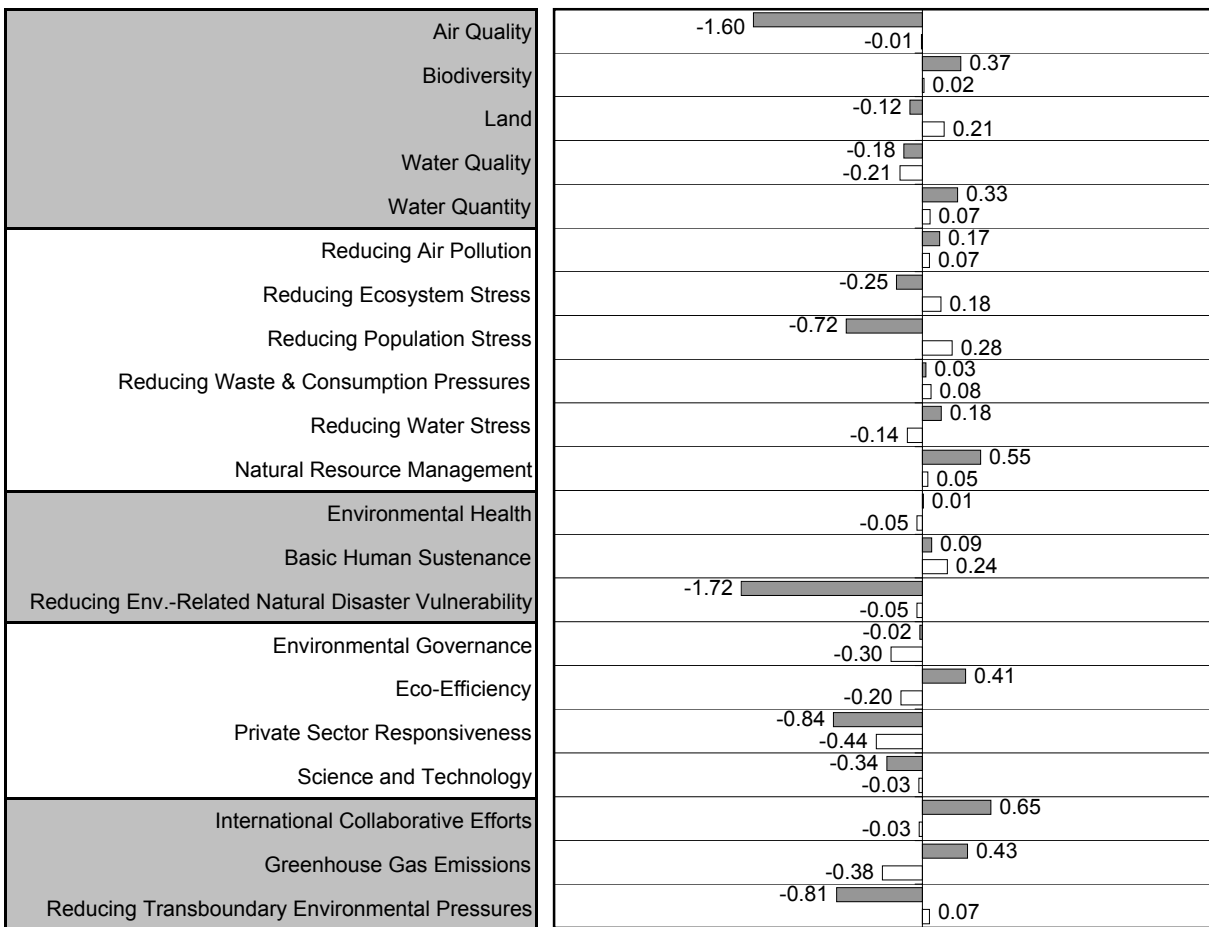
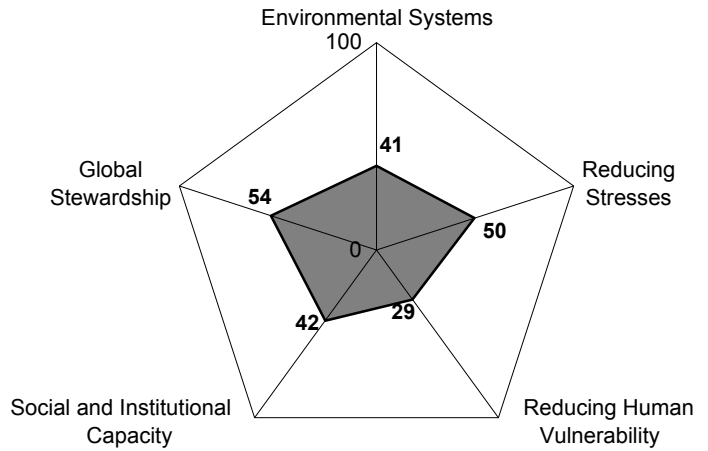


Air Quality	-0.05	0.43
Biodiversity	-0.33	-0.23
Land	-0.92	-0.68
Water Quality	-0.01	0.57
Water Quantity	-0.36	-0.14
Reducing Air Pollution	-0.86	-1.08
Reducing Ecosystem Stress	-0.20	0.47
Reducing Population Stress	-0.07	1.05
Reducing Waste & Consumption Pressures	-0.25	0.76
Reducing Water Stress	-0.61	-0.71
Natural Resource Management	-0.83	-0.55
Environmental Health	0.81	0.83
Basic Human Sustenance	0.97	0.93
Reducing Env.-Related Natural Disaster Vulnerability	0.50	0.19
Environmental Governance	0.60	0.99
Eco-Efficiency	-0.19	-0.13
Private Sector Responsiveness	-0.06	0.92
Science and Technology	0.85	1.28
International Collaborative Efforts	0.31	0.62
Greenhouse Gas Emissions	-0.36	-0.15
Reducing Transboundary Environmental Pressures	-0.83	-0.36

= Indicator value
 = Reference (average value for peer group)

Guatemala

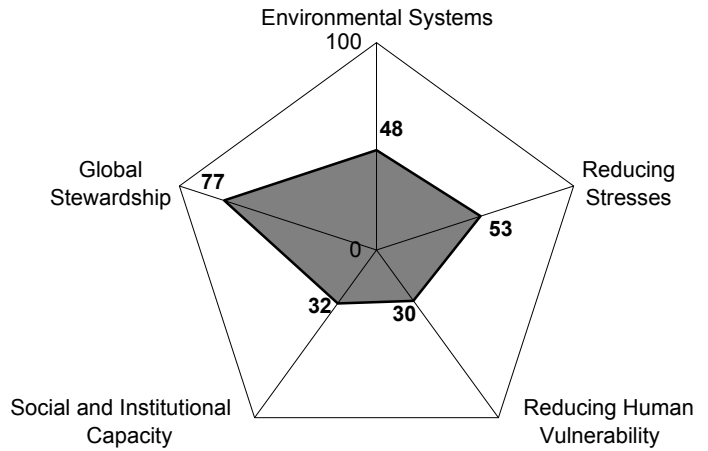
ESI:	44.0
Ranking:	116
GDP/Capita:	\$3,584
Peer group ESI:	48.9
Variable coverage:	61
Missing variables imputed:	8



= Indicator value
 = Reference (average value for peer group)

Guinea

ESI:	48.1
Ranking:	81
GDP/Capita:	\$1,858
Peer group ESI:	46.7
Variable coverage:	53
Missing variables imputed:	15

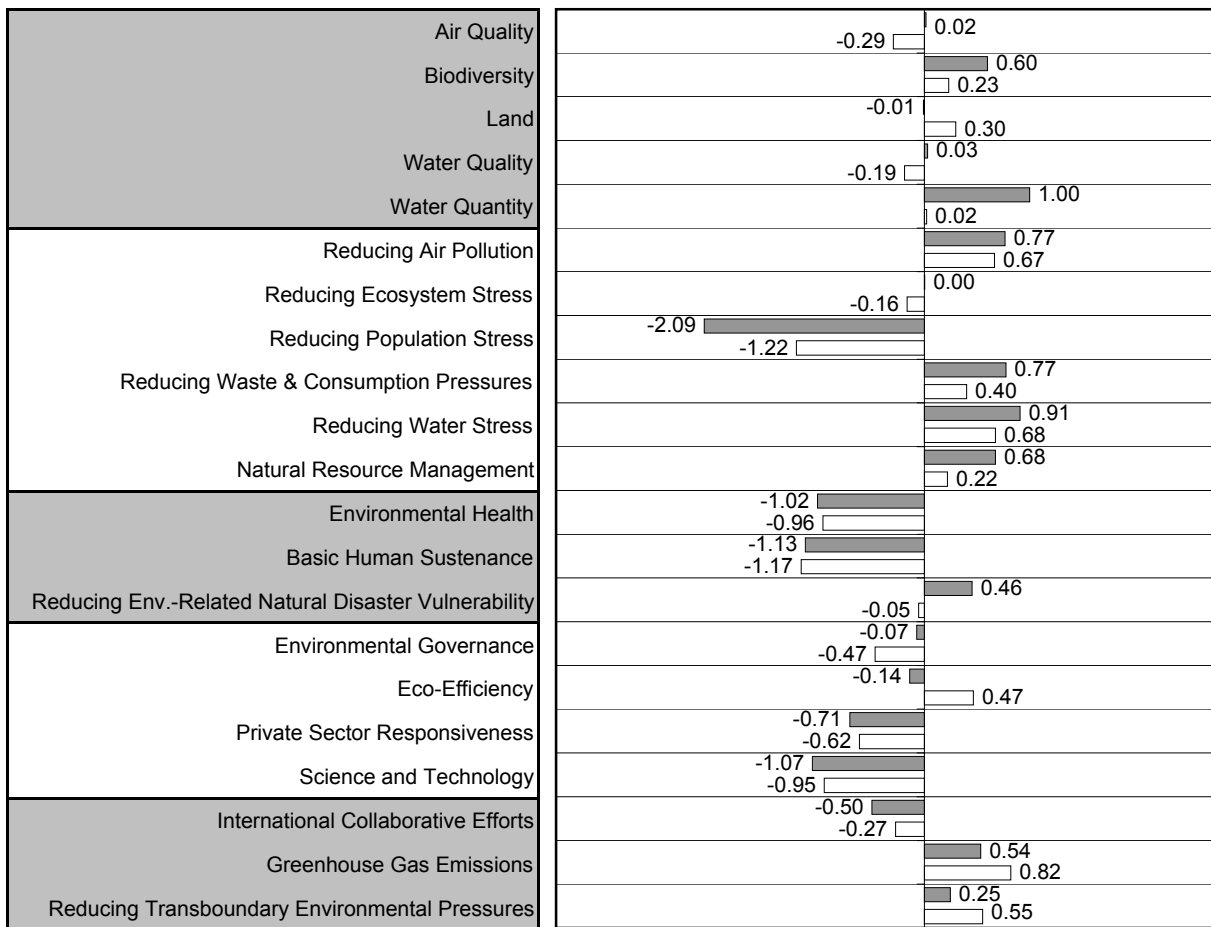
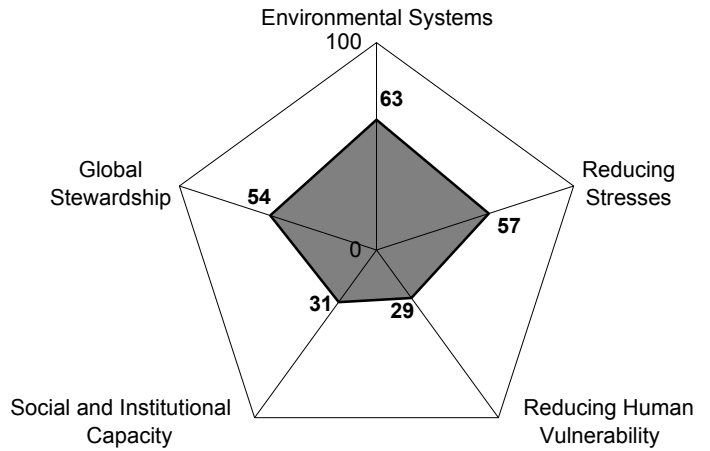


Air Quality	-0.70	0.16
Biodiversity	-0.01	0.15
Land	-0.08	0.10
Water Quality	-0.19	0.60
Water Quantity	-0.16	0.10
Reducing Air Pollution		1.02
Reducing Ecosystem Stress		0.51
Reducing Population Stress	-1.98	0.13
Reducing Waste & Consumption Pressures	-0.43	0.00
Reducing Water Stress		0.05
Natural Resource Management		0.16
Environmental Health		0.95
Basic Human Sustenance	-0.83	0.38
Reducing Env.-Related Natural Disaster Vulnerability	-1.24	0.25
Environmental Governance	-0.56	0.19
Eco-Efficiency	-0.24	0.51
Private Sector Responsiveness	-0.64	0.66
Science and Technology	-0.52	0.10
International Collaborative Efforts	-0.70	0.10
Greenhouse Gas Emissions	-0.59	1.28
Reducing Transboundary Environmental Pressures	-1.21	1.13
	-0.50	0.23
	-0.18	0.23
	-0.28	

= Indicator value
 = Reference (average value for peer group)

Guinea-Bissau

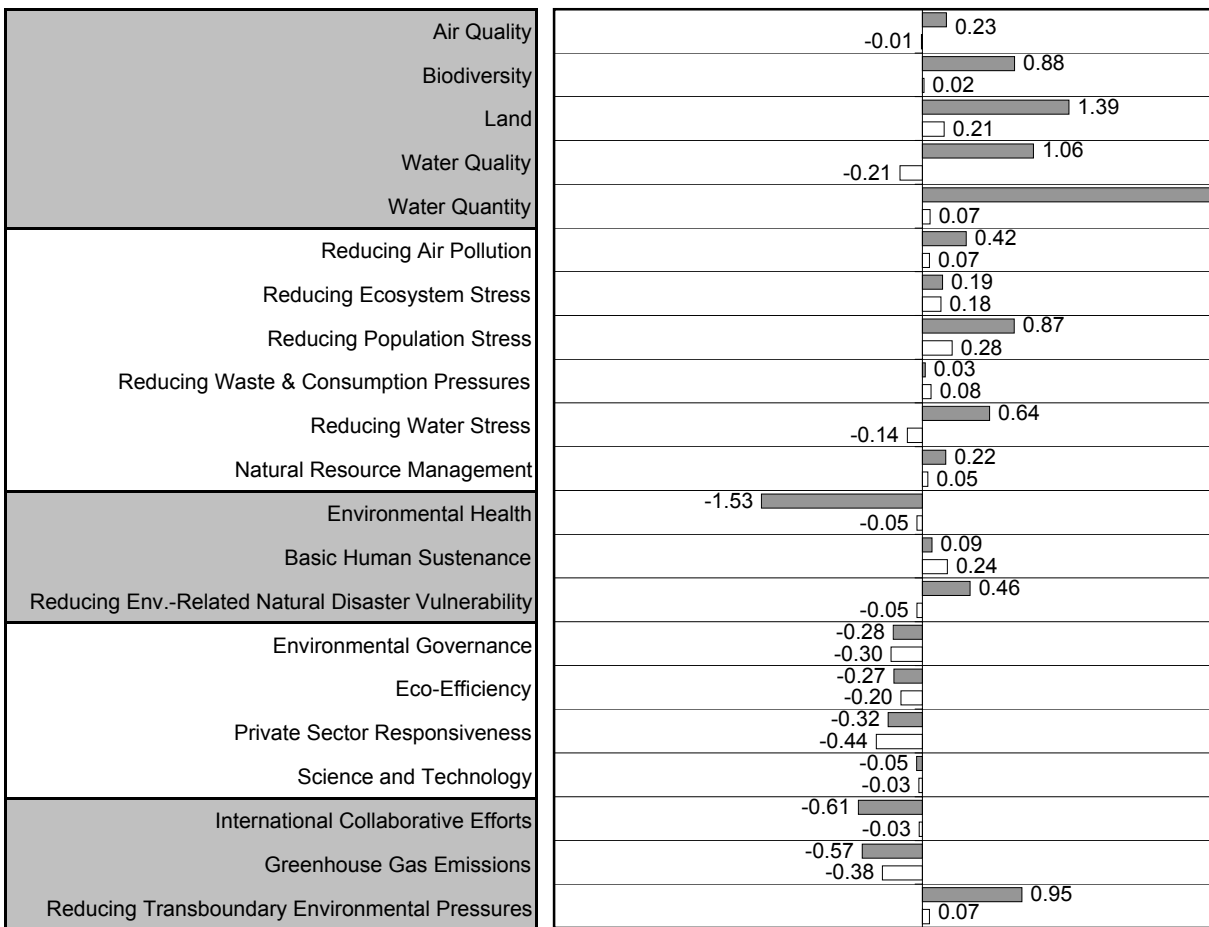
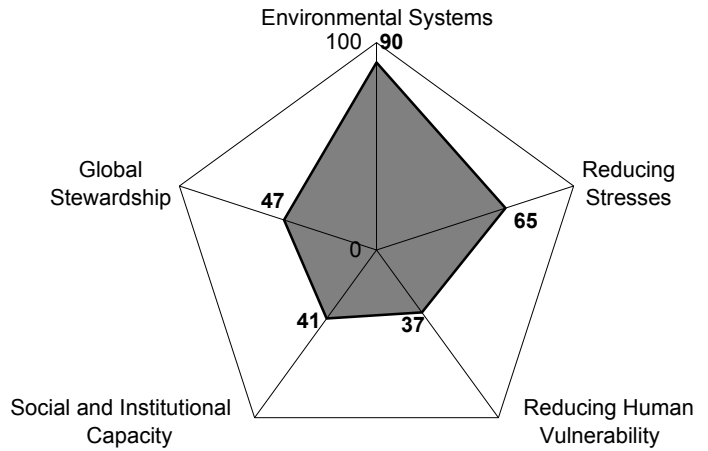
ESI:	48.6
Ranking:	77
GDP/Capita:	\$592
Peer group ESI:	46.4
Variable coverage:	45
Missing variables imputed:	20



= Indicator value
 = Reference (average value for peer group)

Guyana

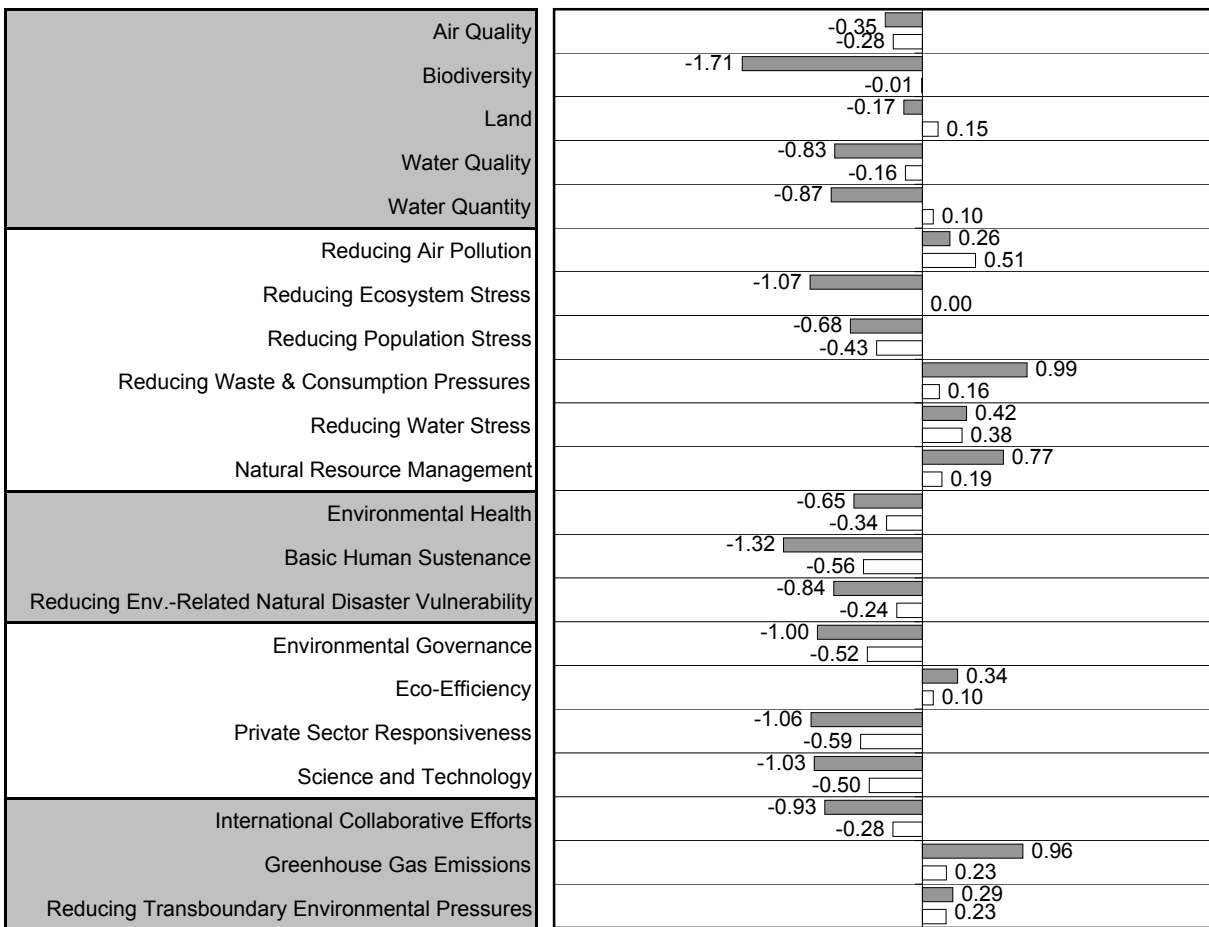
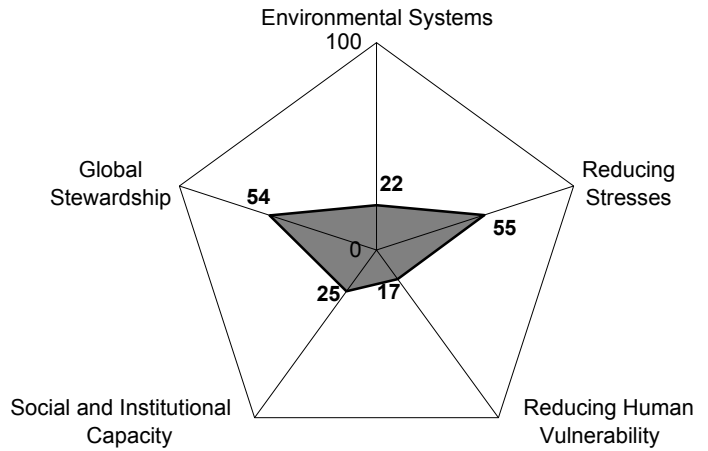
ESI:	62.9
Ranking:	8
GDP/Capita:	\$3,647
Peer group ESI:	48.9
Variable coverage:	48
Missing variables imputed:	17



= Indicator value
 = Reference (average value for peer group)

Haiti

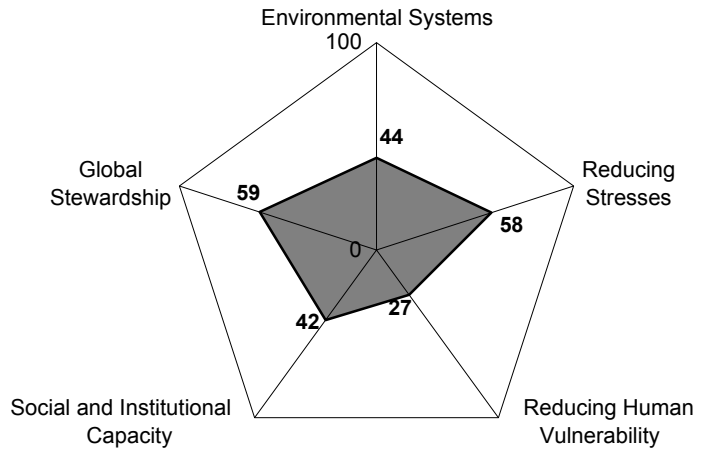
ESI:	34.8
Ranking:	141
GDP/Capita:	\$1,422
Peer group ESI:	46.7
Variable coverage:	54
Missing variables imputed:	13



= Indicator value
 = Reference (average value for peer group)

Honduras

ESI:	47.4
Ranking:	87
GDP/Capita:	\$2,312
Peer group ESI:	46.7
Variable coverage:	61
Missing variables imputed:	7

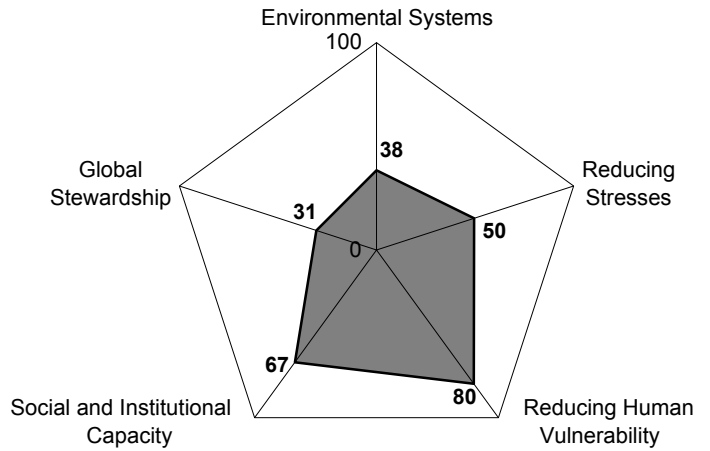


Air Quality	-0.88	-0.28
Biodiversity	-0.07	-0.01
Land	0.08	0.15
Water Quality	-0.53	-0.16
Water Quantity	0.71	0.10
Reducing Air Pollution	0.60	0.51
Reducing Ecosystem Stress	-0.03	0.00
Reducing Population Stress	-0.60	-0.43
Reducing Waste & Consumption Pressures	0.53	0.16
Reducing Water Stress	-0.05	0.38
Natural Resource Management	0.79	0.19
Environmental Health	-0.34	0.17
Basic Human Sustenance	0.10	0.10
Reducing Env.-Related Natural Disaster Vulnerability	-2.14	-0.24
Environmental Governance	0.00	0.00
Eco-Efficiency	-0.52	0.40
Private Sector Responsiveness	-0.85	-0.59
Science and Technology	-0.37	-0.50
International Collaborative Efforts	-0.18	-0.28
Greenhouse Gas Emissions	0.14	0.23
Reducing Transboundary Environmental Pressures	0.74	0.23

= Indicator value
 = Reference (average value for peer group)

Hungary

ESI:	52.0
Ranking:	54
GDP/Capita:	\$12,673
Peer group ESI:	52.1
Variable coverage:	72
Missing variables imputed:	0

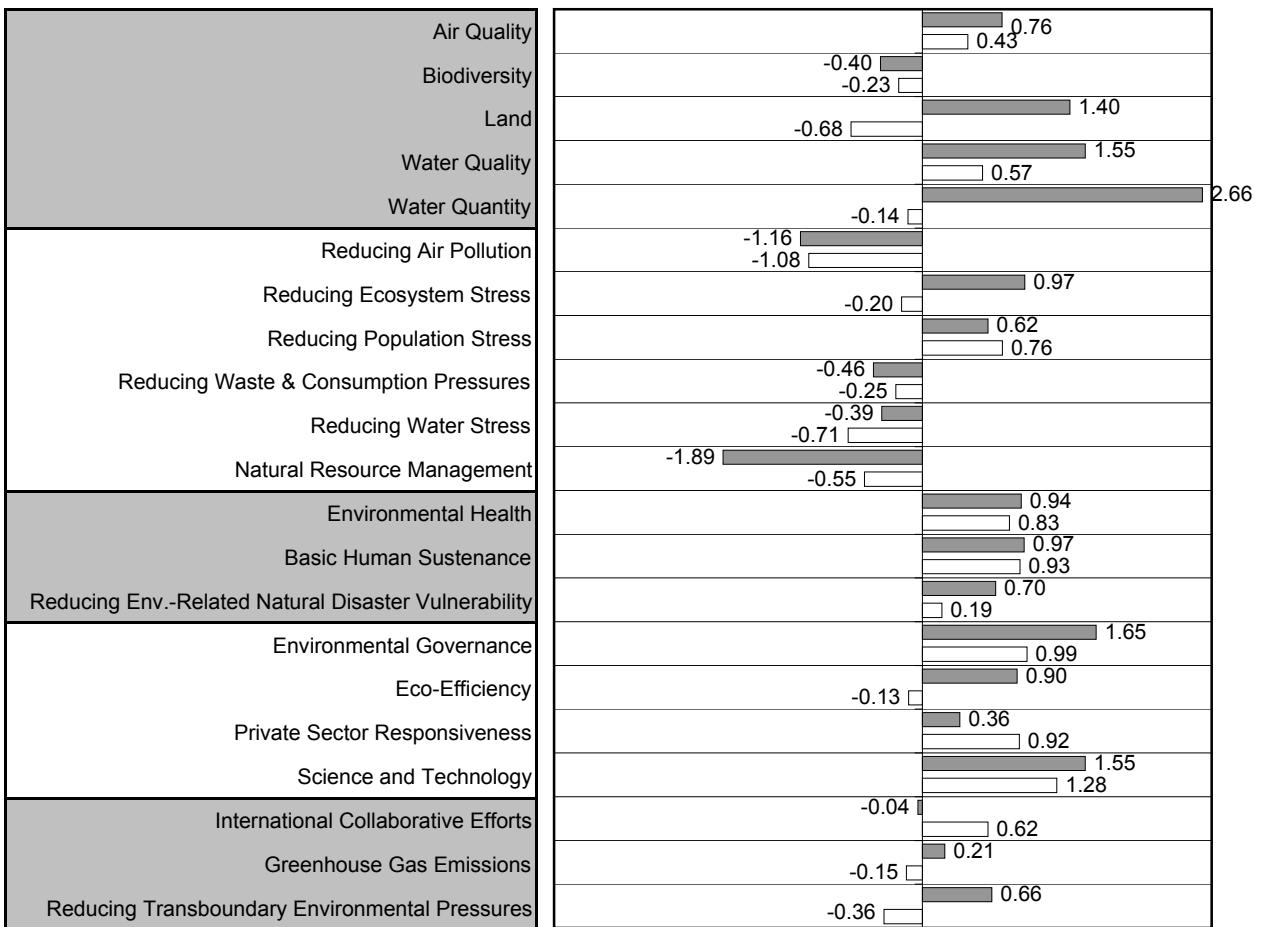
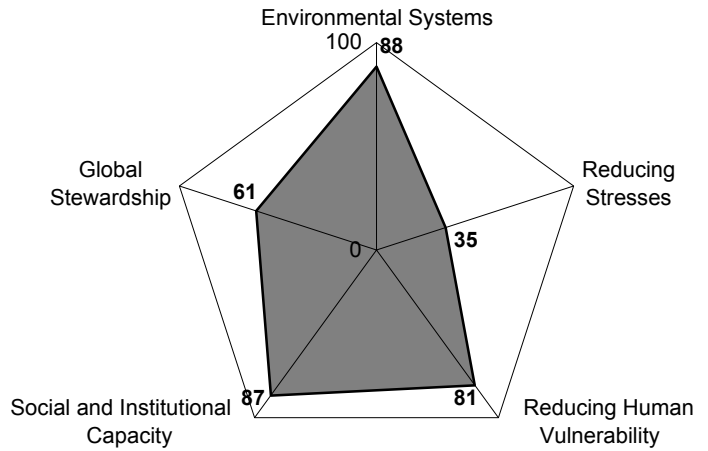


Air Quality	0.26	0.15
Biodiversity	-0.22	-0.02
Land	-0.92	0.02
Water Quality	-0.38	0.03
Water Quantity	-0.21	-0.01
Reducing Air Pollution	-0.71	-0.16
Reducing Ecosystem Stress	0.25	0.18
Reducing Population Stress	1.17	0.59
Reducing Waste & Consumption Pressures	-0.21	-0.13
Reducing Water Stress	-0.20	0.12
Natural Resource Management	-0.69	0.11
Environmental Health	0.93	0.53
Basic Human Sustenance	0.97	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.60	0.23
Environmental Governance	0.81	0.15
Eco-Efficiency	-0.31	-0.23
Private Sector Responsiveness	0.70	0.16
Science and Technology	0.55	0.21
International Collaborative Efforts	-0.34	0.00
Greenhouse Gas Emissions	-0.55	-0.50
Reducing Transboundary Environmental Pressures	-0.64	-0.51

= Indicator value
 = Reference (average value for peer group)

Iceland

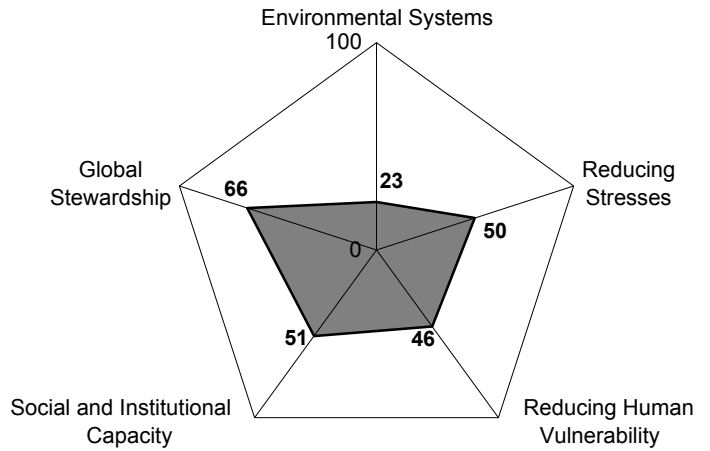
ESI:	70.8
Ranking:	5
GDP/Capita:	\$26,662
Peer group ESI:	55.4
Variable coverage:	63
Missing variables imputed:	6



= Indicator value
 = Reference (average value for peer group)

India

ESI:	45.2
Ranking:	101
GDP/Capita:	\$2,530
Peer group ESI:	46.7
Variable coverage:	69
Missing variables imputed:	3

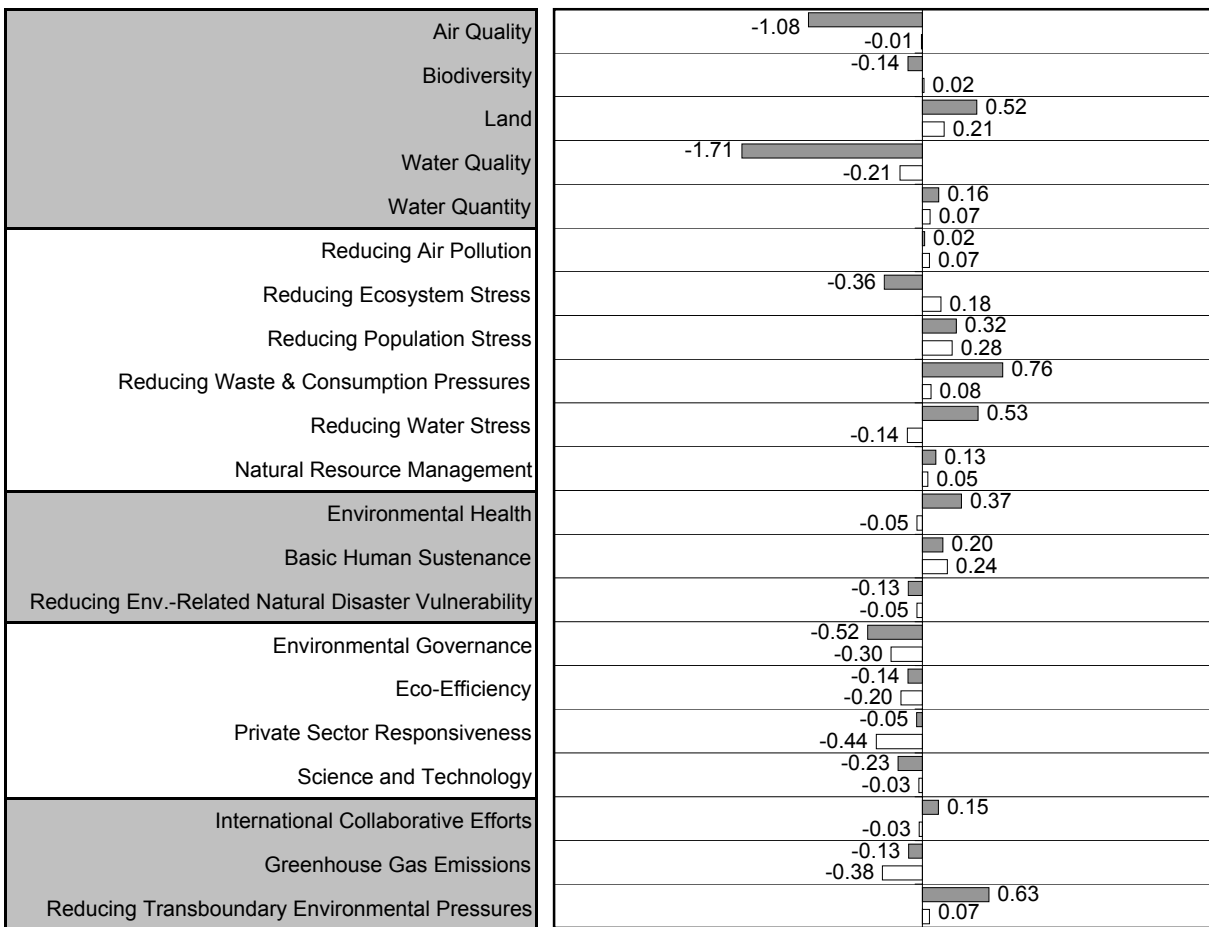
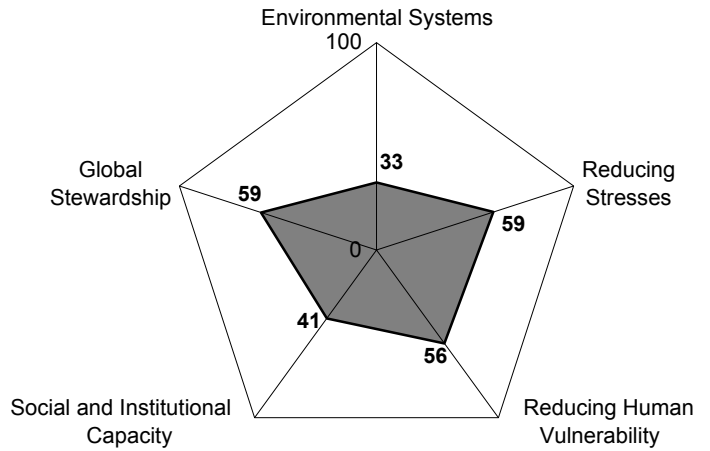


Air Quality	-0.98	-0.28
Biodiversity	-0.62	-0.01
Land	-0.36	0.15
Water Quality	-0.96	-0.16
Water Quantity	-0.75	0.10
Reducing Air Pollution	-0.28	0.51
Reducing Ecosystem Stress		0.32
Reducing Population Stress		0.00
Reducing Waste & Consumption Pressures	-0.43	0.12
Reducing Water Stress	-0.27	0.35
Natural Resource Management	-0.25	0.16
Environmental Health	-0.25	0.38
Basic Human Sustenance	-0.34	0.19
Reducing Env.-Related Natural Disaster Vulnerability	-0.04	0.08
Environmental Governance	-0.56	
Eco-Efficiency	-0.37	
Private Sector Responsiveness	-0.24	
Science and Technology	-0.10	
International Collaborative Efforts	-0.52	
Greenhouse Gas Emissions	0.00	0.10
Reducing Transboundary Environmental Pressures	-0.59	0.50
	-0.28	
	-0.50	
		0.67
	-0.28	
	-0.37	0.23
		0.92
		0.23

= Indicator value
 = Reference (average value for peer group)

Indonesia

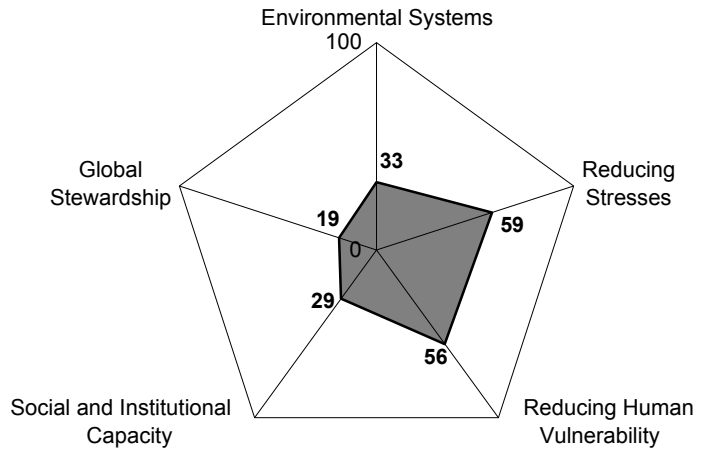
ESI:	48.8
Ranking:	75
GDP/Capita:	\$2,926
Peer group ESI:	48.9
Variable coverage:	70
Missing variables imputed:	5



= Indicator value
 = Reference (average value for peer group)

Iran

ESI:	39.8
Ranking:	132
GDP/Capita:	\$6,214
Peer group ESI:	52.1
Variable coverage:	59
Missing variables imputed:	11

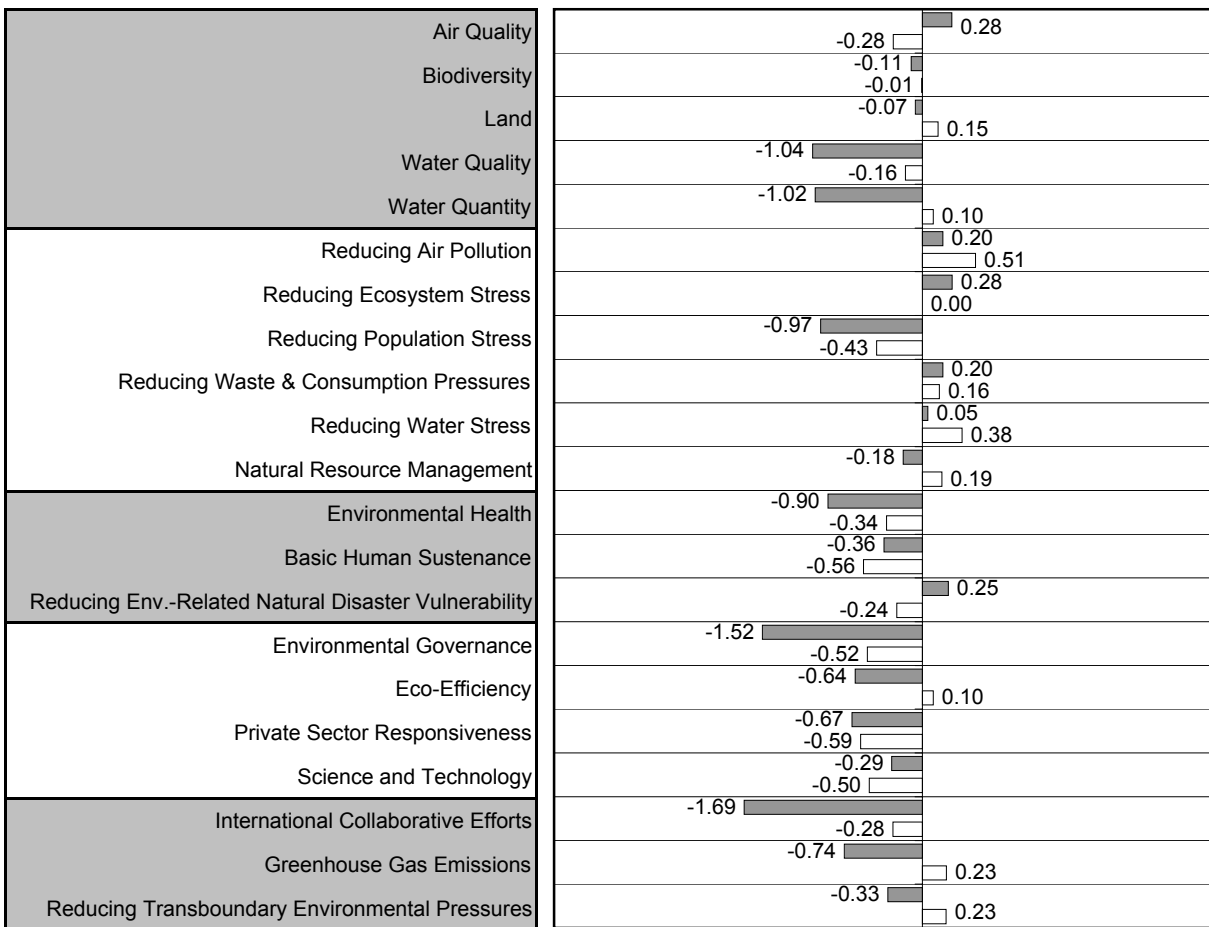
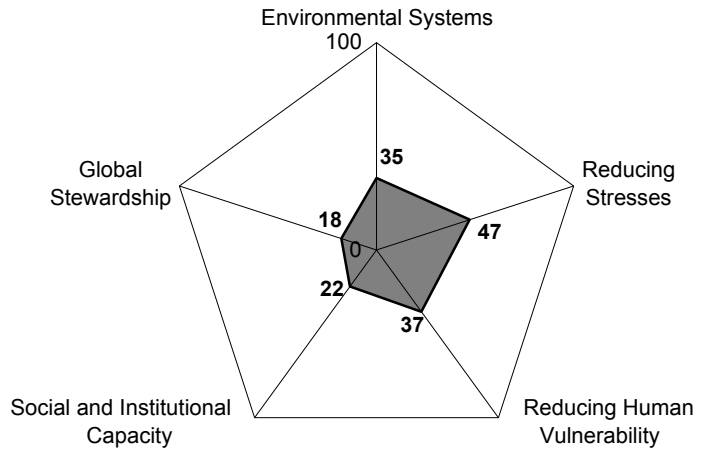


Air Quality	-0.95	0.15
Biodiversity	-0.08	-0.02
Land		0.11
Water Quality	-0.69	0.02
Water Quantity	-0.64	0.03
Reducing Air Pollution	-0.16	0.51
Reducing Ecosystem Stress		0.28
Reducing Population Stress		0.18
Reducing Waste & Consumption Pressures		0.33
Reducing Water Stress		0.59
Natural Resource Management	-0.13	0.45
Environmental Health	-0.33	0.07
Basic Human Sustenance	-0.20	0.11
Reducing Env.-Related Natural Disaster Vulnerability		0.08
Environmental Governance		0.53
Eco-Efficiency	-0.28	0.65
Private Sector Responsiveness	-0.72	0.55
Science and Technology	-0.66	0.23
International Collaborative Efforts	-0.23	0.15
Greenhouse Gas Emissions	-0.43	0.16
Reducing Transboundary Environmental Pressures	-0.40	0.21
	-0.16	0.00
	-0.95	
	-0.50	
	-1.53	-0.51

= Indicator value
 = Reference (average value for peer group)

Iraq

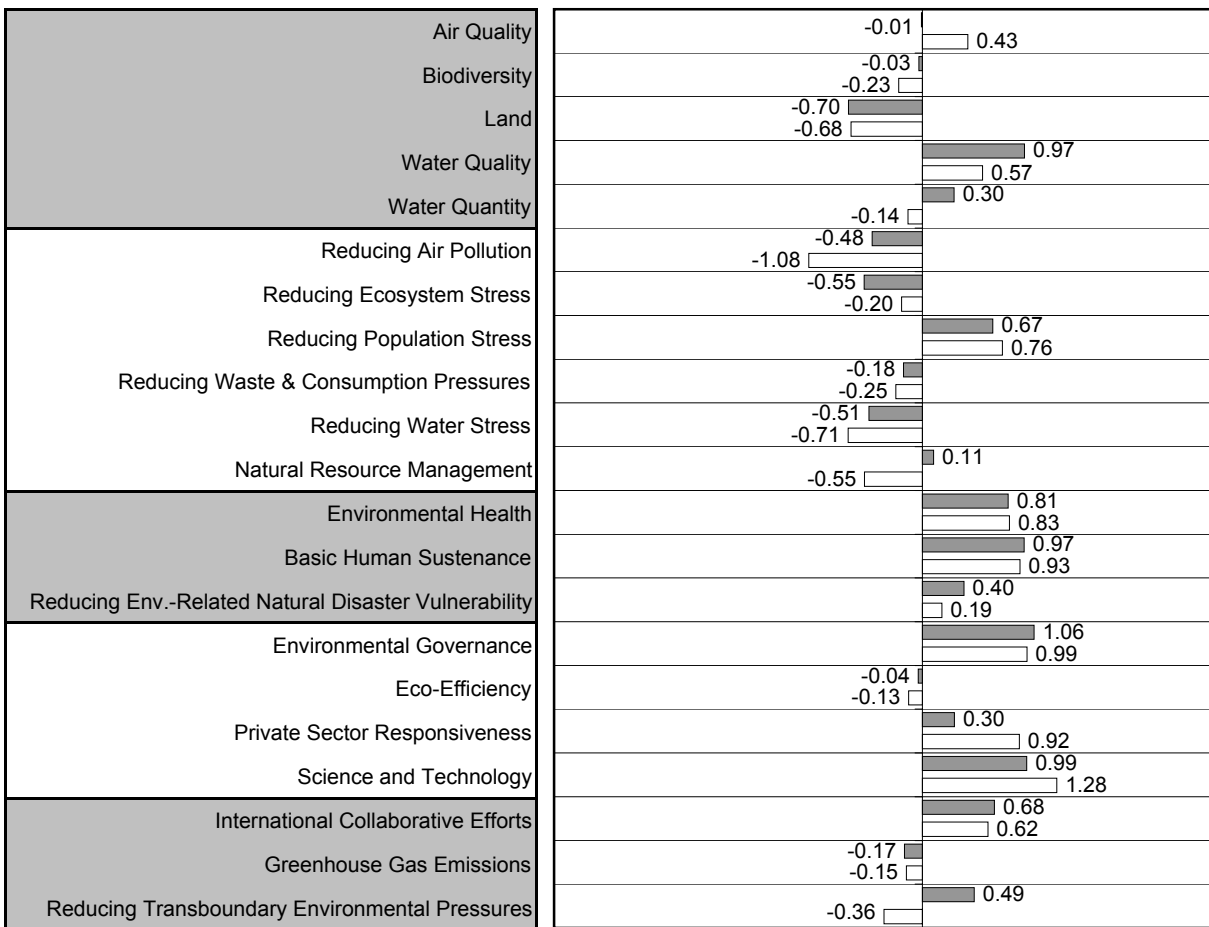
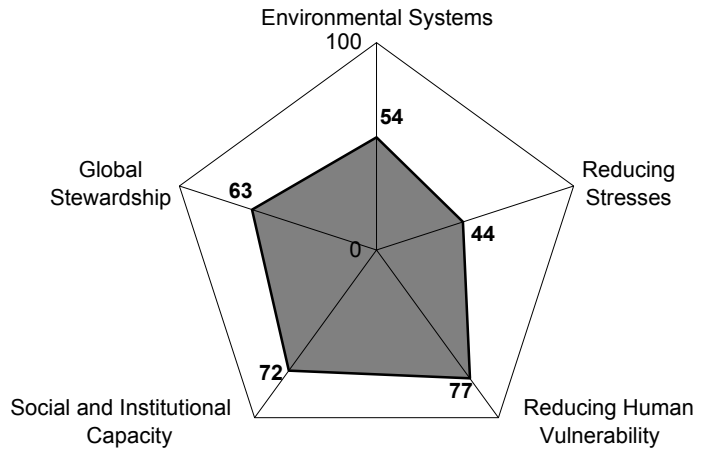
ESI:	33.6
Ranking:	143
GDP/Capita:	\$1,500
Peer group ESI:	46.7
Variable coverage:	48
Missing variables imputed:	19



= Indicator value
 = Reference (average value for peer group)

Ireland

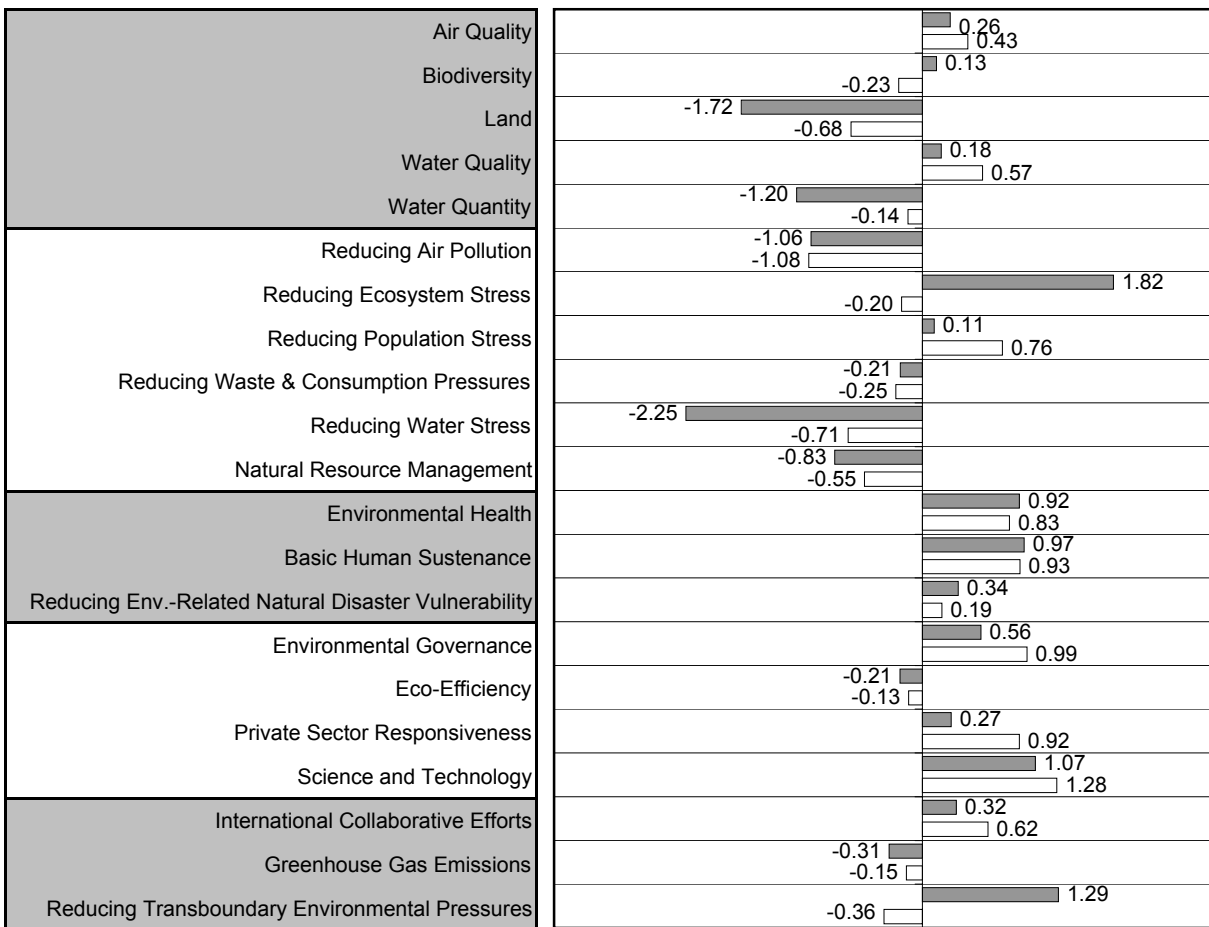
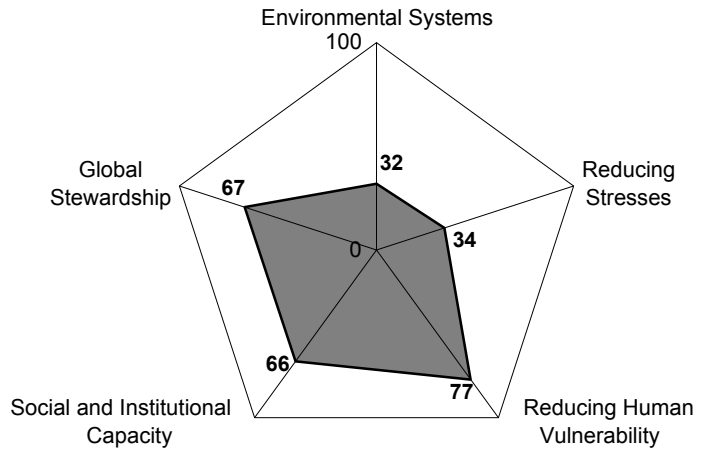
ESI:	59.2
Ranking:	21
GDP/Capita:	\$31,981
Peer group ESI:	55.4
Variable coverage:	74
Missing variables imputed:	0



= Indicator value
 = Reference (average value for peer group)

Israel

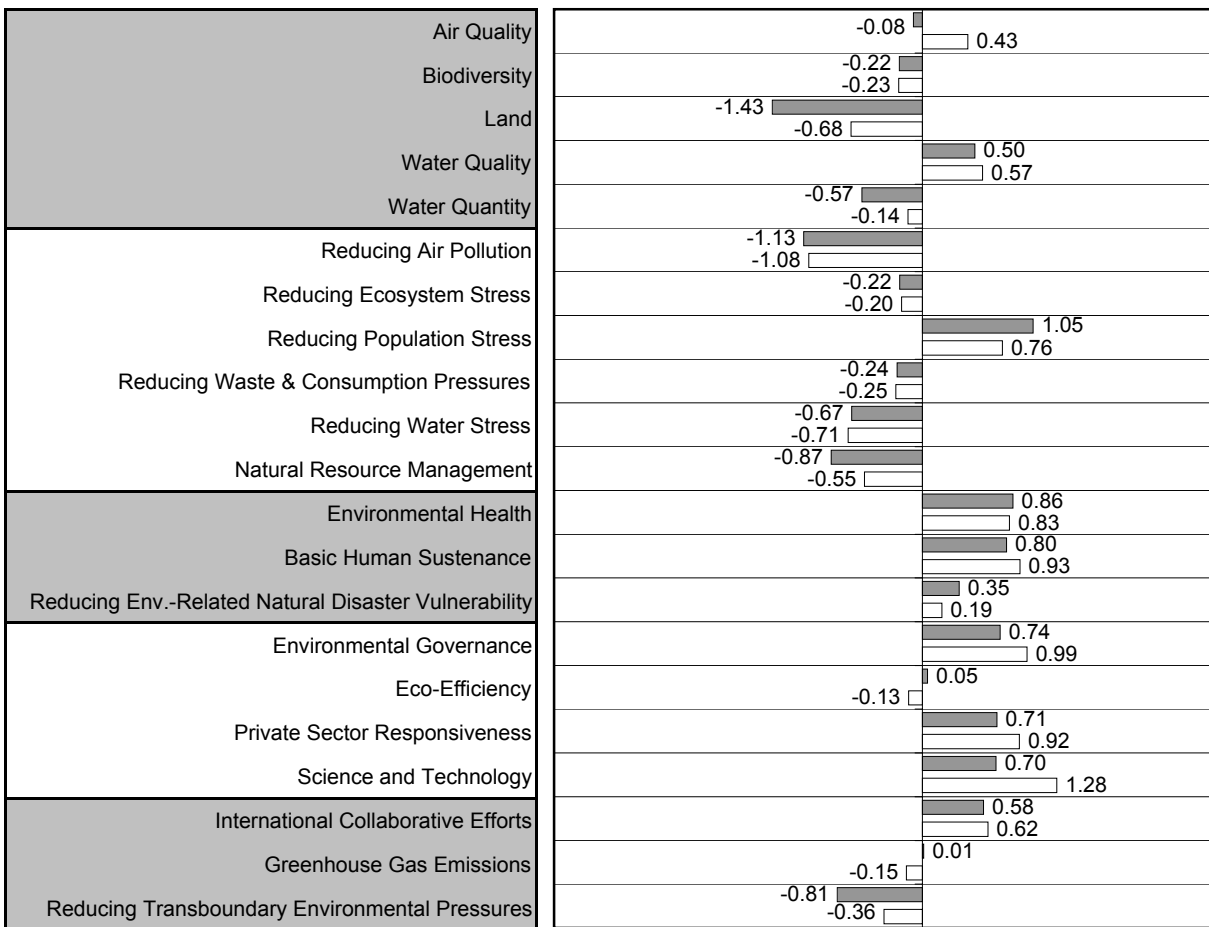
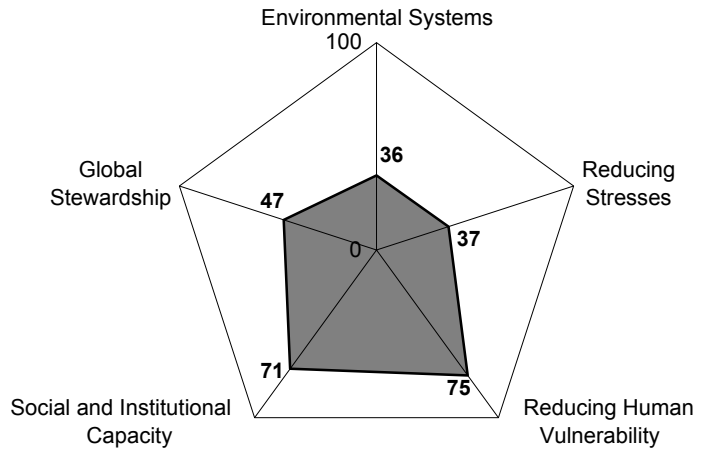
ESI:	50.9
Ranking:	62
GDP/Capita:	\$17,300
Peer group ESI:	55.4
Variable coverage:	64
Missing variables imputed:	6



= Indicator value
 = Reference (average value for peer group)

Italy

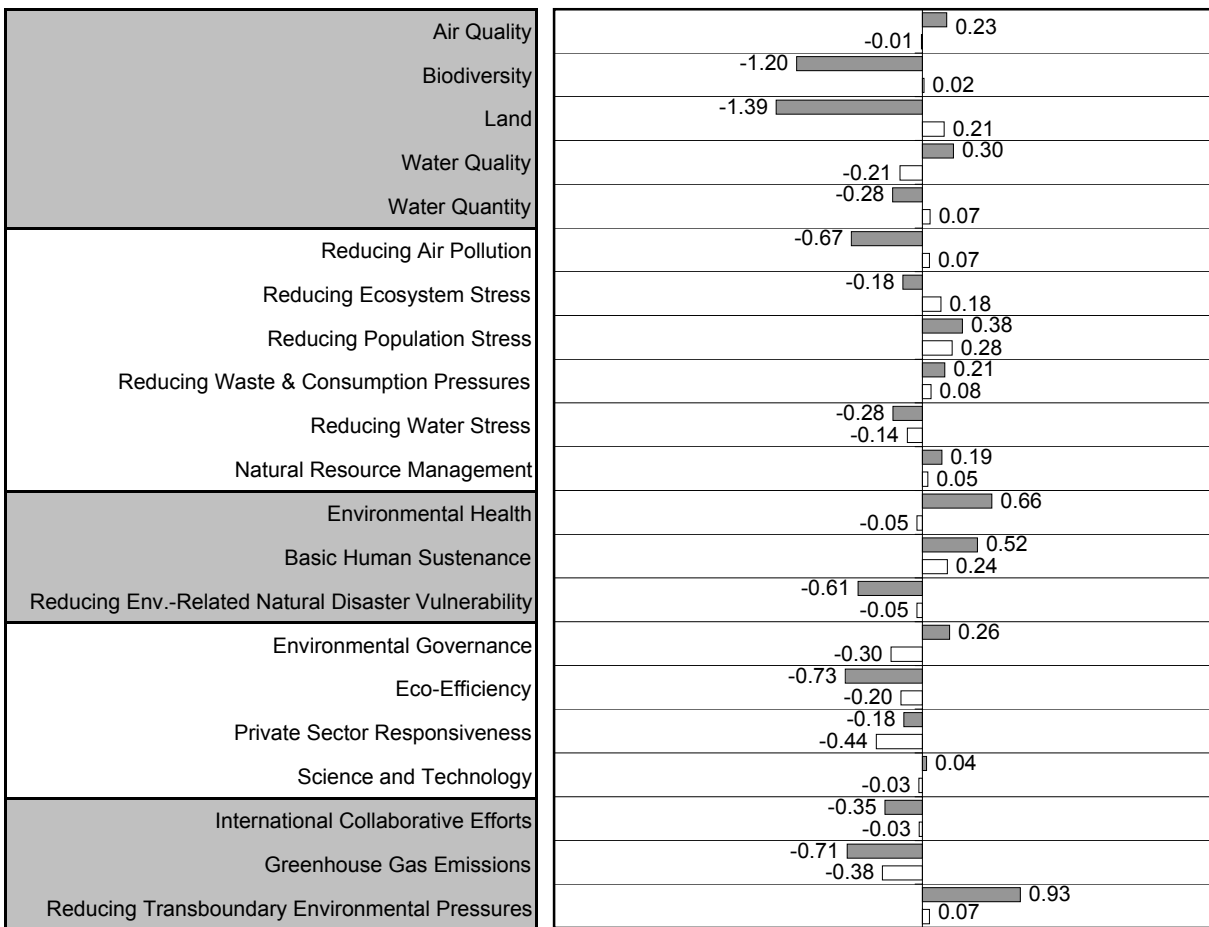
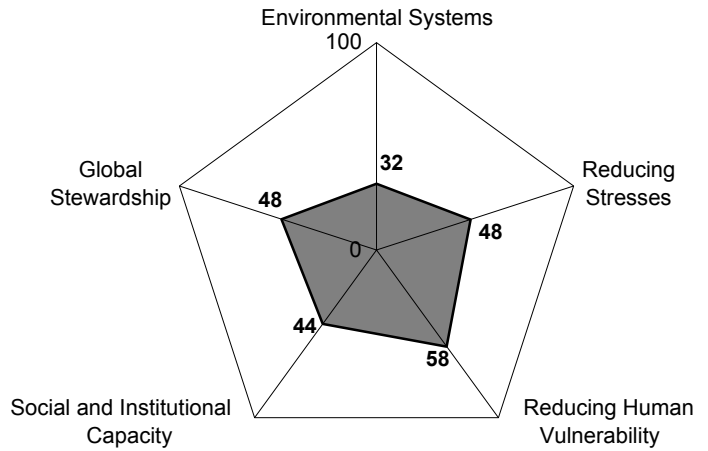
ESI:	50.1
Ranking:	69
GDP/Capita:	\$23,524
Peer group ESI:	55.4
Variable coverage:	74
Missing variables imputed:	0



= Indicator value
 = Reference (average value for peer group)

Jamaica

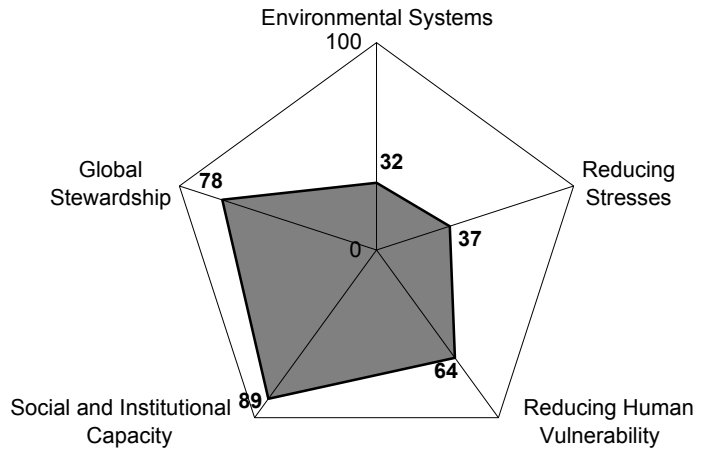
ESI:	44.7
Ranking:	109
GDP/Capita:	\$3,639
Peer group ESI:	48.9
Variable coverage:	60
Missing variables imputed:	9



= Indicator value
 = Reference (average value for peer group)

Japan

ESI:	57.3
Ranking:	30
GDP/Capita:	\$24,491
Peer group ESI:	55.4
Variable coverage:	72
Missing variables imputed:	3

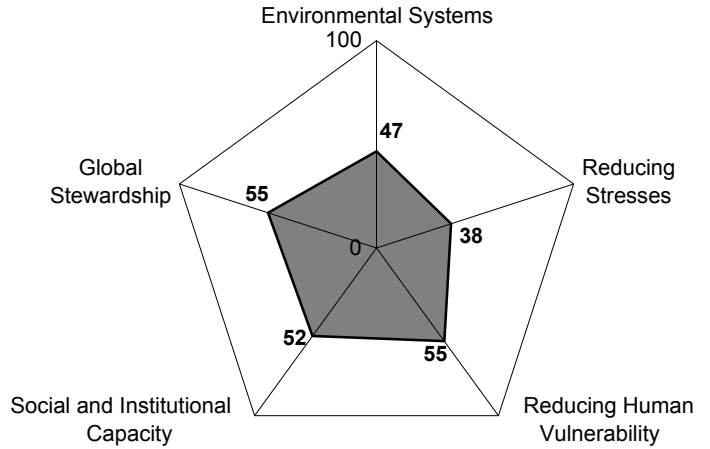


Air Quality	0.03	0.43
Biodiversity	-0.80	-0.23
Land	-1.74	-0.68
Water Quality		1.06
Water Quantity	-0.82	-0.14
Reducing Air Pollution	-1.55	-1.08
Reducing Ecosystem Stress		0.14
Reducing Population Stress		1.14
Reducing Waste & Consumption Pressures		0.76
Reducing Water Stress	-0.25	0.24
Natural Resource Management	-0.89	-0.71
	-1.05	-0.55
Environmental Health		0.94
Basic Human Sustenance		0.83
		0.97
Reducing Env.-Related Natural Disaster Vulnerability	-0.80	0.93
		0.19
Environmental Governance		0.99
		0.99
Eco-Efficiency	-0.10	-0.13
Private Sector Responsiveness		2.04
		0.92
Science and Technology		1.93
		1.28
International Collaborative Efforts		1.43
		0.62
Greenhouse Gas Emissions		0.24
	-0.15	
Reducing Transboundary Environmental Pressures		0.67
	-0.36	

= Indicator value
 = Reference (average value for peer group)

Jordan

ESI:	47.8
Ranking:	84
GDP/Capita:	\$3,756
Peer group ESI:	48.9
Variable coverage:	67
Missing variables imputed:	6

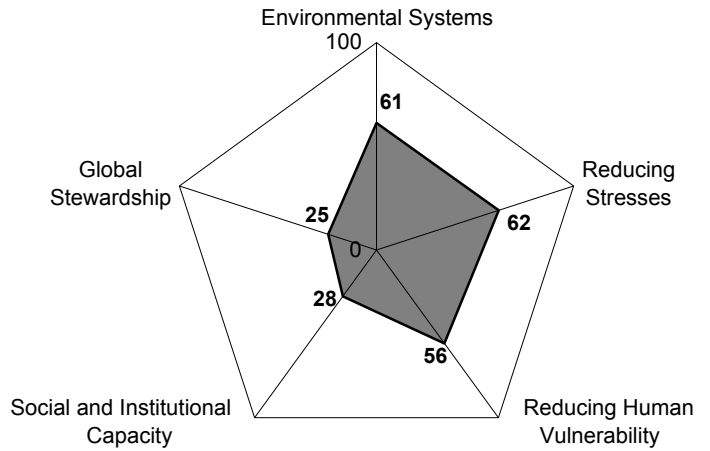


Air Quality	-0.01	0.24
Biodiversity		0.14
Land		0.02
Water Quality	-0.24	0.61
Water Quantity	-0.21	0.21
Reducing Air Pollution	-1.18	0.07
Reducing Ecosystem Stress	-0.37	0.07
Reducing Population Stress		0.28
Reducing Waste & Consumption Pressures	-0.27	0.18
Reducing Water Stress		0.28
Natural Resource Management	-1.57	0.31
Environmental Health	-0.14	0.08
Basic Human Sustenance	-0.24	0.05
Reducing Env.-Related Natural Disaster Vulnerability	-0.05	0.22
Environmental Governance		0.56
Eco-Efficiency	-0.36	0.24
Private Sector Responsiveness	-0.05	0.27
Science and Technology	-0.30	0.11
International Collaborative Efforts	-0.49	0.35
Greenhouse Gas Emissions	-0.20	0.69
Reducing Transboundary Environmental Pressures	-0.44	0.03
	-0.03	0.30
	-0.62	0.07
	-0.38	

= Indicator value
 = Reference (average value for peer group)

Kazakhstan

ESI:	48.6
Ranking:	78
GDP/Capita:	\$5,701
Peer group ESI:	48.9
Variable coverage:	59
Missing variables imputed:	10

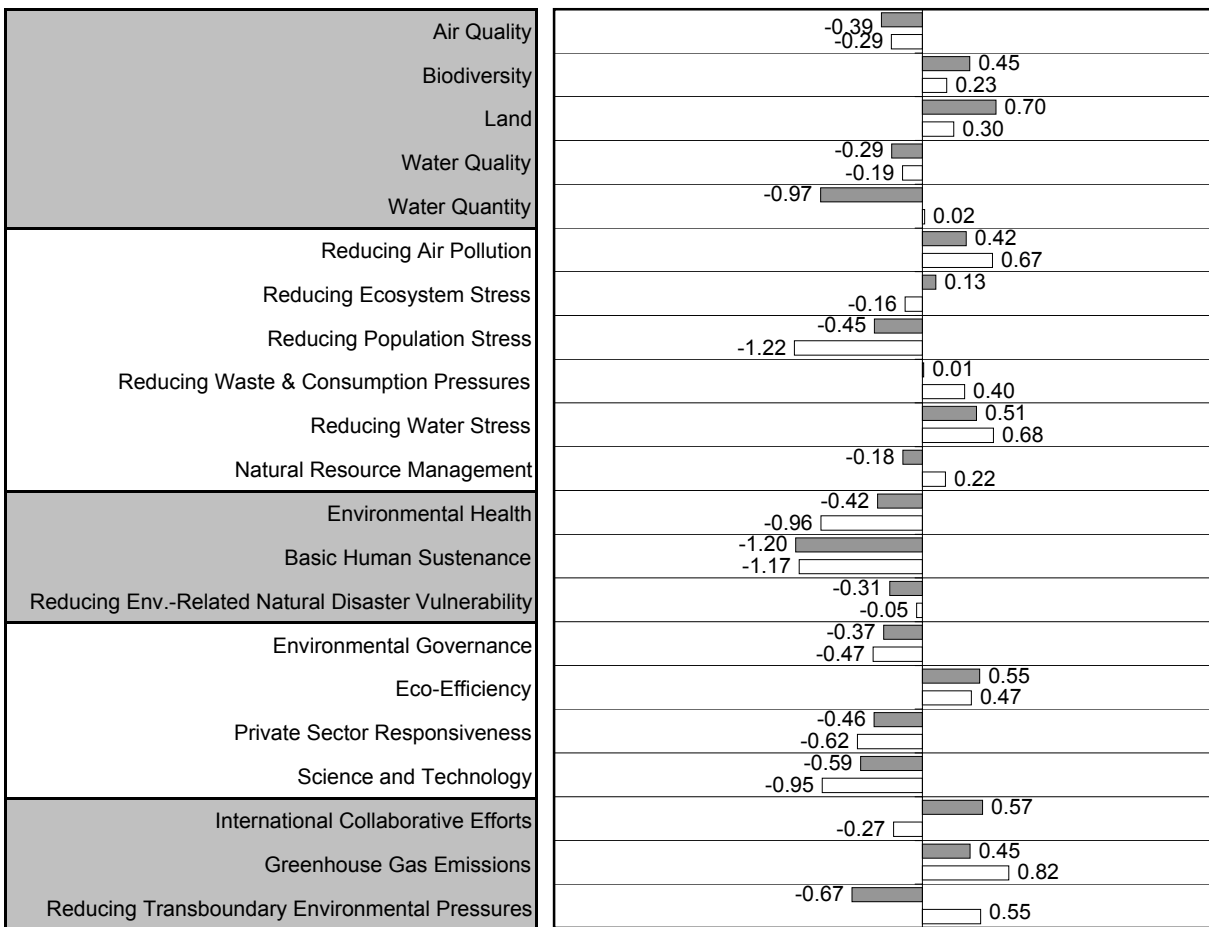
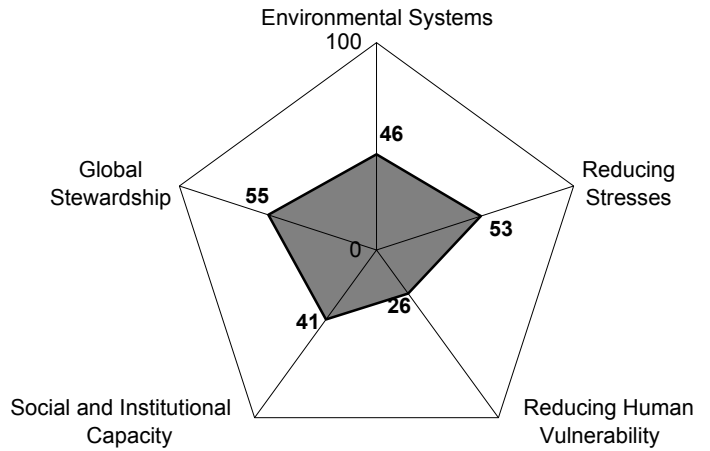


Indicator	Indicator Value	Reference Value
Air Quality	-0.01	1.23
Biodiversity	0.02	0.02
Land	0.86	0.21
Water Quality	-0.31	-0.21
Water Quantity	-0.36	0.07
Reducing Air Pollution	0.31	0.07
Reducing Ecosystem Stress	0.97	0.18
Reducing Population Stress	0.78	0.28
Reducing Waste & Consumption Pressures	-0.60	0.08
Reducing Water Stress	0.17	-0.14
Natural Resource Management	0.20	0.05
Environmental Health	-0.09	-0.05
Basic Human Sustenance	-0.07	0.24
Reducing Env.-Related Natural Disaster Vulnerability	0.60	-0.05
Environmental Governance	-0.73	-0.30
Eco-Efficiency	-1.30	-0.20
Private Sector Responsiveness	-0.53	-0.44
Science and Technology	0.18	-0.03
International Collaborative Efforts	-0.68	-0.03
Greenhouse Gas Emissions	-1.41	-0.38
Reducing Transboundary Environmental Pressures	0.02	0.07

= Indicator value
 = Reference (average value for peer group)

Kenya

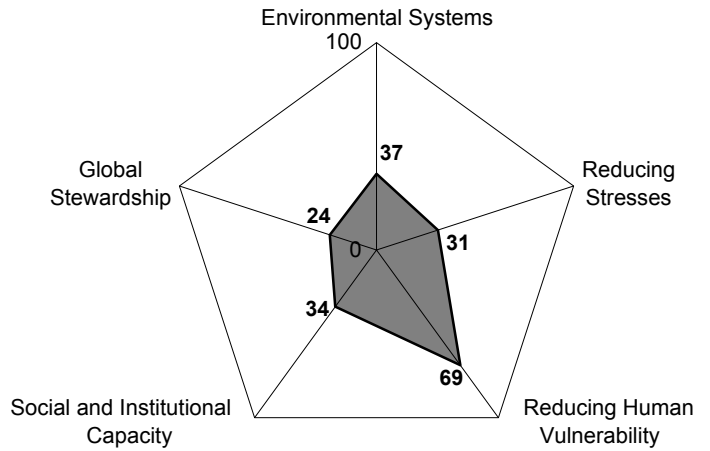
ESI:	45.3
Ranking:	100
GDP/Capita:	\$900
Peer group ESI:	46.4
Variable coverage:	61
Missing variables imputed:	8



= Indicator value
 = Reference (average value for peer group)

Kuwait

ESI:	36.6
Ranking:	138
GDP/Capita:	\$14,455
Peer group ESI:	55.4
Variable coverage:	57
Missing variables imputed:	14

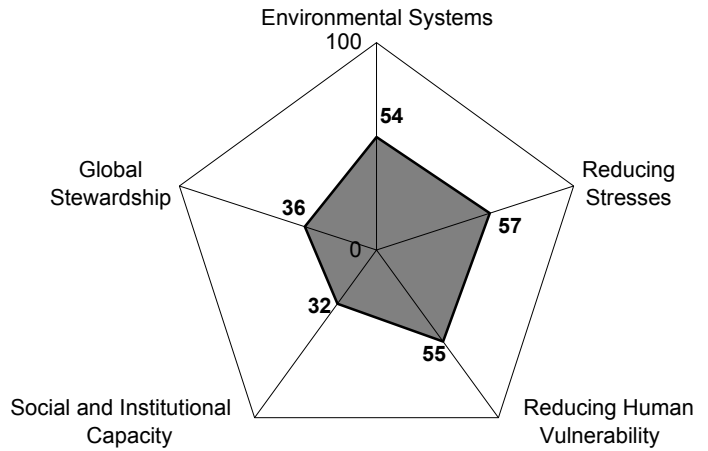


Air Quality	0.99	0.43
Biodiversity	-0.66	-0.23
Land	-0.87	-0.68
Water Quality	0.16	0.57
Water Quantity	-1.31	-0.14
Reducing Air Pollution	-0.65	-1.08
Reducing Ecosystem Stress	1.38	-0.20
Reducing Population Stress	-1.11	0.76
Reducing Waste & Consumption Pressures	-0.84	-0.25
Reducing Water Stress	-1.21	-0.71
Natural Resource Management	-0.51	-0.55
Environmental Health	0.08	0.83
Basic Human Sustenance	0.84	0.93
Reducing Env.-Related Natural Disaster Vulnerability	0.54	0.19
Environmental Governance	-0.17	0.99
Eco-Efficiency	-1.50	-0.13
Private Sector Responsiveness	-0.14	0.92
Science and Technology	0.13	1.28
International Collaborative Efforts	-0.58	0.62
Greenhouse Gas Emissions	-1.11	-0.15
Reducing Transboundary Environmental Pressures	-0.47	-0.36

= Indicator value
 = Reference (average value for peer group)

Kyrgyzstan

ESI:	48.4
Ranking:	80
GDP/Capita:	\$1,491
Peer group ESI:	46.7
Variable coverage:	58
Missing variables imputed:	11

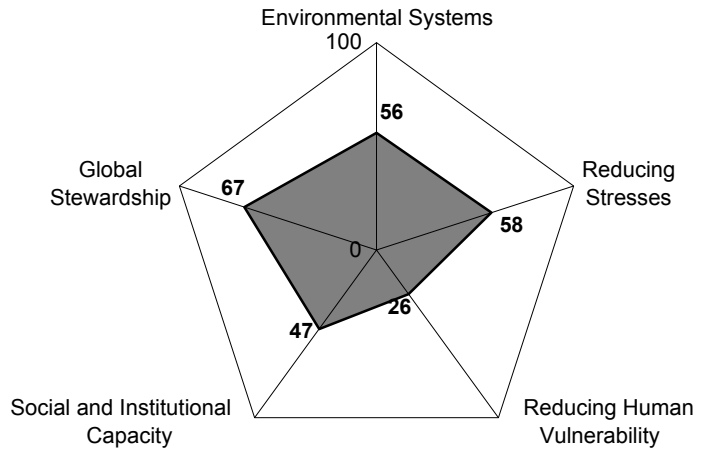


Air Quality	0.26	-0.28
Biodiversity	0.06	-0.01
Land	0.16	0.15
Water Quality	0.03	-0.16
Water Quantity	0.06	0.10
Reducing Air Pollution	0.58	0.51
Reducing Ecosystem Stress	1.10	0.00
Reducing Population Stress	0.16	-0.43
Reducing Waste & Consumption Pressures	0.16	-0.50
Reducing Water Stress	0.38	-0.34
Natural Resource Management	0.12	0.19
Environmental Health	0.11	-0.44
Basic Human Sustenance	0.11	-0.34
Reducing Env.-Related Natural Disaster Vulnerability	0.69	-0.24
Environmental Governance	0.10	-0.69
Eco-Efficiency	0.10	-0.52
Private Sector Responsiveness	0.01	-0.66
Science and Technology	0.01	-0.59
International Collaborative Efforts	0.23	-1.43
Greenhouse Gas Emissions	0.70	-0.28
Reducing Transboundary Environmental Pressures	0.23	-0.31

= Indicator value
 = Reference (average value for peer group)

Laos

ESI:	52.4
Ranking:	52
GDP/Capita:	\$1,649
Peer group ESI:	46.7
Variable coverage:	56
Missing variables imputed:	13

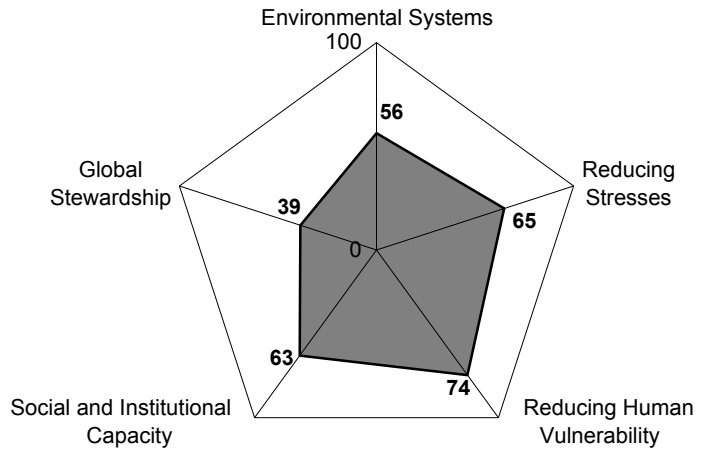


Air Quality	-0.68	-0.28
Biodiversity	-0.16	-0.01
Land		0.03
Water Quality		0.15
Water Quantity	-0.16	0.19
Reducing Air Pollution		1.43
Reducing Ecosystem Stress		0.10
Reducing Population Stress	-0.81	0.86
Reducing Waste & Consumption Pressures	-0.74	0.51
Reducing Water Stress	-0.43	0.00
Natural Resource Management		0.75
Environmental Health		0.16
Basic Human Sustenance	-0.35	0.87
Reducing Env.-Related Natural Disaster Vulnerability	-0.34	0.38
Environmental Governance	-1.28	0.31
Eco-Efficiency	-0.56	0.19
Private Sector Responsiveness	-0.28	
Science and Technology	-0.24	
International Collaborative Efforts	-0.81	
Greenhouse Gas Emissions	-0.52	1.80
Reducing Transboundary Environmental Pressures	-0.62	0.10
	-0.59	
	-0.67	
	-0.50	
	-0.78	
	-0.28	1.75
		0.23
		0.34
		0.23

= Indicator value
 = Reference (average value for peer group)

Latvia

ESI:	60.4
Ranking:	15
GDP/Capita:	\$8,680
Peer group ESI:	52.1
Variable coverage:	69
Missing variables imputed:	2

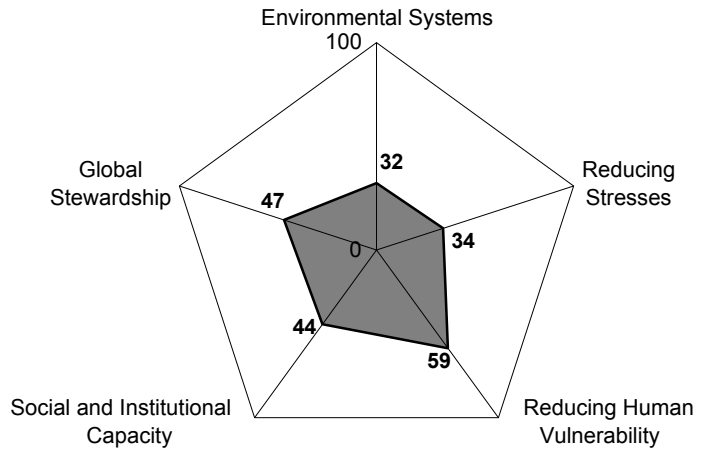


Air Quality	0.61	0.15
Biodiversity	0.06	-0.02
Land	0.02	-0.34
Water Quality	0.50	0.03
Water Quantity	0.01	-0.04
Reducing Air Pollution	0.01	-0.01
Reducing Ecosystem Stress	0.35	-0.16
Reducing Population Stress	1.15	0.18
Reducing Waste & Consumption Pressures	0.59	-0.33
Reducing Water Stress	0.58	-0.13
Natural Resource Management	0.52	-0.20
Environmental Health	0.74	0.11
Basic Human Sustenance	0.53	0.78
Reducing Env.-Related Natural Disaster Vulnerability	0.55	0.46
Environmental Governance	0.48	0.23
Eco-Efficiency	0.15	0.02
Private Sector Responsiveness	0.13	-0.23
Science and Technology	0.69	0.16
International Collaborative Efforts	0.21	-0.64
Greenhouse Gas Emissions	0.00	-0.26
Reducing Transboundary Environmental Pressures	0.03	-0.50
		-0.51

= Indicator value
 = Reference (average value for peer group)

Lebanon

ESI:	40.5
Ranking:	129
GDP/Capita:	\$4,412
Peer group ESI:	48.9
Variable coverage:	56
Missing variables imputed:	13

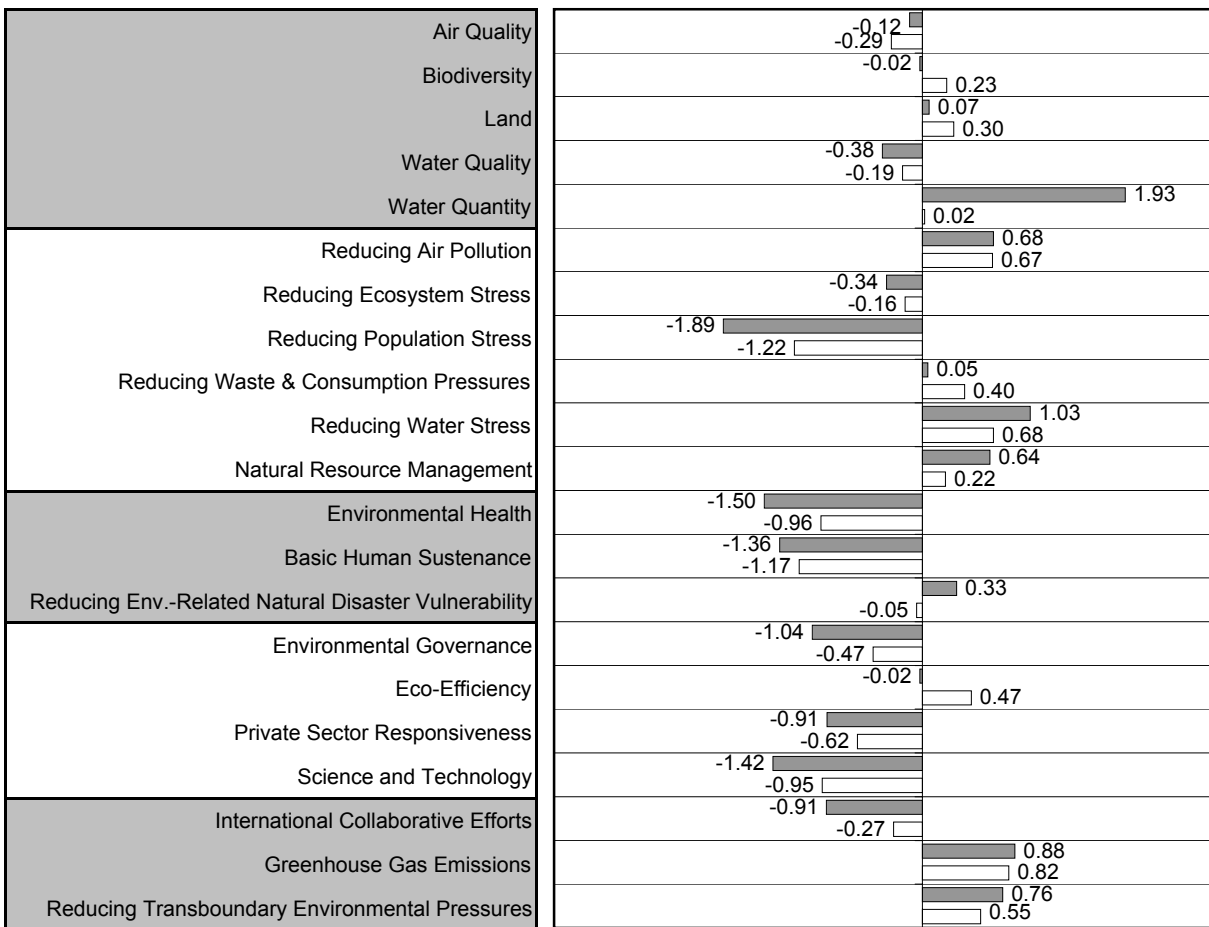
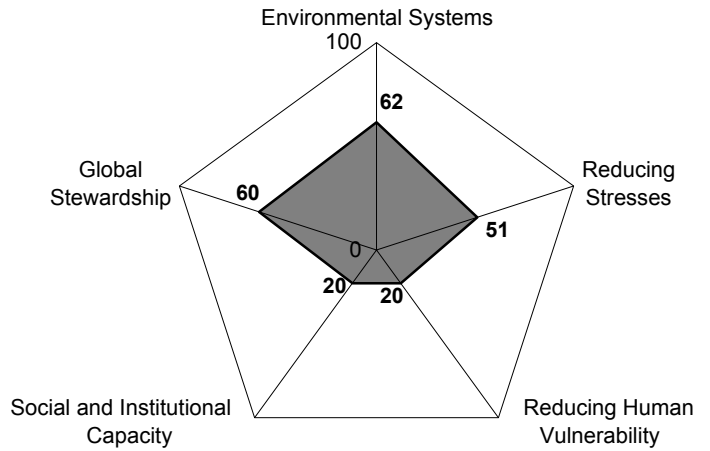


Air Quality	-0.01	0.64
Biodiversity	-0.07	0.02
Land	-1.46	0.21
Water Quality	-0.70	-0.21
Water Quantity	-0.71	0.07
Reducing Air Pollution	-1.46	0.07
Reducing Ecosystem Stress		0.16
Reducing Population Stress		0.18
Reducing Waste & Consumption Pressures		0.06
Reducing Water Stress	-1.50	0.28
Natural Resource Management		0.15
Environmental Health		0.08
Basic Human Sustenance	-0.14	0.09
Reducing Env.-Related Natural Disaster Vulnerability	-0.05	0.11
Environmental Governance		0.91
Eco-Efficiency	-0.36	0.24
Private Sector Responsiveness	-0.05	
Science and Technology	-0.17	
International Collaborative Efforts	-0.30	
Greenhouse Gas Emissions	-0.56	
Reducing Transboundary Environmental Pressures	-0.20	
	-0.30	0.46
	-0.44	
	-0.03	
	-0.17	
	-0.03	
	-0.46	
	-0.38	
		0.40
		0.07

= Indicator value
 = Reference (average value for peer group)

Liberia

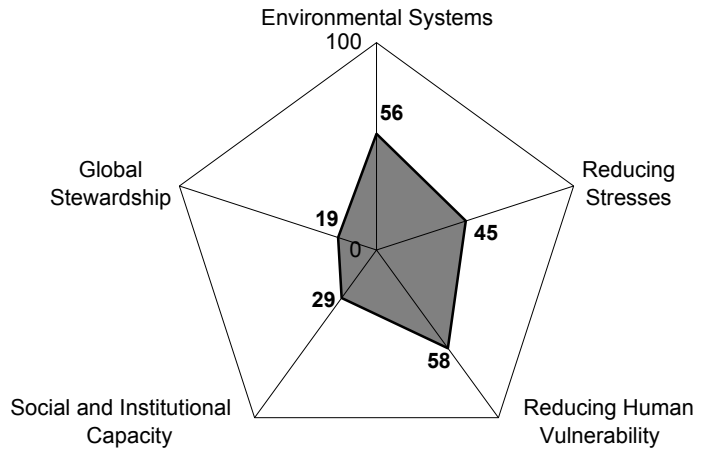
ESI:	43.4
Ranking:	121
GDP/Capita:	\$1,000
Peer group ESI:	46.4
Variable coverage:	48
Missing variables imputed:	19



= Indicator value
 = Reference (average value for peer group)

Libya

ESI:	42.3
Ranking:	126
GDP/Capita:	\$6,400
Peer group ESI:	52.1
Variable coverage:	51
Missing variables imputed:	18

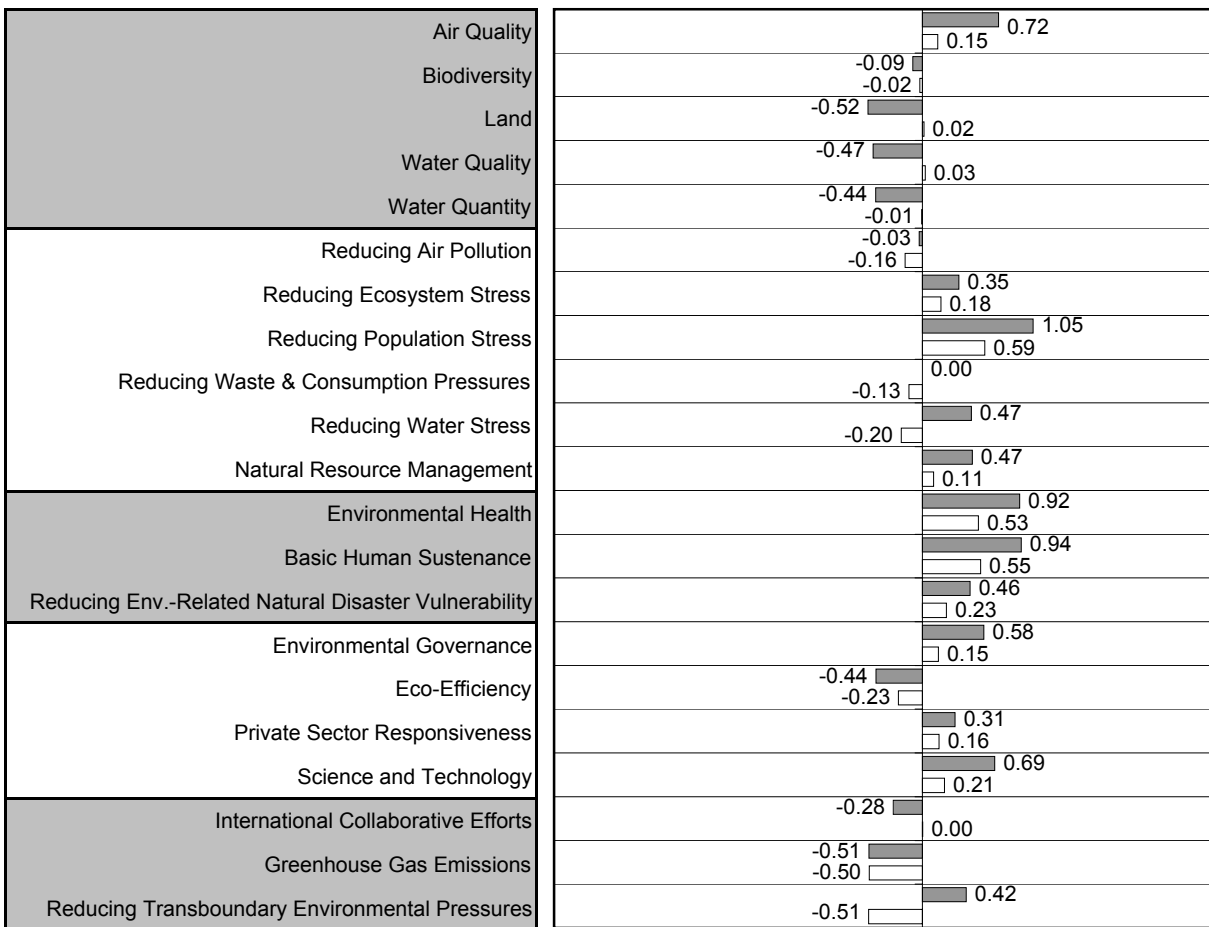
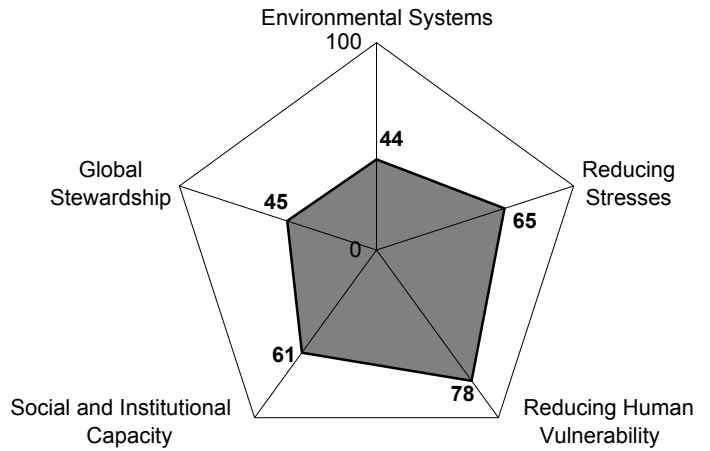


Air Quality	0.41	0.15
Biodiversity	0.22	-0.02
Land	1.50	0.02
Water Quality	-0.30	0.03
Water Quantity	-1.08	-0.01
Reducing Air Pollution	-0.98	-0.16
Reducing Ecosystem Stress	0.72	0.18
Reducing Population Stress	-0.33	0.59
Reducing Waste & Consumption Pressures	-0.17	-0.13
Reducing Water Stress	-0.41	-0.20
Natural Resource Management	0.45	0.11
Environmental Health	0.02	0.53
Basic Human Sustenance	0.21	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.40	0.23
Environmental Governance	-1.05	0.15
Eco-Efficiency	-1.04	-0.23
Private Sector Responsiveness	-0.54	0.16
Science and Technology	0.36	0.21
International Collaborative Efforts	-0.81	0.00
Greenhouse Gas Emissions	-0.89	-0.50
Reducing Transboundary Environmental Pressures	-0.88	-0.51

= Indicator value
 = Reference (average value for peer group)

Lithuania

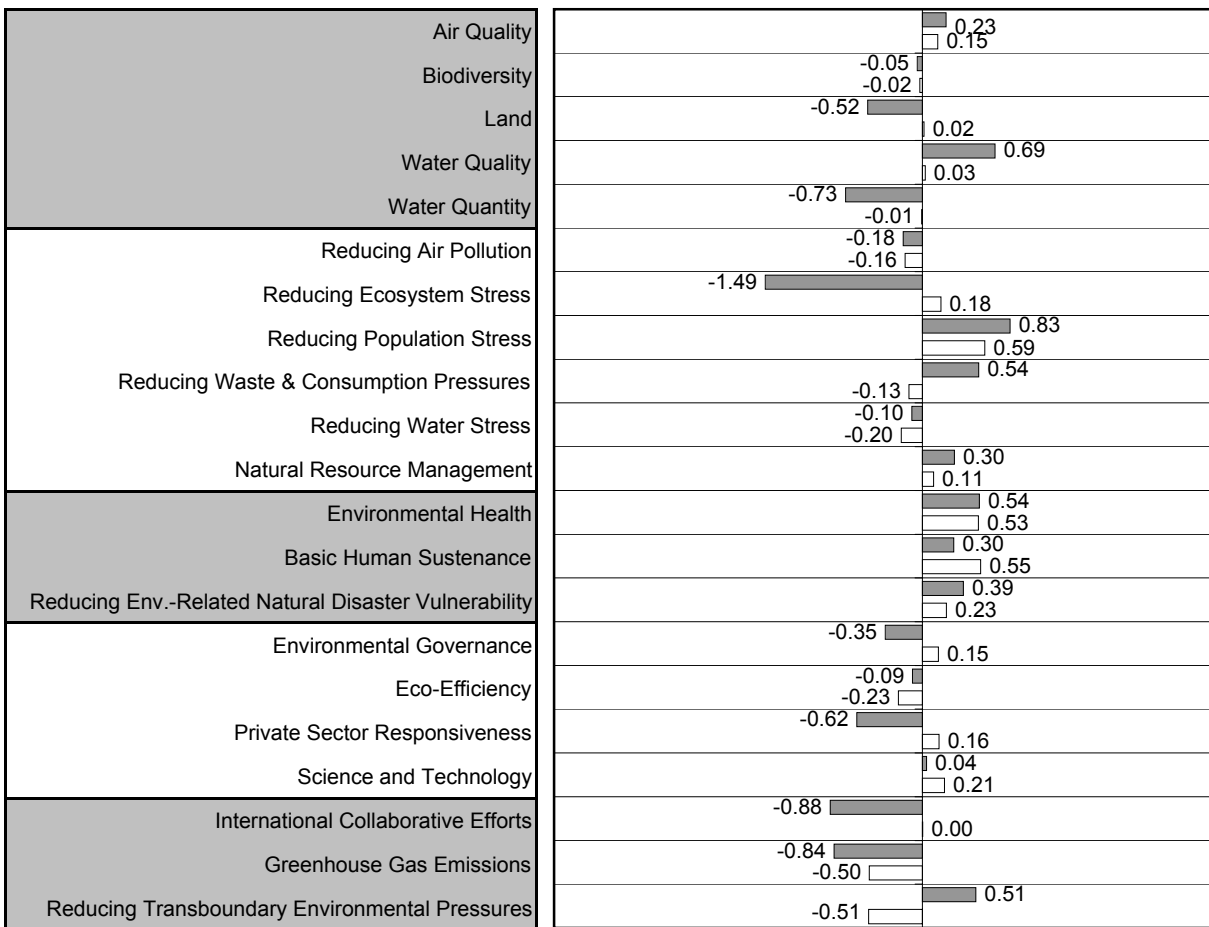
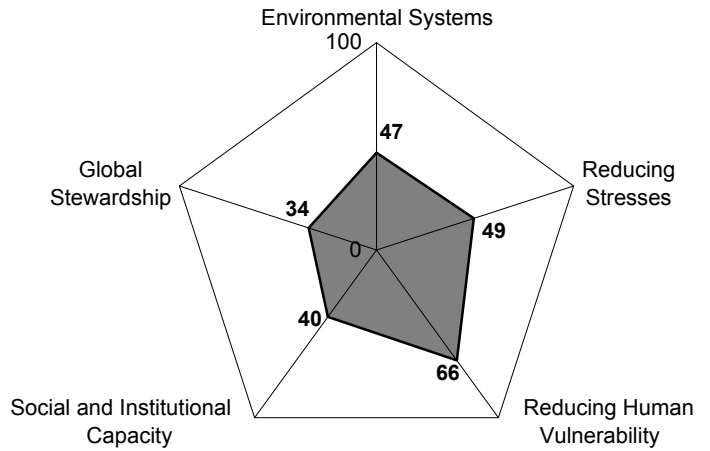
ESI:	58.9
Ranking:	22
GDP/Capita:	\$9,784
Peer group ESI:	52.1
Variable coverage:	69
Missing variables imputed:	2



= Indicator value
 = Reference (average value for peer group)

Macedonia

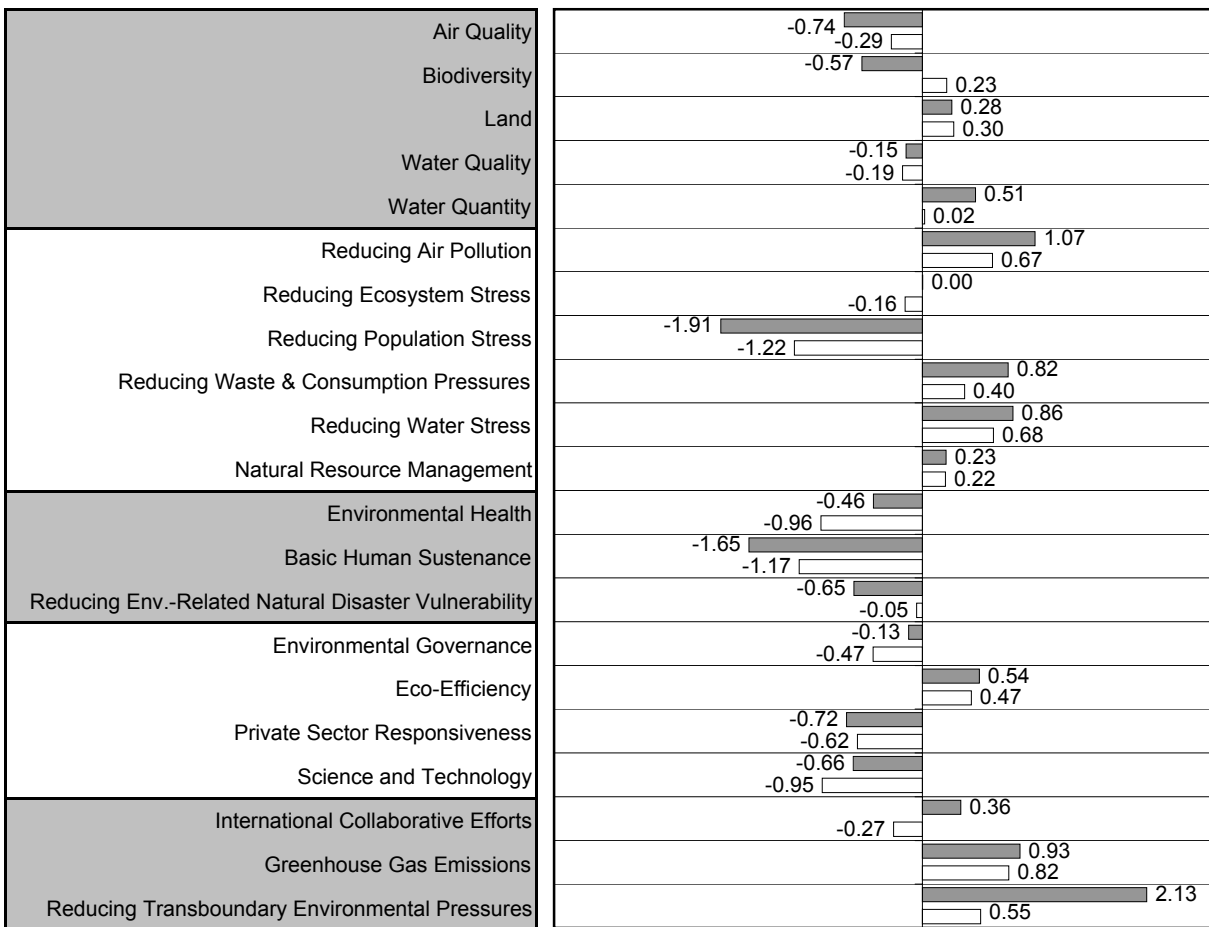
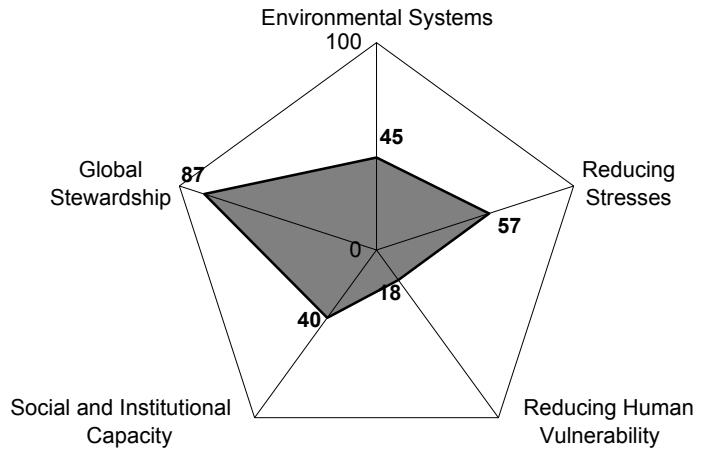
ESI:	47.2
Ranking:	90
GDP/Capita:	\$5,881
Peer group ESI:	52.1
Variable coverage:	61
Missing variables imputed:	6



= Indicator value
 = Reference (average value for peer group)

Madagascar

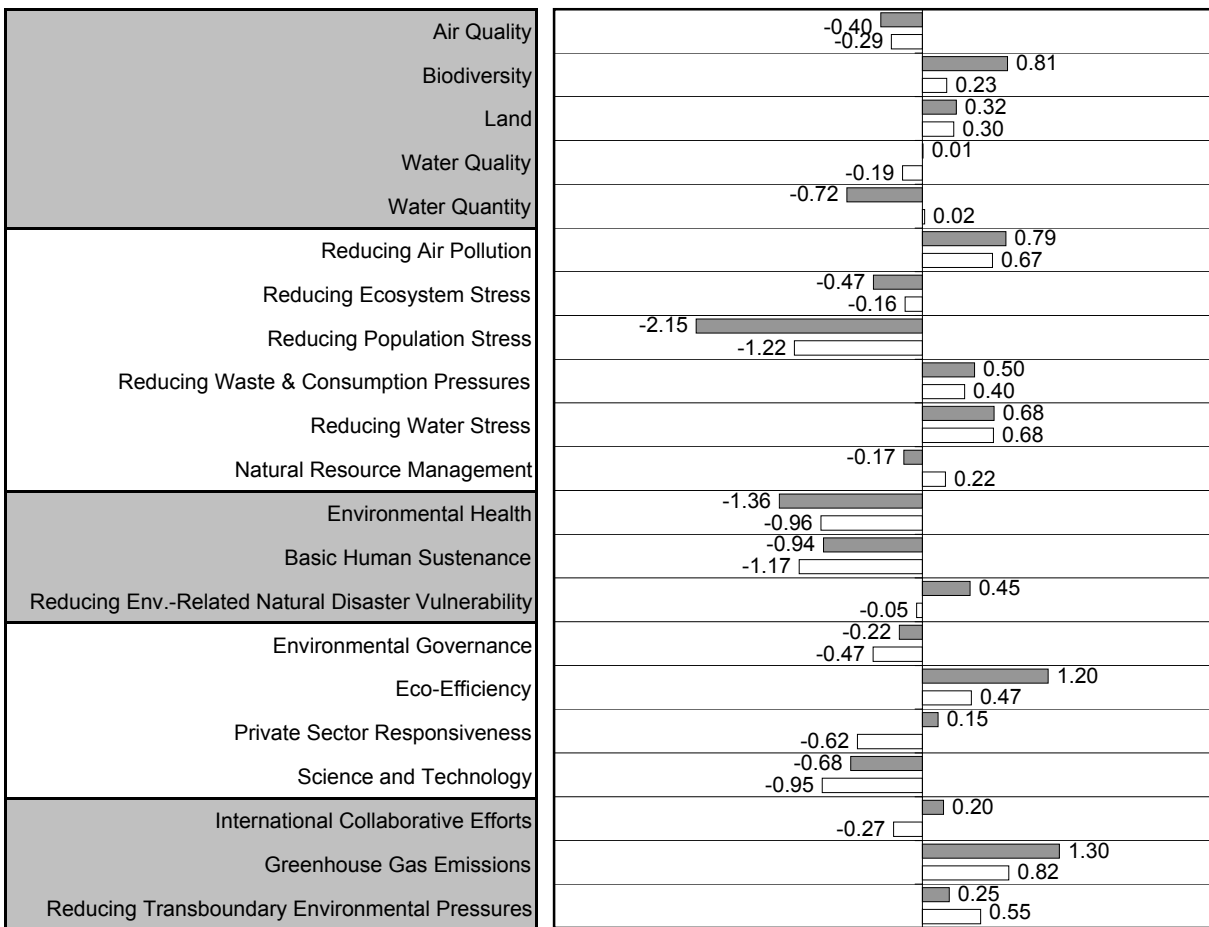
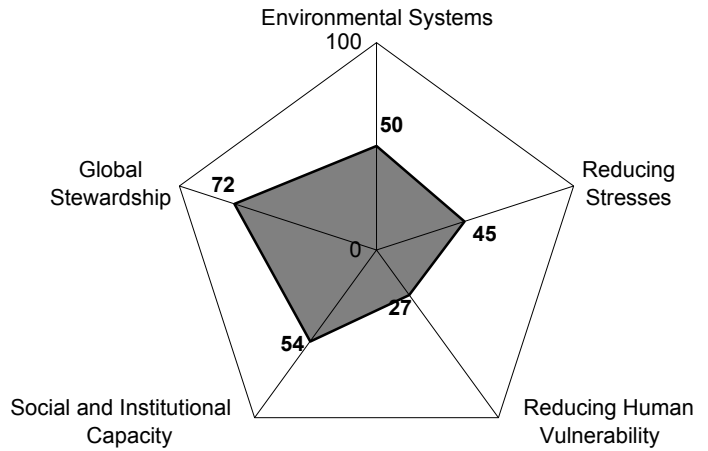
ESI:	50.2
Ranking:	64
GDP/Capita:	\$703
Peer group ESI:	46.4
Variable coverage:	59
Missing variables imputed:	10



= Indicator value
 = Reference (average value for peer group)

Malawi

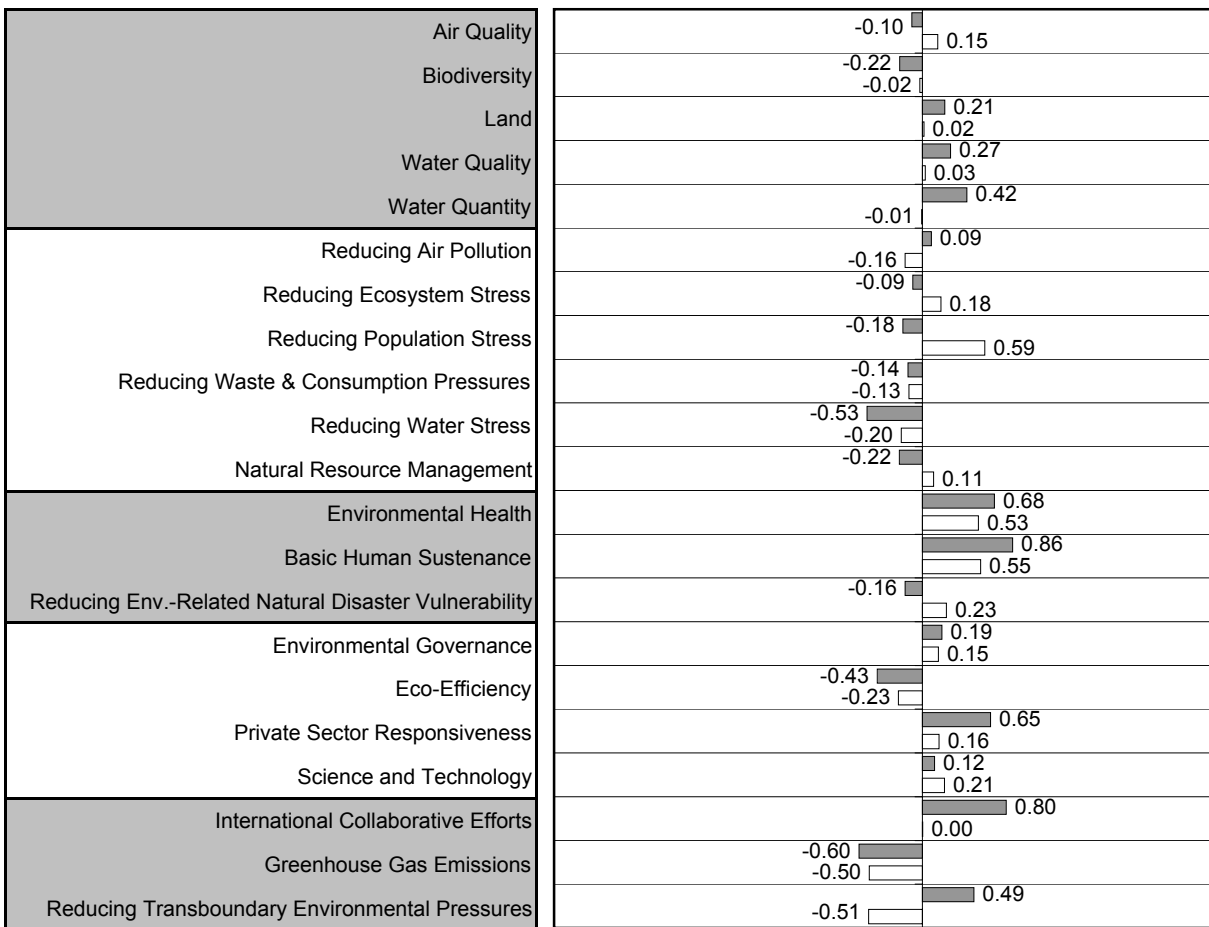
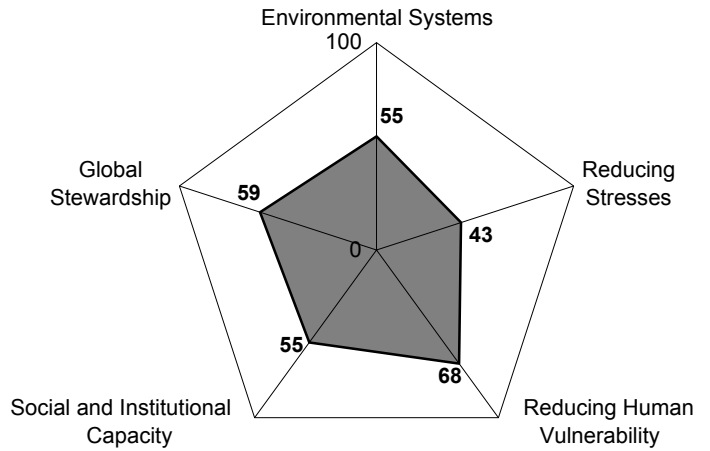
ESI:	49.3
Ranking:	74
GDP/Capita:	\$538
Peer group ESI:	46.4
Variable coverage:	58
Missing variables imputed:	10



= Indicator value
 = Reference (average value for peer group)

Malaysia

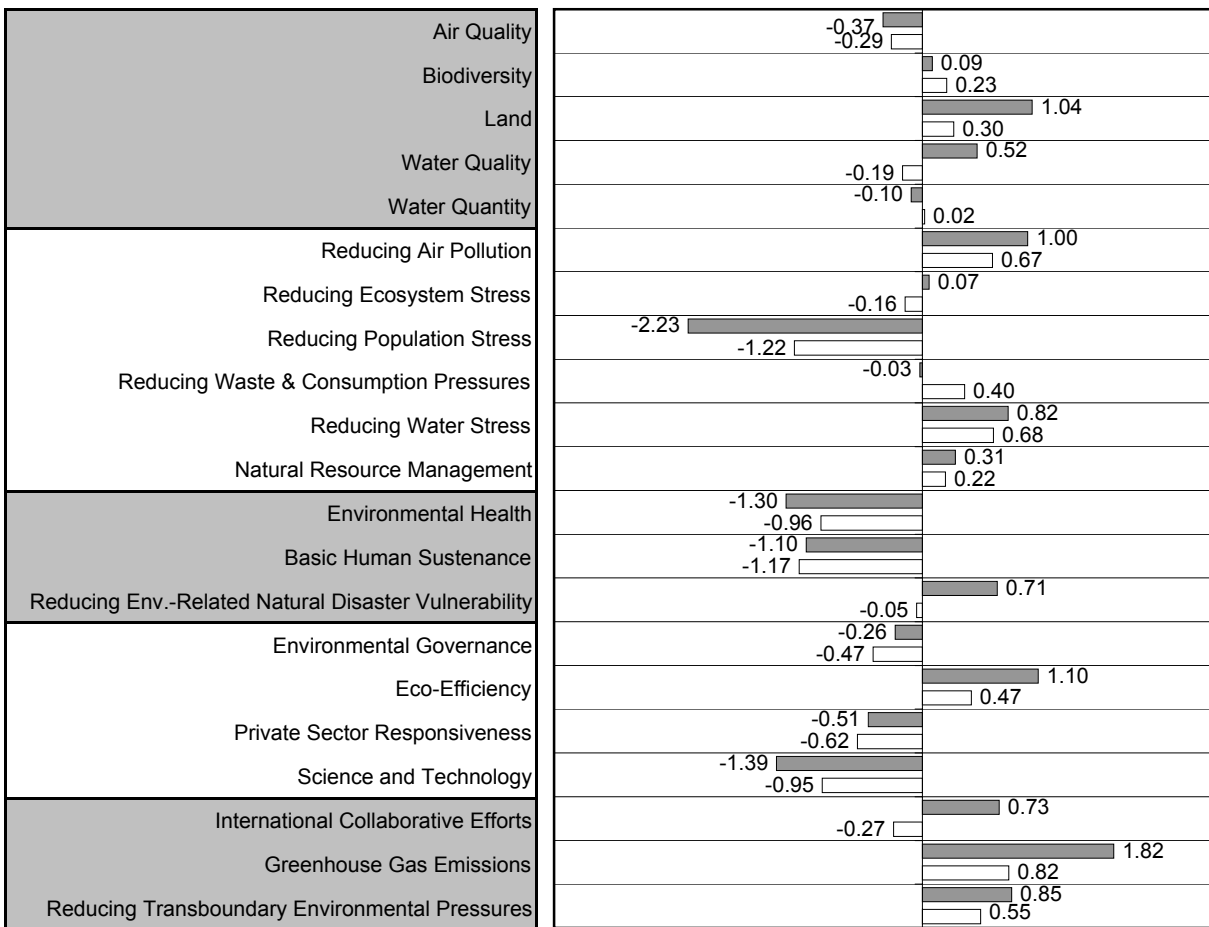
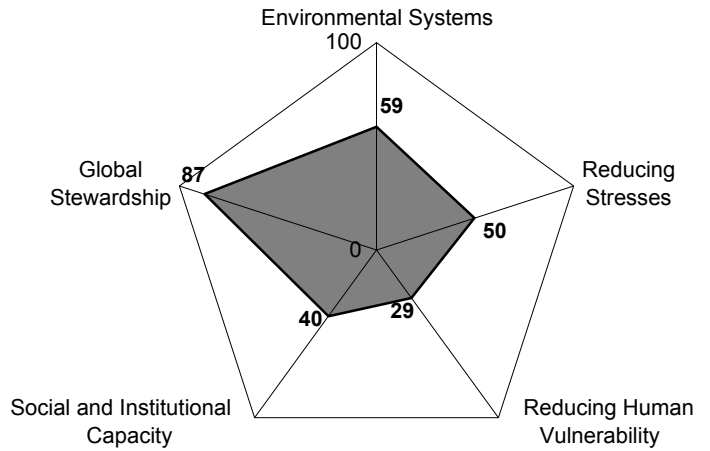
ESI:	54.0
Ranking:	38
GDP/Capita:	\$8,432
Peer group ESI:	52.1
Variable coverage:	70
Missing variables imputed:	4



= Indicator value
 = Reference (average value for peer group)

Mali

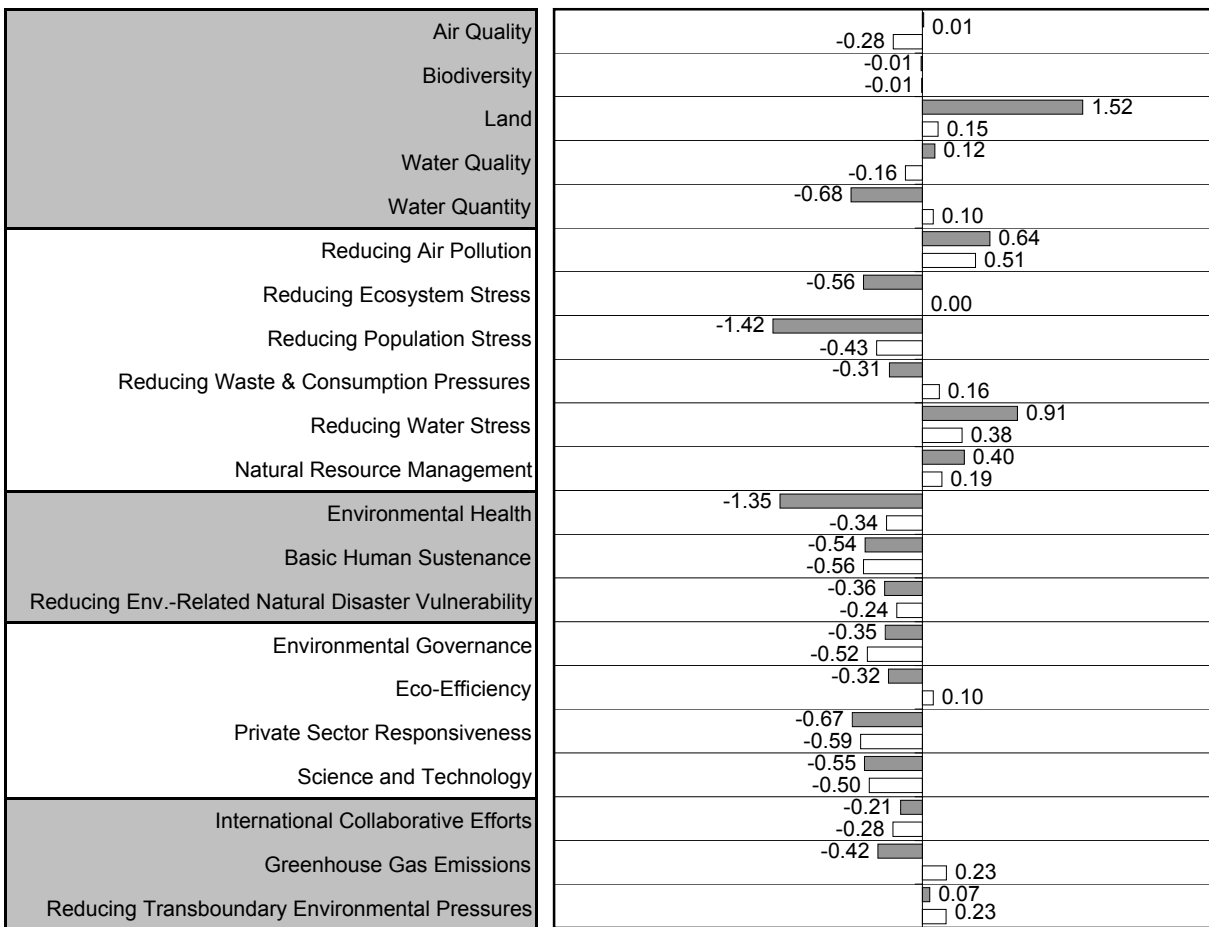
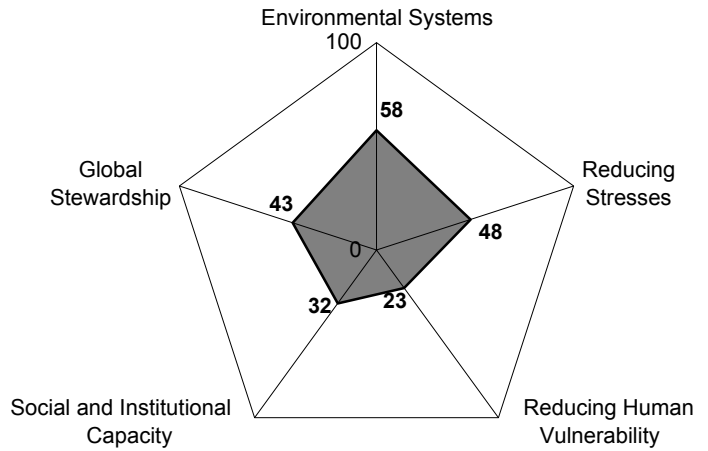
ESI:	53.7
Ranking:	41
GDP/Capita:	\$864
Peer group ESI:	46.4
Variable coverage:	57
Missing variables imputed:	11



= Indicator value
 = Reference (average value for peer group)

Mauritania

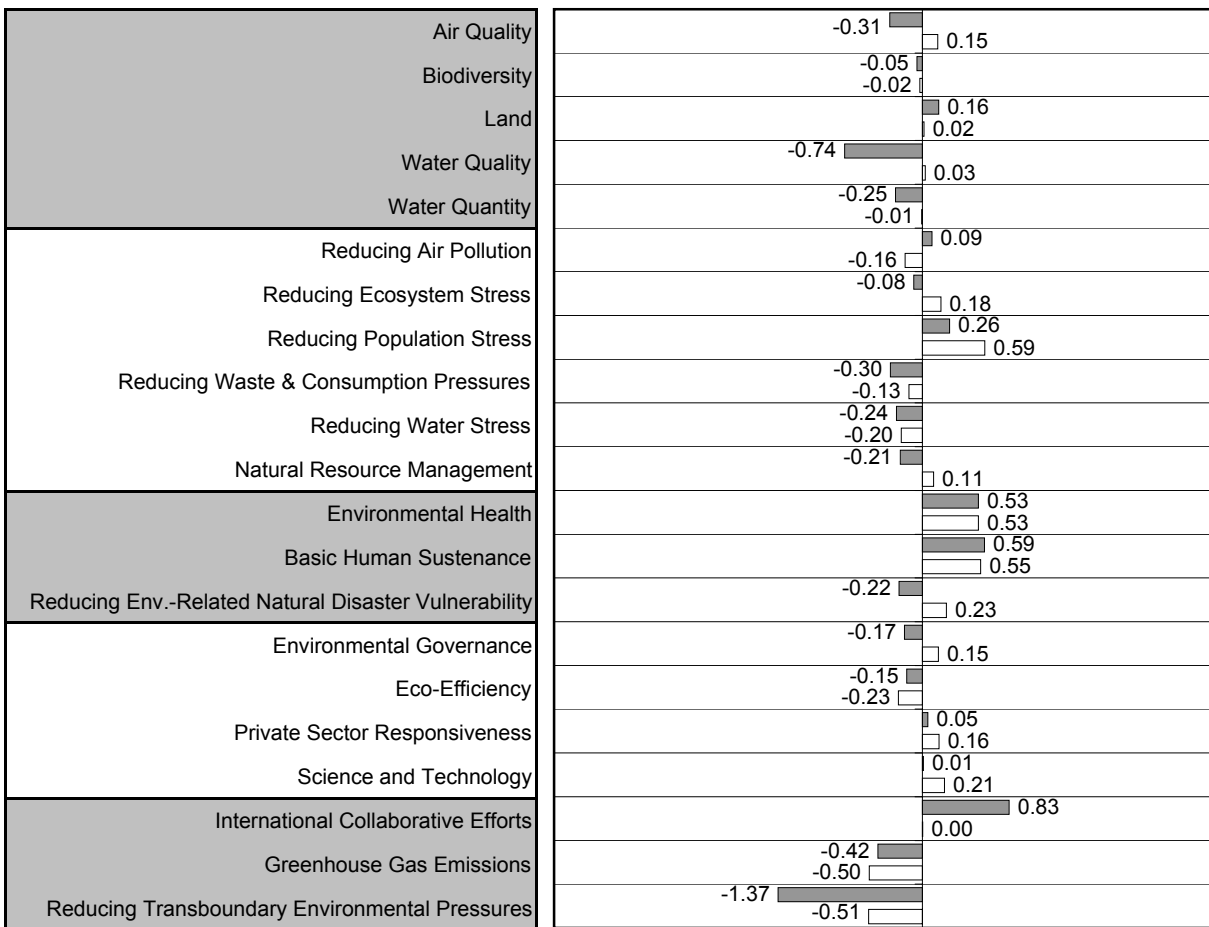
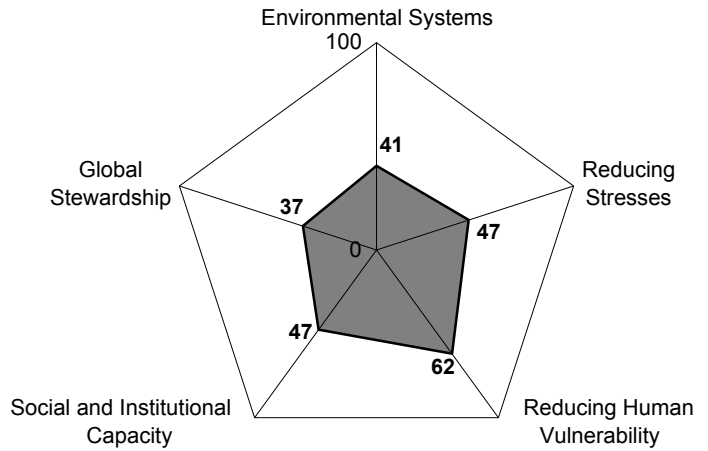
ESI:	42.6
Ranking:	124
GDP/Capita:	\$1,649
Peer group ESI:	46.7
Variable coverage:	52
Missing variables imputed:	16



= Indicator value
 = Reference (average value for peer group)

Mexico

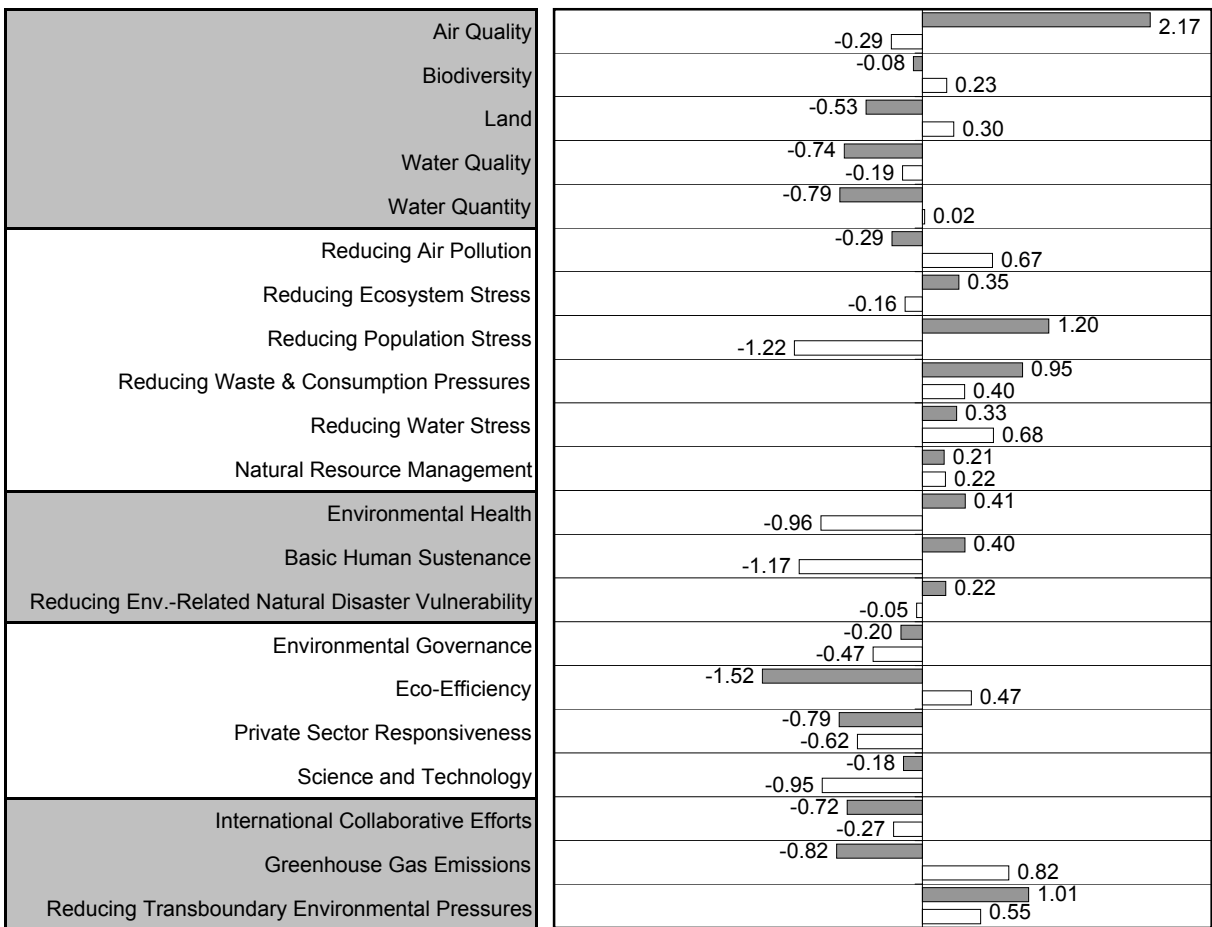
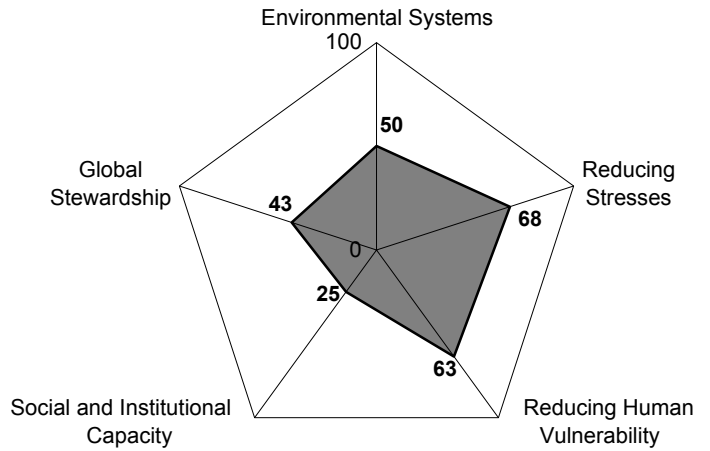
ESI:	46.2
Ranking:	95
GDP/Capita:	\$7,945
Peer group ESI:	52.1
Variable coverage:	74
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Moldova

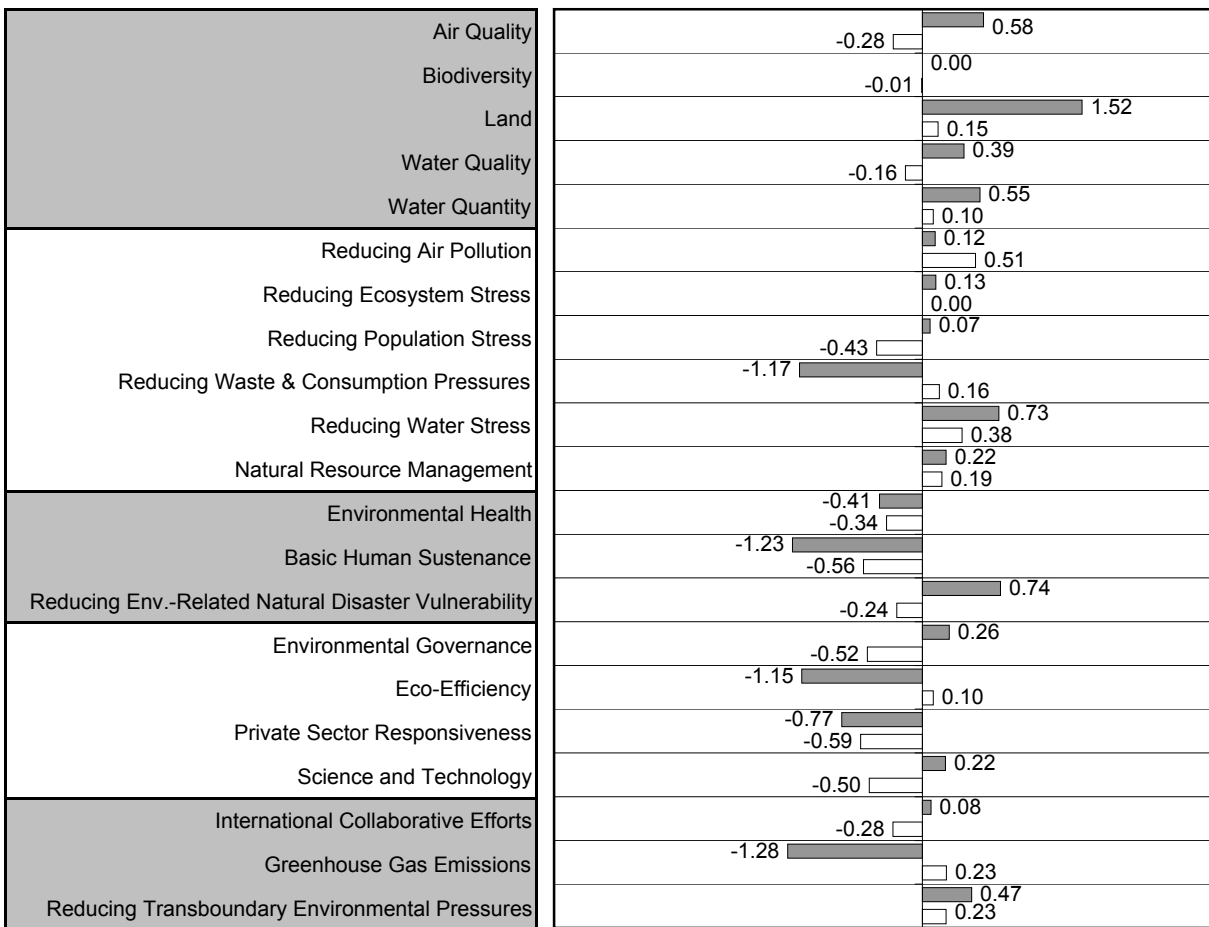
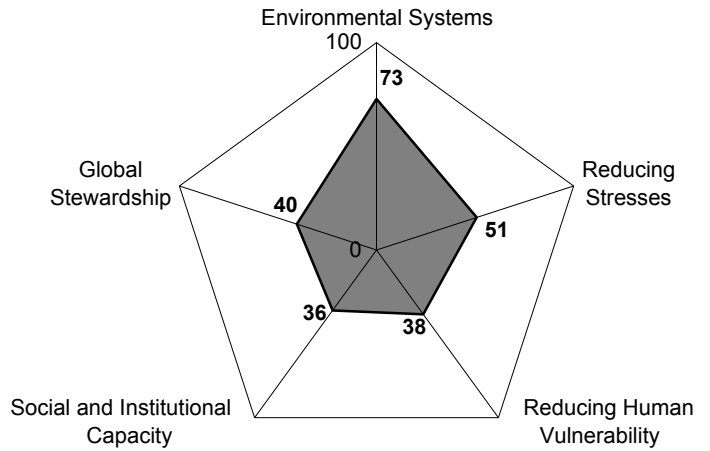
ESI:	51.2
Ranking:	58
GDP/Capita:	\$1,308
Peer group ESI:	46.4
Variable coverage:	61
Missing variables imputed:	7



= Indicator value
 = Reference (average value for peer group)

Mongolia

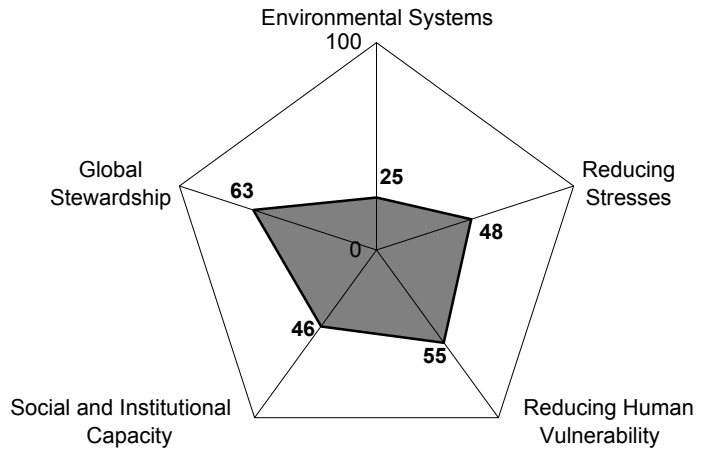
ESI:	50.0
Ranking:	71
GDP/Capita:	\$1,567
Peer group ESI:	46.7
Variable coverage:	53
Missing variables imputed:	16



= Indicator value
 = Reference (average value for peer group)

Morocco

ESI:	44.8
Ranking:	105
GDP/Capita:	\$3,489
Peer group ESI:	48.9
Variable coverage:	64
Missing variables imputed:	7

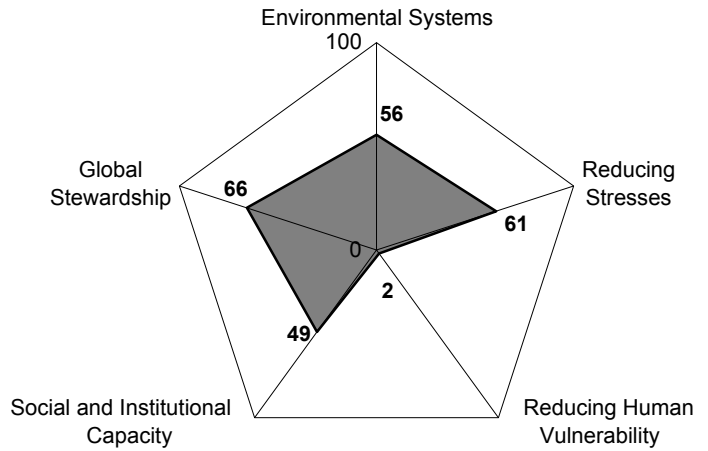


Air Quality	-0.24	0.01
Biodiversity	-0.31	0.02
Land		0.08
Water Quality	-1.93	0.21
Water Quantity	-0.21	0.07
Reducing Air Pollution		0.27
Reducing Ecosystem Stress		0.07
Reducing Population Stress		0.30
Reducing Waste & Consumption Pressures		0.18
Reducing Water Stress		0.31
Natural Resource Management	-0.04	0.28
Environmental Health	-0.79	0.08
Basic Human Sustenance	-0.14	0.05
Reducing Env.-Related Natural Disaster Vulnerability	-0.33	0.18
Environmental Governance	-0.05	0.22
Eco-Efficiency	0.00	0.24
Private Sector Responsiveness	-0.24	
Science and Technology	-0.30	
International Collaborative Efforts	-0.02	0.11
Greenhouse Gas Emissions	-0.20	
Reducing Transboundary Environmental Pressures	-0.44	0.67
	-0.30	0.05
	-0.03	0.24
	-0.38	0.07

= Indicator value
 = Reference (average value for peer group)

Mozambique

ESI:	44.8
Ranking:	107
GDP/Capita:	\$985
Peer group ESI:	46.4
Variable coverage:	58
Missing variables imputed:	11

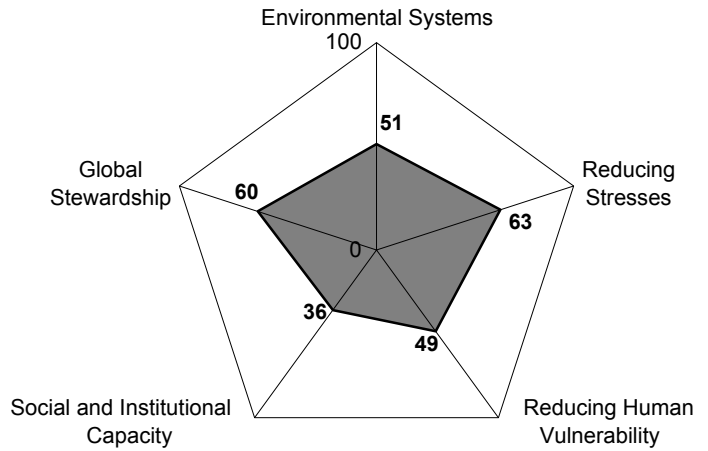


Air Quality	-0.30	0.46
Biodiversity	-0.29	0.23
Land		0.47
Water Quality		0.30
Water Quantity	-0.19	0.02
Reducing Air Pollution		0.06
Reducing Ecosystem Stress		0.02
Reducing Population Stress	-0.16	0.83
Reducing Waste & Consumption Pressures	-0.66	0.67
Reducing Water Stress	-1.22	0.22
Natural Resource Management		0.11
Environmental Health		0.40
Basic Human Sustenance	-1.45	0.67
Reducing Env.-Related Natural Disaster Vulnerability	-2.25	0.68
Environmental Governance	-0.96	0.44
Eco-Efficiency	-1.17	0.22
Private Sector Responsiveness	-2.49	0.11
Science and Technology	-0.05	0.40
International Collaborative Efforts	-0.45	0.67
Greenhouse Gas Emissions	-0.47	0.68
Reducing Transboundary Environmental Pressures		0.44
		0.22
		1.73
		0.47
		1.44
		0.82
		0.06
		0.55

= Indicator value
 = Reference (average value for peer group)

Myanmar

ESI:	52.8
Ranking:	46
GDP/Capita:	\$1,800
Peer group ESI:	46.7
Variable coverage:	52
Missing variables imputed:	16

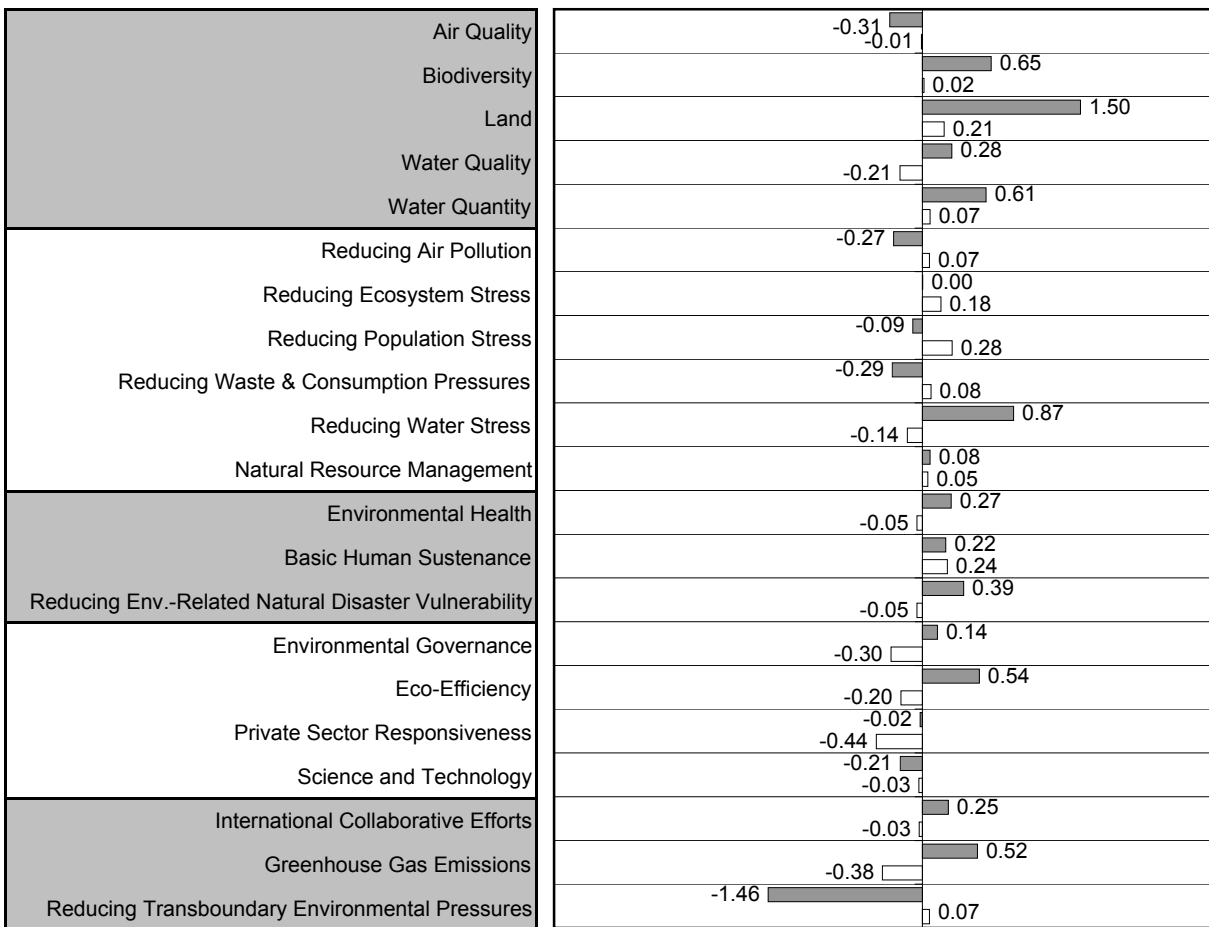
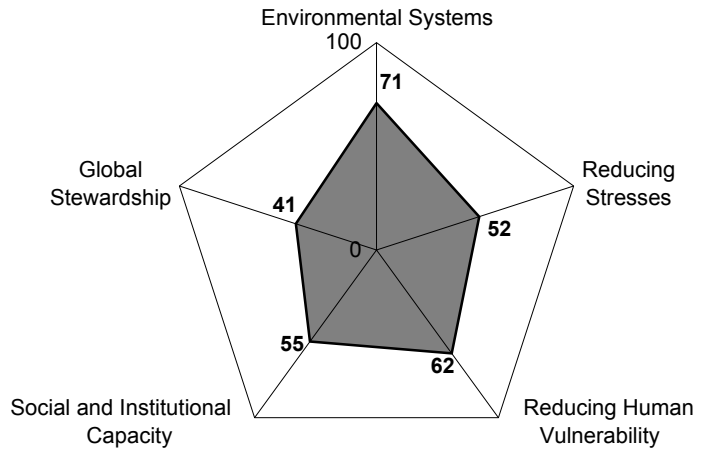


Air Quality	-0.67	-0.28
Biodiversity	-0.04	-0.01
Land		0.17
Water Quality		0.15
Water Quantity		0.14
Reducing Air Pollution		0.54
Reducing Ecosystem Stress	-0.18	0.75
Reducing Population Stress		0.51
Reducing Waste & Consumption Pressures	-0.43	0.27
Reducing Water Stress		0.34
Natural Resource Management		0.16
Environmental Health		0.72
Basic Human Sustenance	-0.03	0.38
Reducing Env.-Related Natural Disaster Vulnerability	-0.34	0.06
Environmental Governance		0.19
Eco-Efficiency	-0.56	0.22
Private Sector Responsiveness	-0.30	0.76
Science and Technology	-0.24	0.10
International Collaborative Efforts	-1.19	0.55
Greenhouse Gas Emissions	-0.52	0.59
Reducing Transboundary Environmental Pressures	-0.48	0.48
	-0.50	1.60
	-1.37	0.23
	-0.28	0.54
		0.23

= Indicator value
 = Reference (average value for peer group)

Namibia

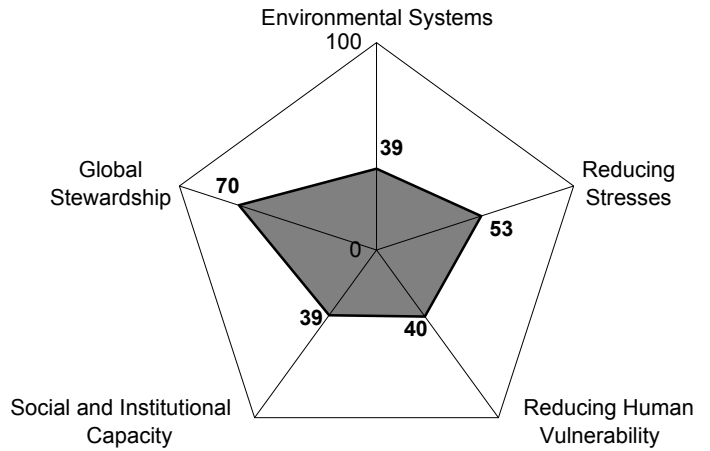
ESI:	56.8
Ranking:	32
GDP/Capita:	\$5,544
Peer group ESI:	48.9
Variable coverage:	59
Missing variables imputed:	10



= Indicator value
 = Reference (average value for peer group)

Nepal

ESI:	47.7
Ranking:	85
GDP/Capita:	\$1,233
Peer group ESI:	46.4
Variable coverage:	56
Missing variables imputed:	15

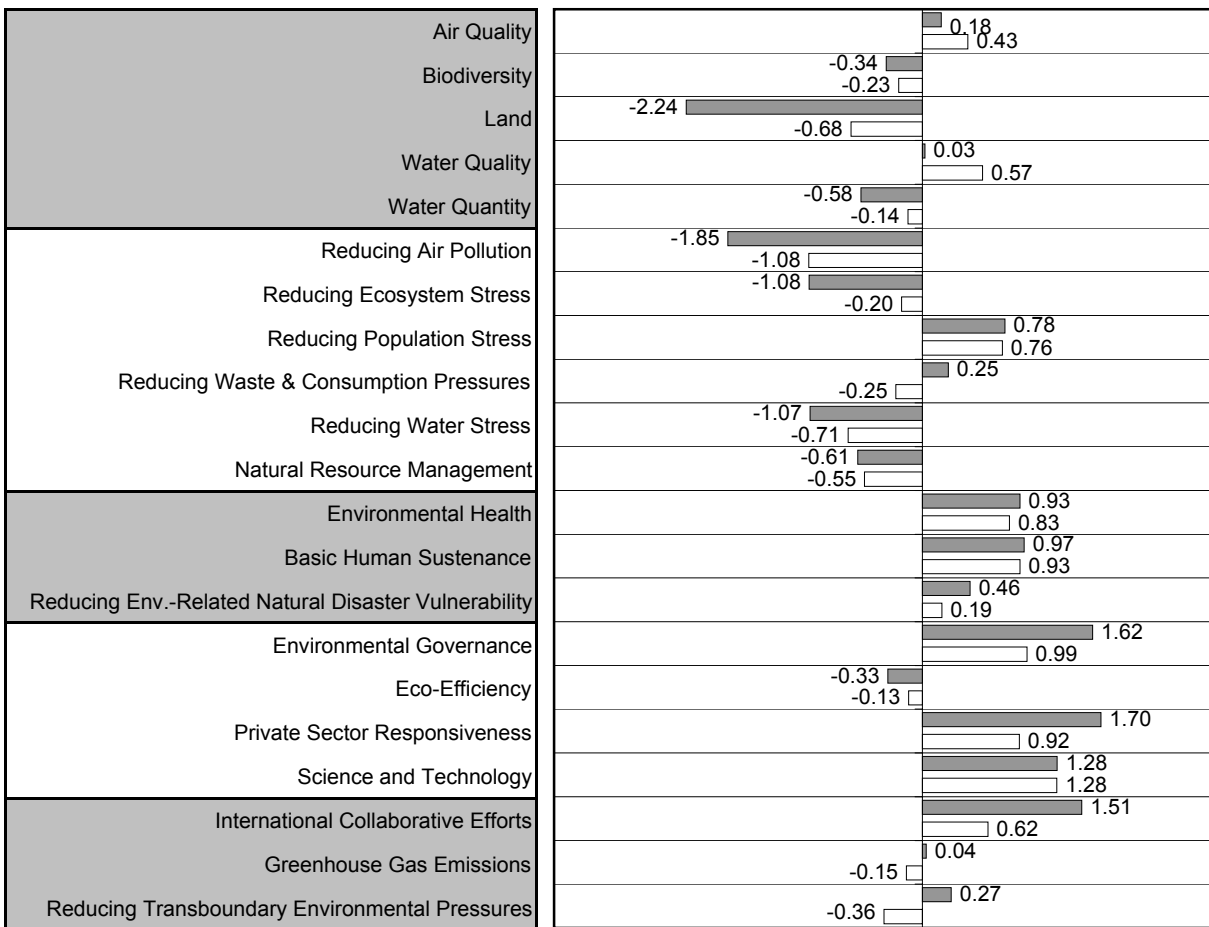
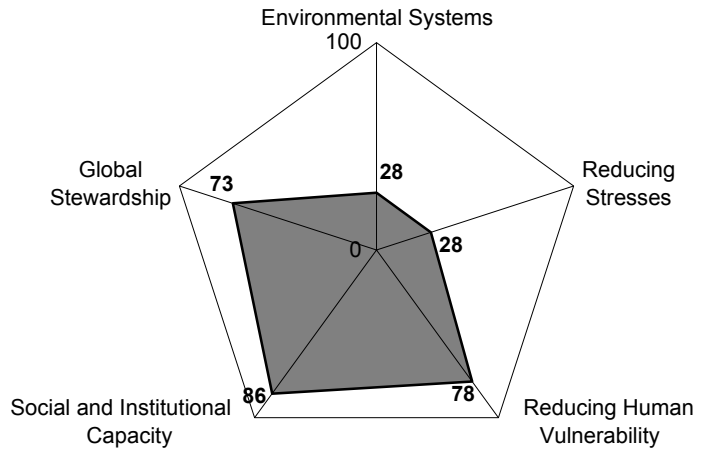


Air Quality	-0.64	0.29
Biodiversity	-0.05	0.23
Land	-0.03	0.30
Water Quality	-0.35	-0.19
Water Quantity	-0.30	0.02
Reducing Air Pollution	-0.28	0.41
Reducing Ecosystem Stress	-0.16	0.67
Reducing Population Stress	-0.57	-1.22
Reducing Waste & Consumption Pressures	-0.16	0.79
Reducing Water Stress	-0.16	0.40
Natural Resource Management	0.28	0.68
Environmental Health	0.22	0.01
Basic Human Sustenance	-0.96	0.03
Reducing Env.-Related Natural Disaster Vulnerability	-1.17	-0.83
Environmental Governance	-0.05	-0.12
Eco-Efficiency	-0.47	0.87
Private Sector Responsiveness	-0.55	0.47
Science and Technology	-0.62	-1.33
International Collaborative Efforts	-0.95	-0.07
Greenhouse Gas Emissions	-0.27	0.91
Reducing Transboundary Environmental Pressures		0.82
		0.71
		0.55

= Indicator value
 = Reference (average value for peer group)

Netherlands

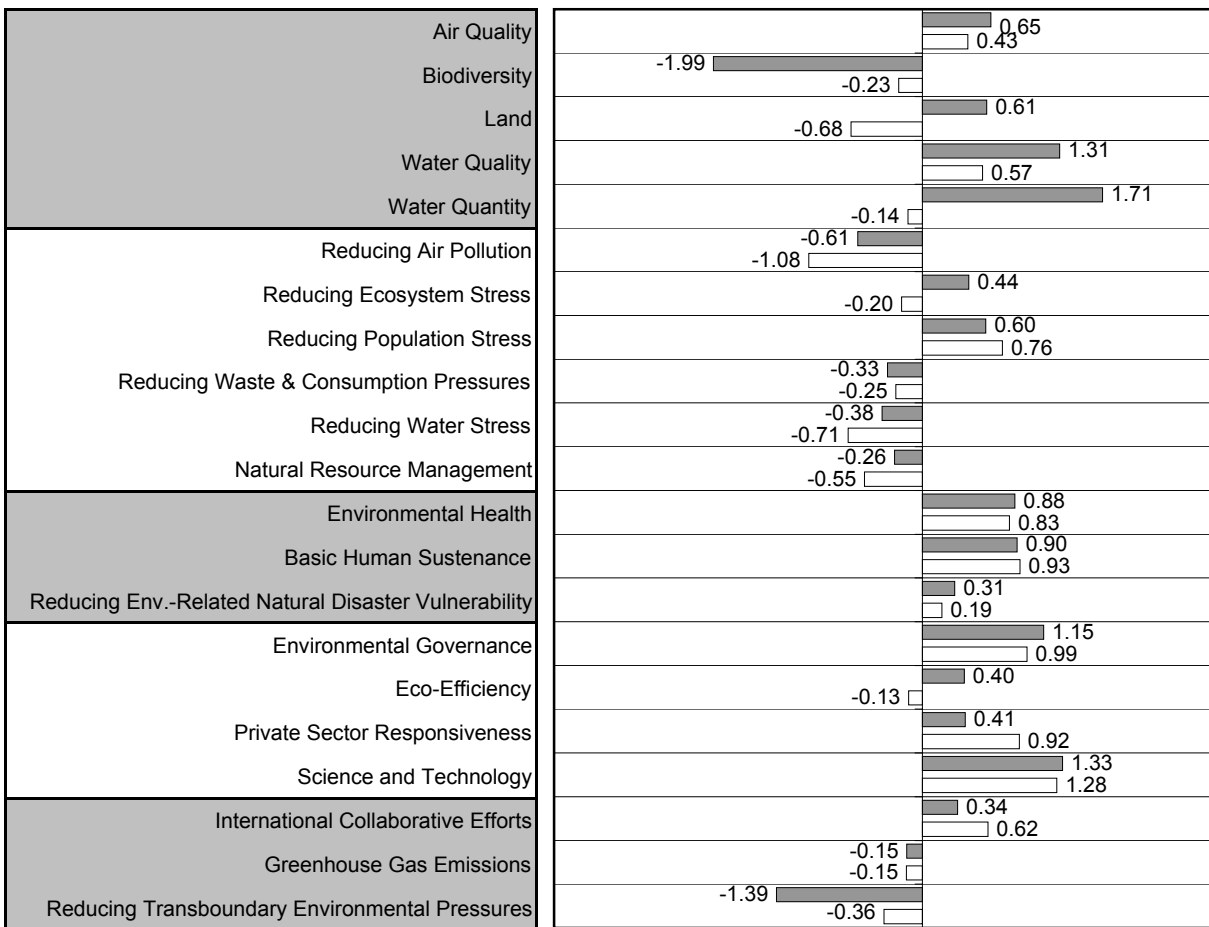
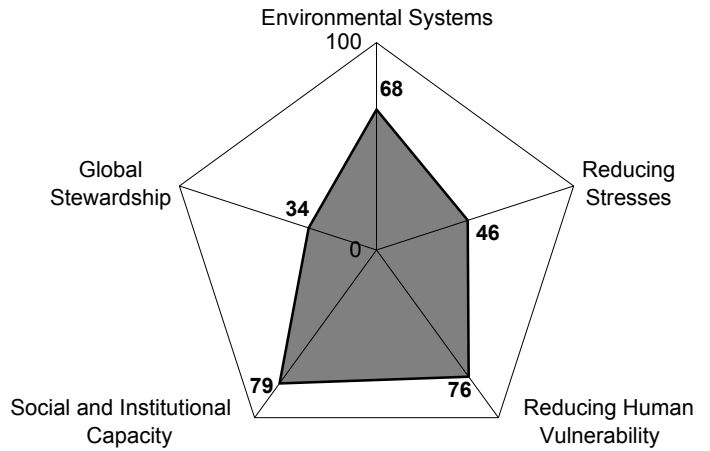
ESI:	53.7
Ranking:	40
GDP/Capita:	\$25,578
Peer group ESI:	55.4
Variable coverage:	75
Missing variables imputed:	0



= Indicator value
 = Reference (average value for peer group)

New Zealand

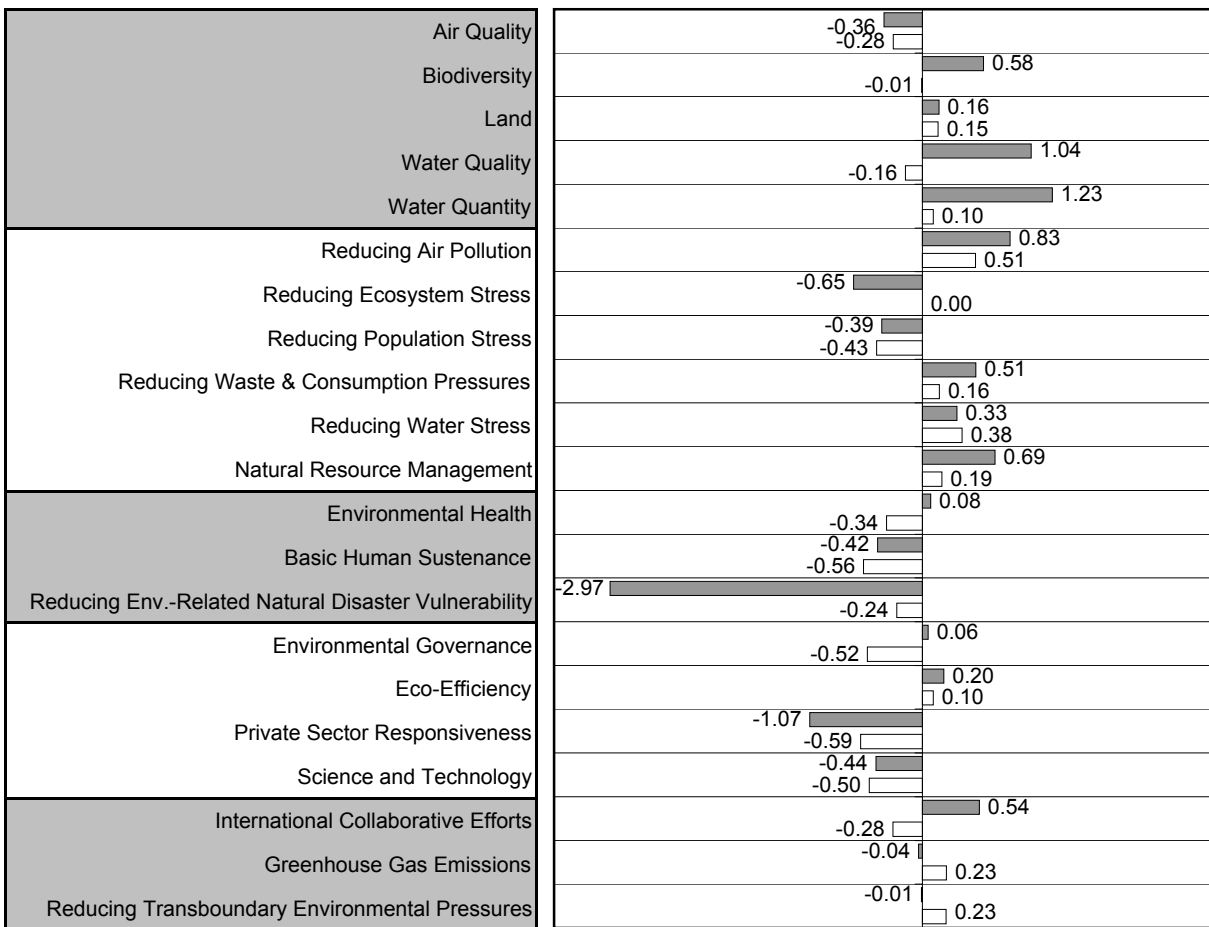
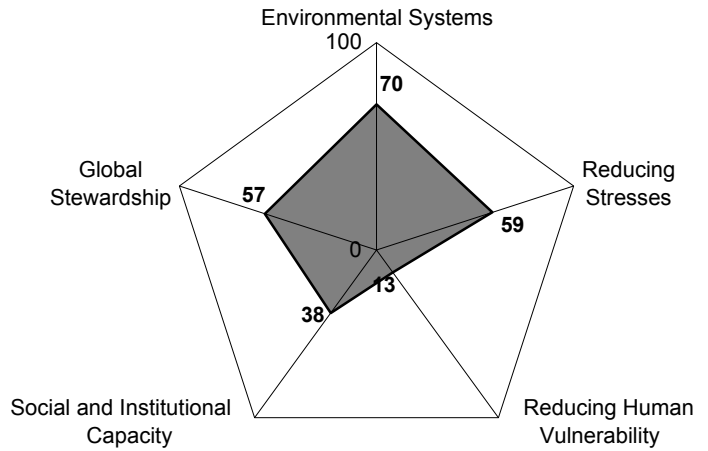
ESI:	61.0
Ranking:	14
GDP/Capita:	\$18,416
Peer group ESI:	55.4
Variable coverage:	70
Missing variables imputed:	2



= Indicator value
 = Reference (average value for peer group)

Nicaragua

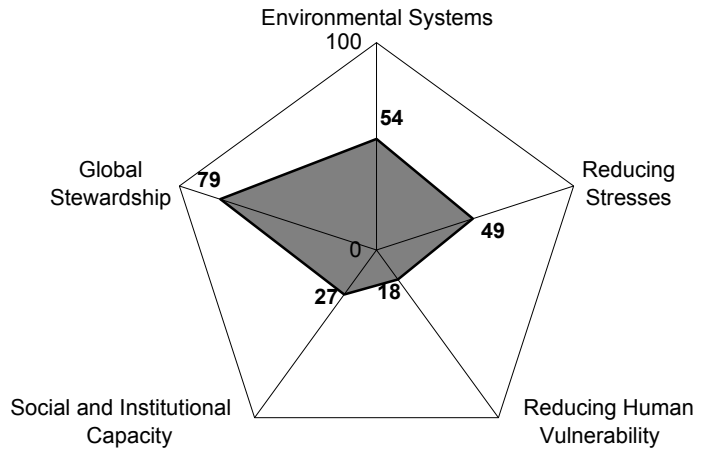
ESI:	50.2
Ranking:	66
GDP/Capita:	\$2,194
Peer group ESI:	46.7
Variable coverage:	63
Missing variables imputed:	7



= Indicator value
 = Reference (average value for peer group)

Niger

ESI:	45.0
Ranking:	103
GDP/Capita:	\$719
Peer group ESI:	46.4
Variable coverage:	52
Missing variables imputed:	15

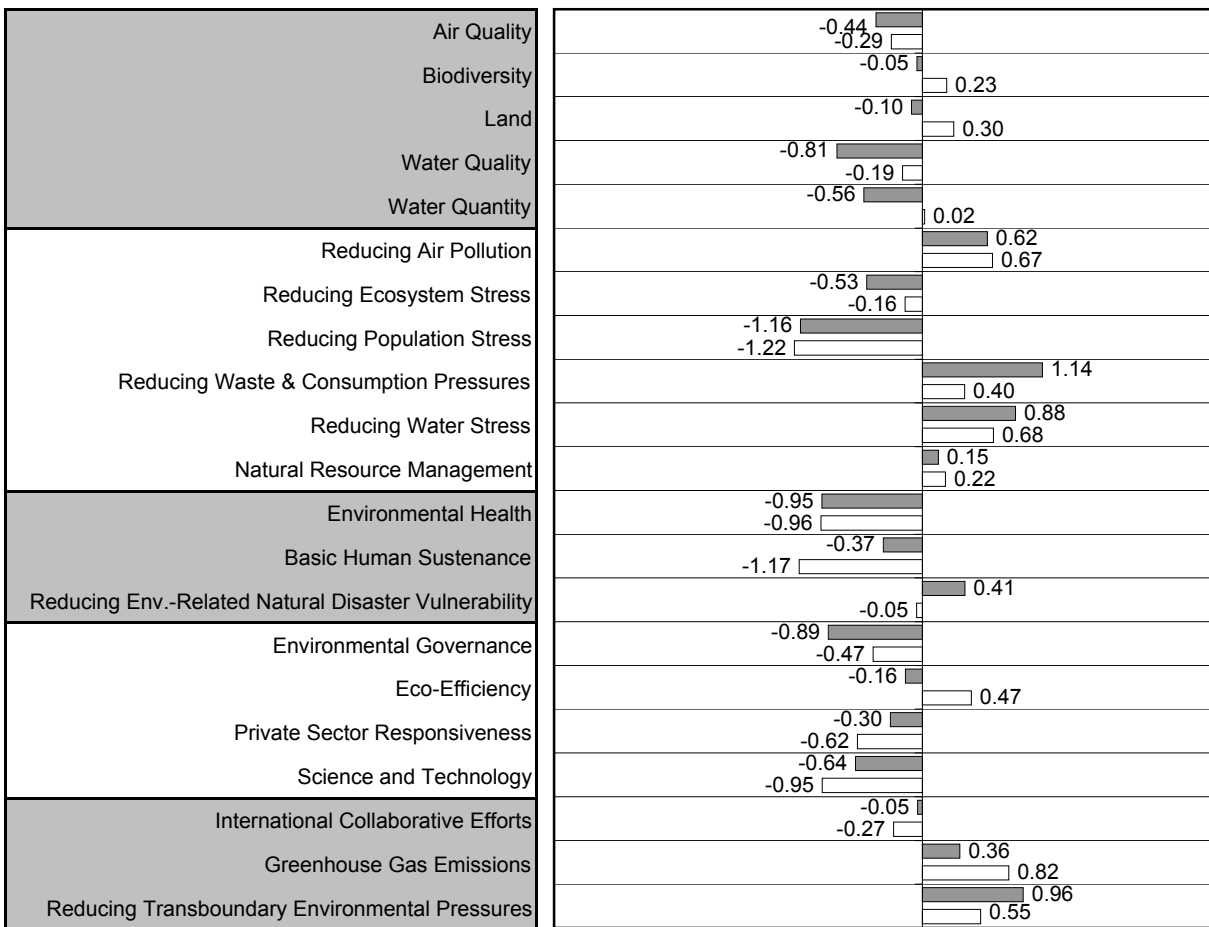
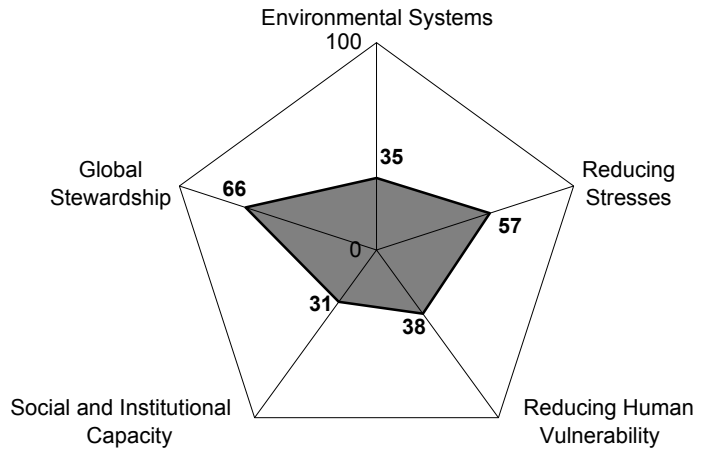


Air Quality	-0.35	0.23
Biodiversity	-0.29	0.23
Land		1.26
Water Quality	-0.13	0.30
Water Quantity	-0.19	
	-0.56	0.02
Reducing Air Pollution		0.84
Reducing Ecosystem Stress	-0.87	0.67
Reducing Population Stress	-2.23	-0.16
Reducing Waste & Consumption Pressures	-1.22	0.88
Reducing Water Stress		0.97
Natural Resource Management		0.68
		0.25
		0.22
Environmental Health	-1.53	
Basic Human Sustenance	-0.96	
Reducing Env.-Related Natural Disaster Vulnerability	-1.56	-1.17
		0.30
Environmental Governance	-0.05	
	-0.47	
	-0.47	
Eco-Efficiency		0.08
Private Sector Responsiveness		0.47
	-0.65	
	-0.62	
Science and Technology	-1.47	
	-0.95	
International Collaborative Efforts		-0.23
		-0.27
Greenhouse Gas Emissions		1.05
		0.82
Reducing Transboundary Environmental Pressures		1.62
		0.55

= Indicator value
 = Reference (average value for peer group)

Nigeria

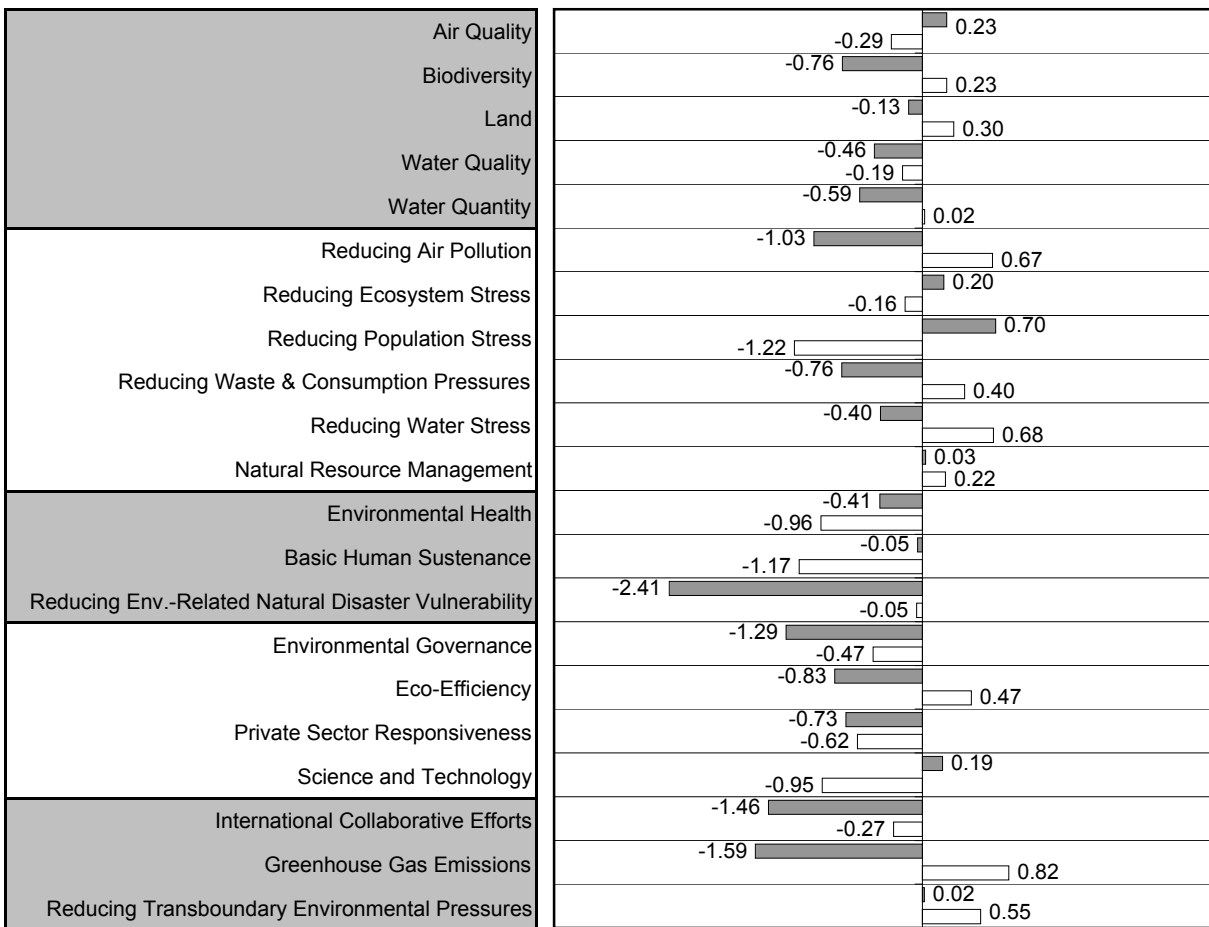
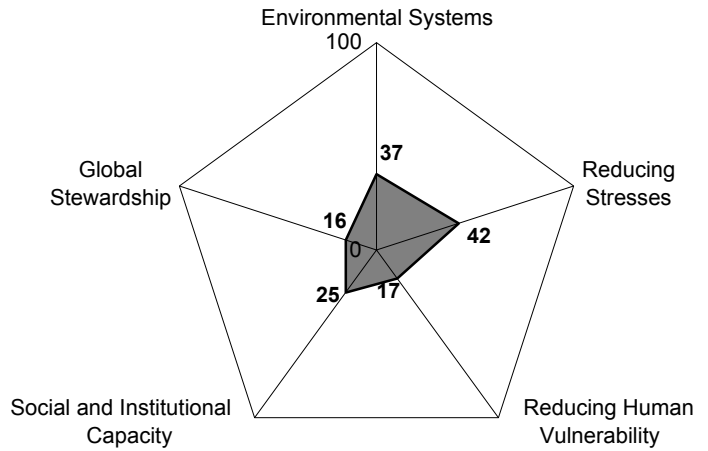
ESI:	45.4
Ranking:	98
GDP/Capita:	\$891
Peer group ESI:	46.4
Variable coverage:	59
Missing variables imputed:	11



= Indicator value
 = Reference (average value for peer group)

North Korea

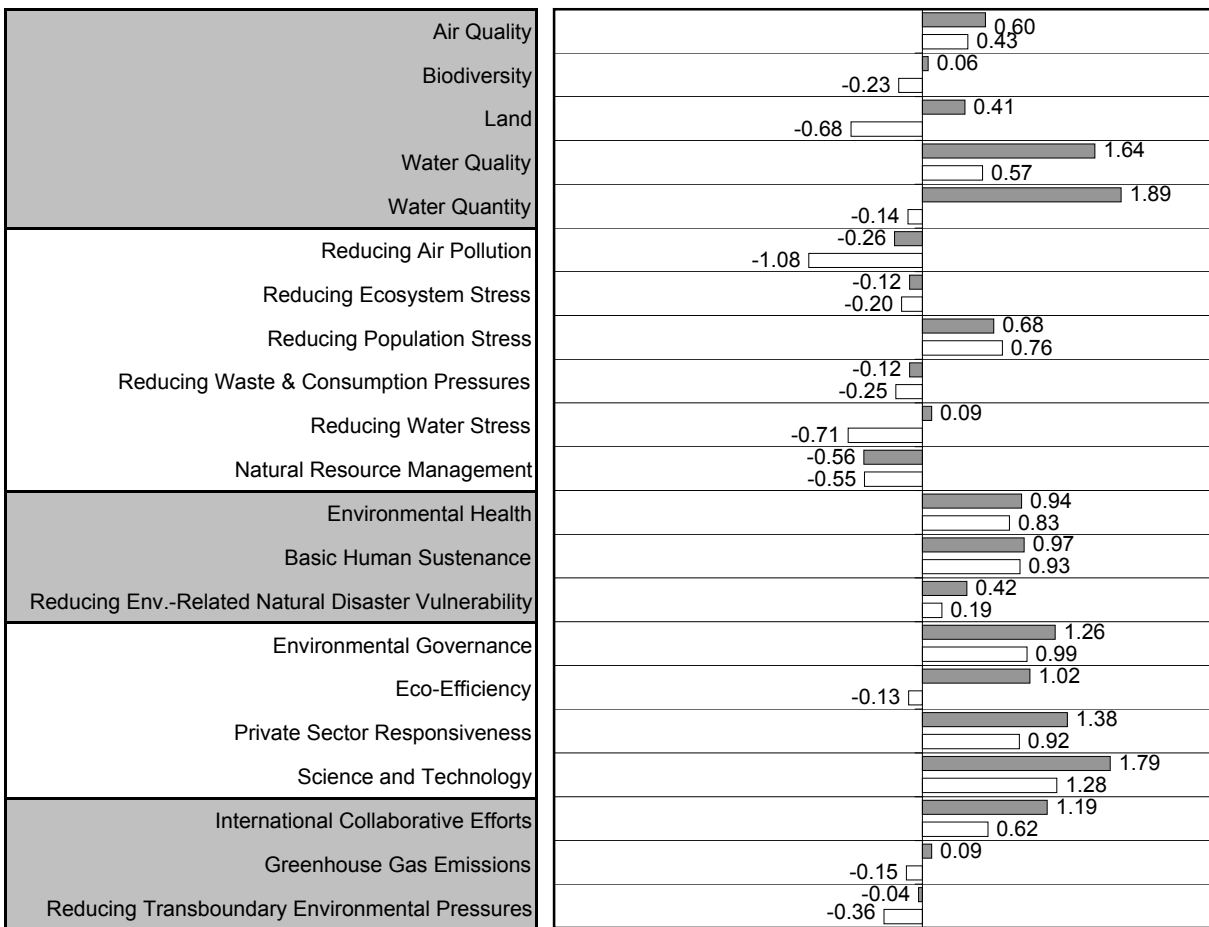
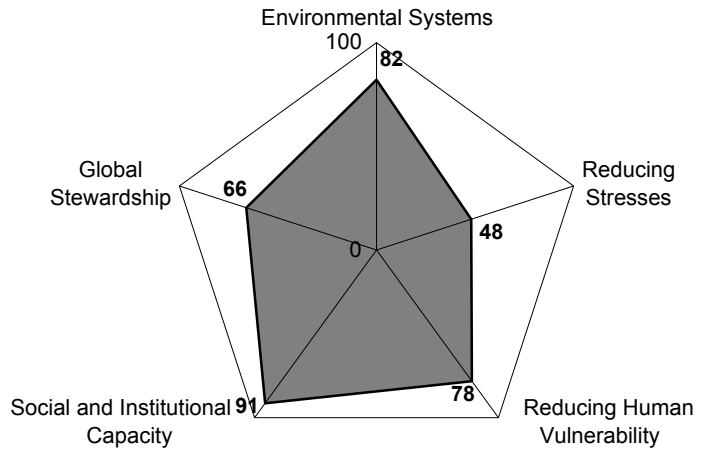
ESI:	29.2
Ranking:	146
GDP/Capita:	\$1,300
Peer group ESI:	46.4
Variable coverage:	47
Missing variables imputed:	21



= Indicator value
 = Reference (average value for peer group)

Norway

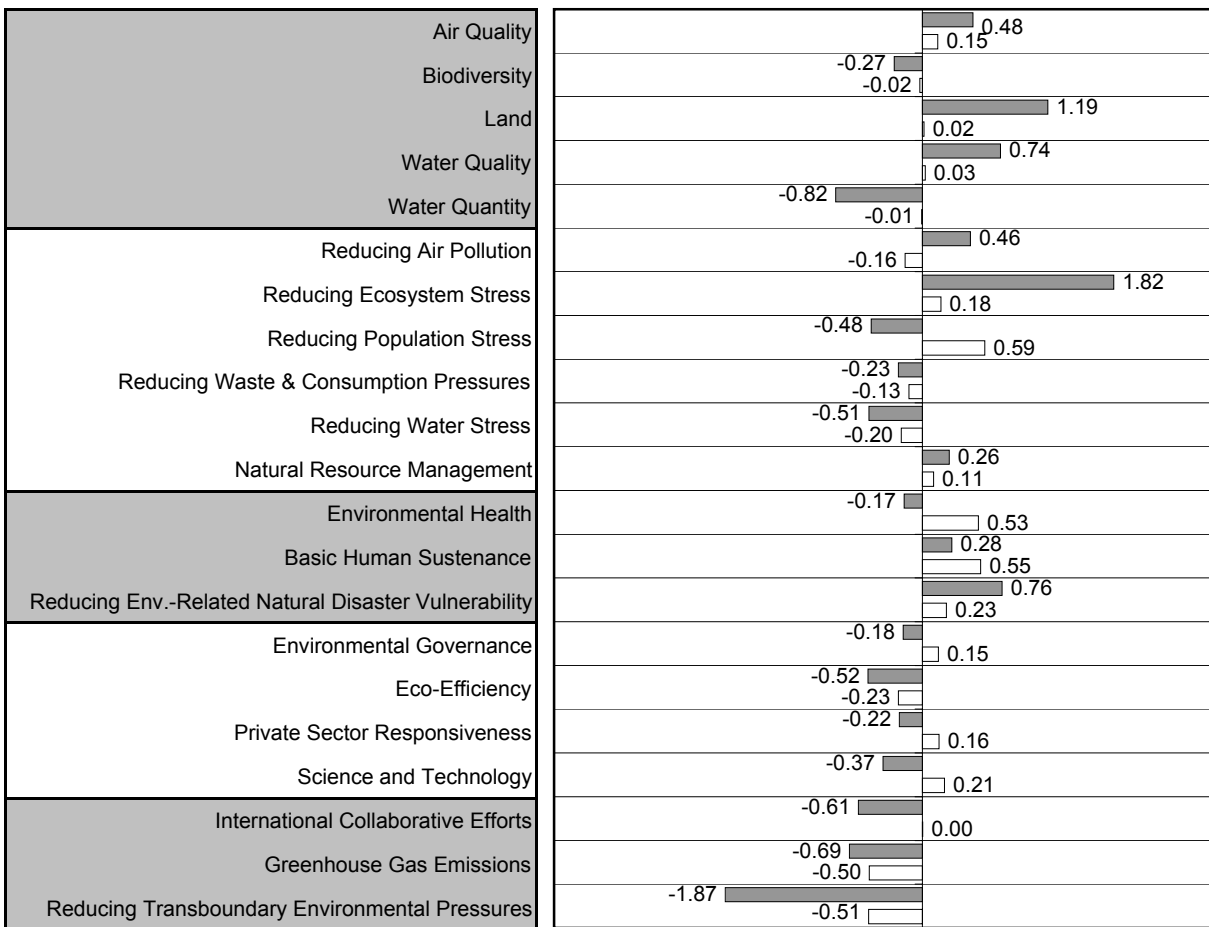
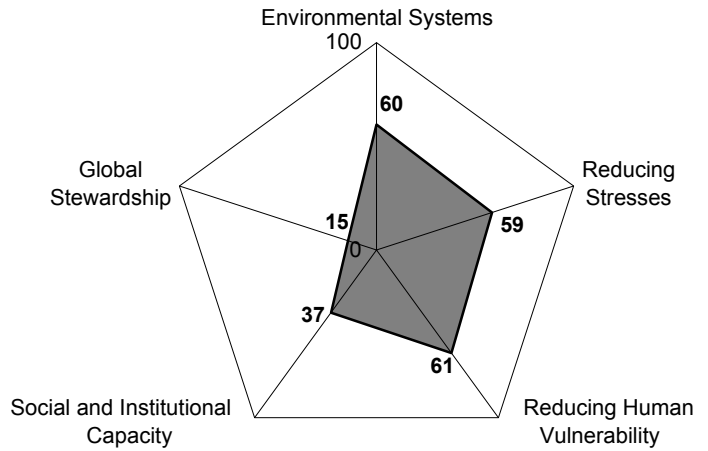
ESI:	73.4
Ranking:	2
GDP/Capita:	\$32,232
Peer group ESI:	55.4
Variable coverage:	72
Missing variables imputed:	2



= Indicator value
 = Reference (average value for peer group)

Oman

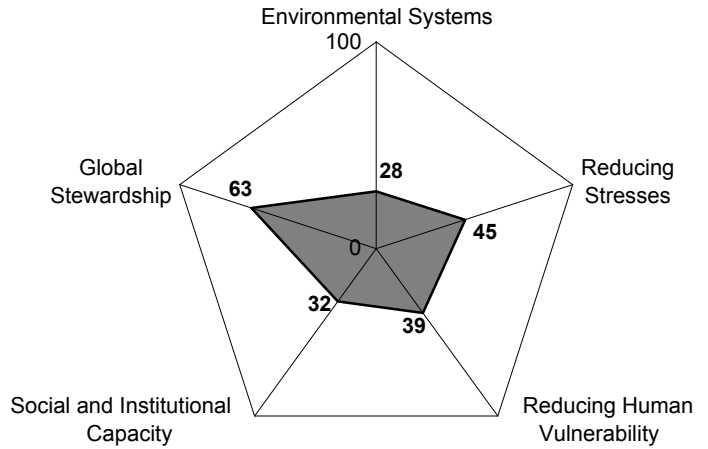
ESI:	47.9
Ranking:	83
GDP/Capita:	\$11,813
Peer group ESI:	52.1
Variable coverage:	54
Missing variables imputed:	15



= Indicator value
 = Reference (average value for peer group)

Pakistan

ESI:	39.9
Ranking:	131
GDP/Capita:	\$1,714
Peer group ESI:	46.7
Variable coverage:	65
Missing variables imputed:	7

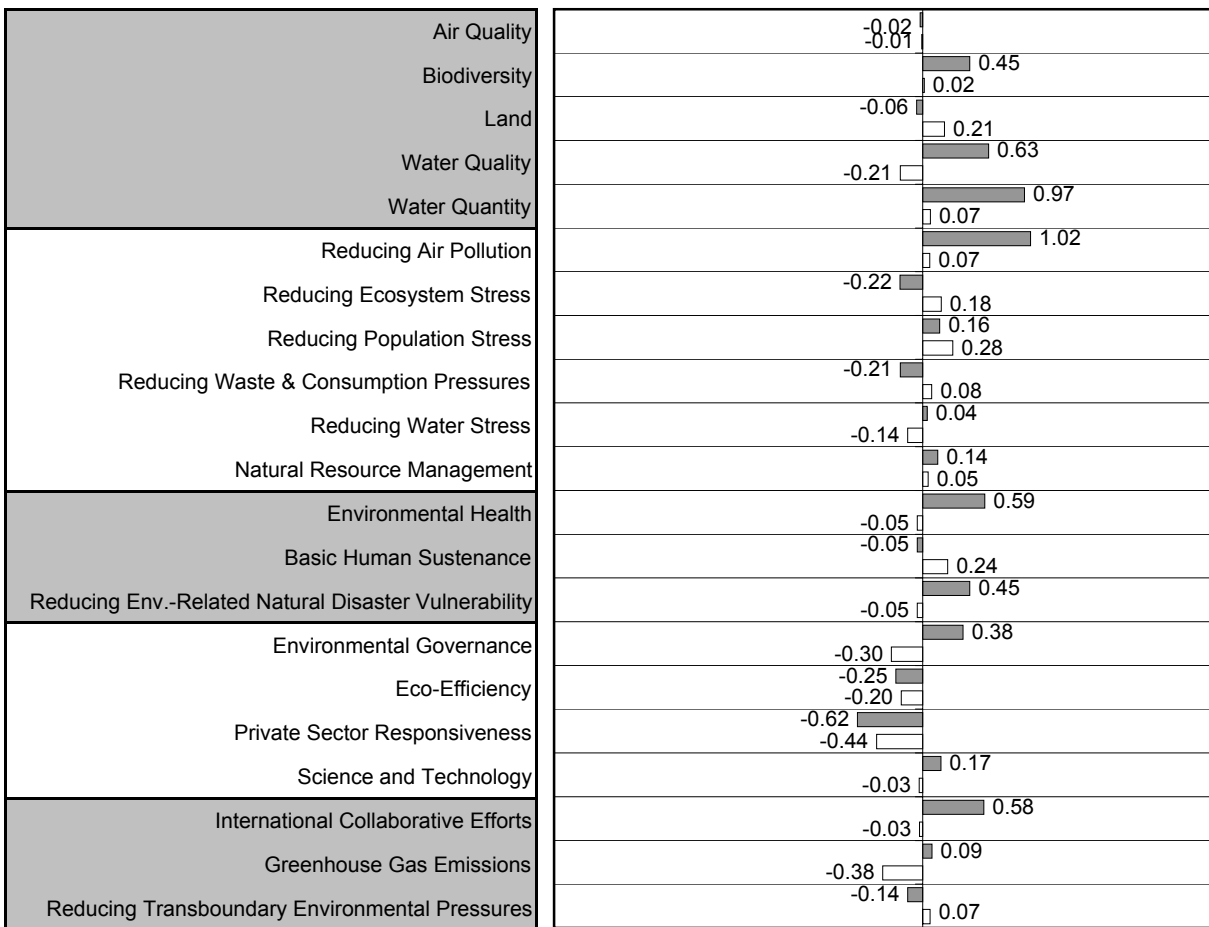
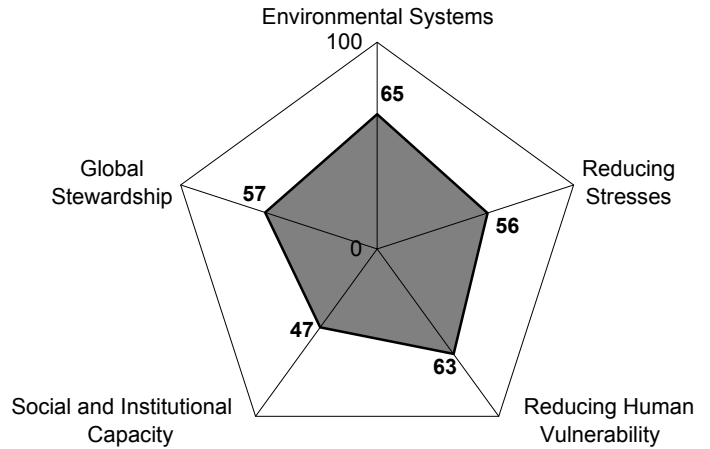


Air Quality	-0.47	0.28
Biodiversity	-0.06	-0.01
Land	-0.08	0.15
Water Quality	-1.48	-0.16
Water Quantity	-0.87	0.10
Reducing Air Pollution	-0.18	0.33
Reducing Ecosystem Stress	-0.18	0.51
Reducing Population Stress	-0.62	0.00
Reducing Waste & Consumption Pressures	-0.43	0.06
Reducing Water Stress	-0.38	0.16
Natural Resource Management	-0.38	0.38
Environmental Health	-0.53	0.07
Basic Human Sustenance	-0.34	0.19
Reducing Env.-Related Natural Disaster Vulnerability	-0.56	0.13
Environmental Governance	-0.48	0.06
Eco-Efficiency	-0.24	0.16
Private Sector Responsiveness	-0.54	0.03
Science and Technology	-0.52	0.10
International Collaborative Efforts	-0.67	0.03
Greenhouse Gas Emissions	-0.59	0.10
Reducing Transboundary Environmental Pressures	-0.74	1.36
	-0.50	0.23
	-0.29	0.23
	-0.28	
	-0.04	

= Indicator value
 = Reference (average value for peer group)

Panama

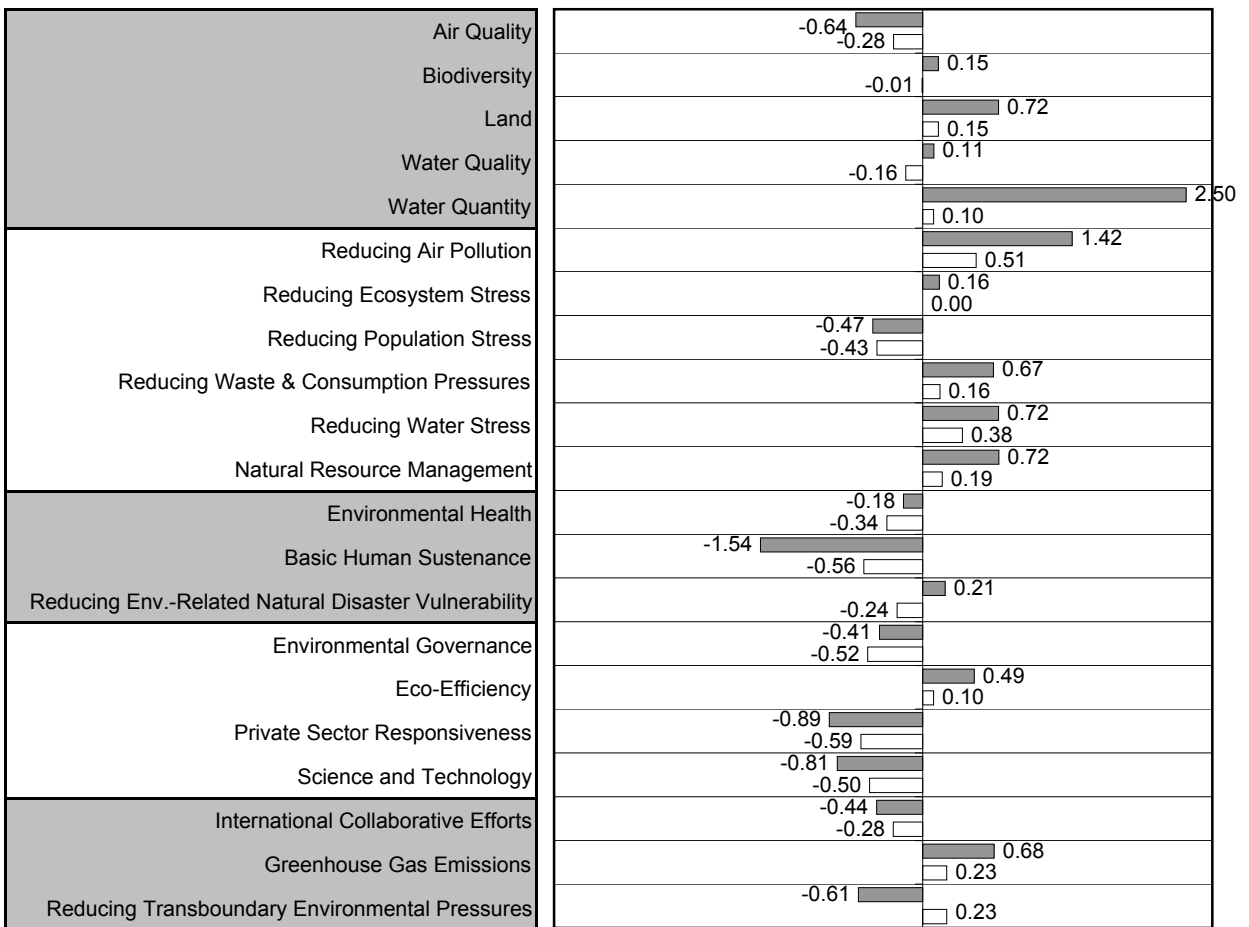
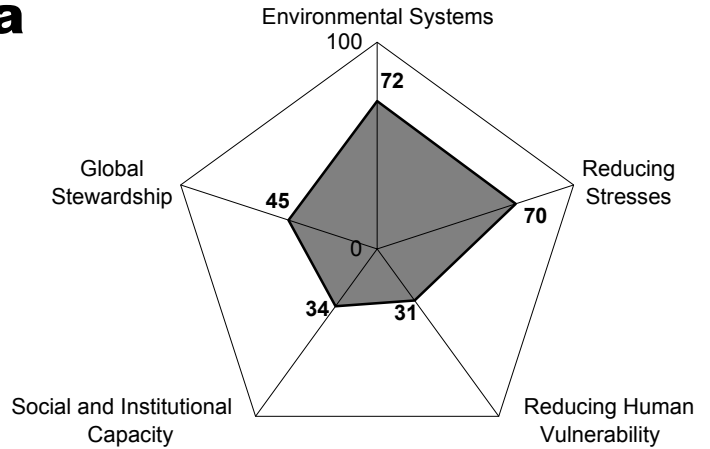
ESI:	57.7
Ranking:	28
GDP/Capita:	\$5,631
Peer group ESI:	48.9
Variable coverage:	62
Missing variables imputed:	8



= Indicator value
 = Reference (average value for peer group)

Papua New Guinea

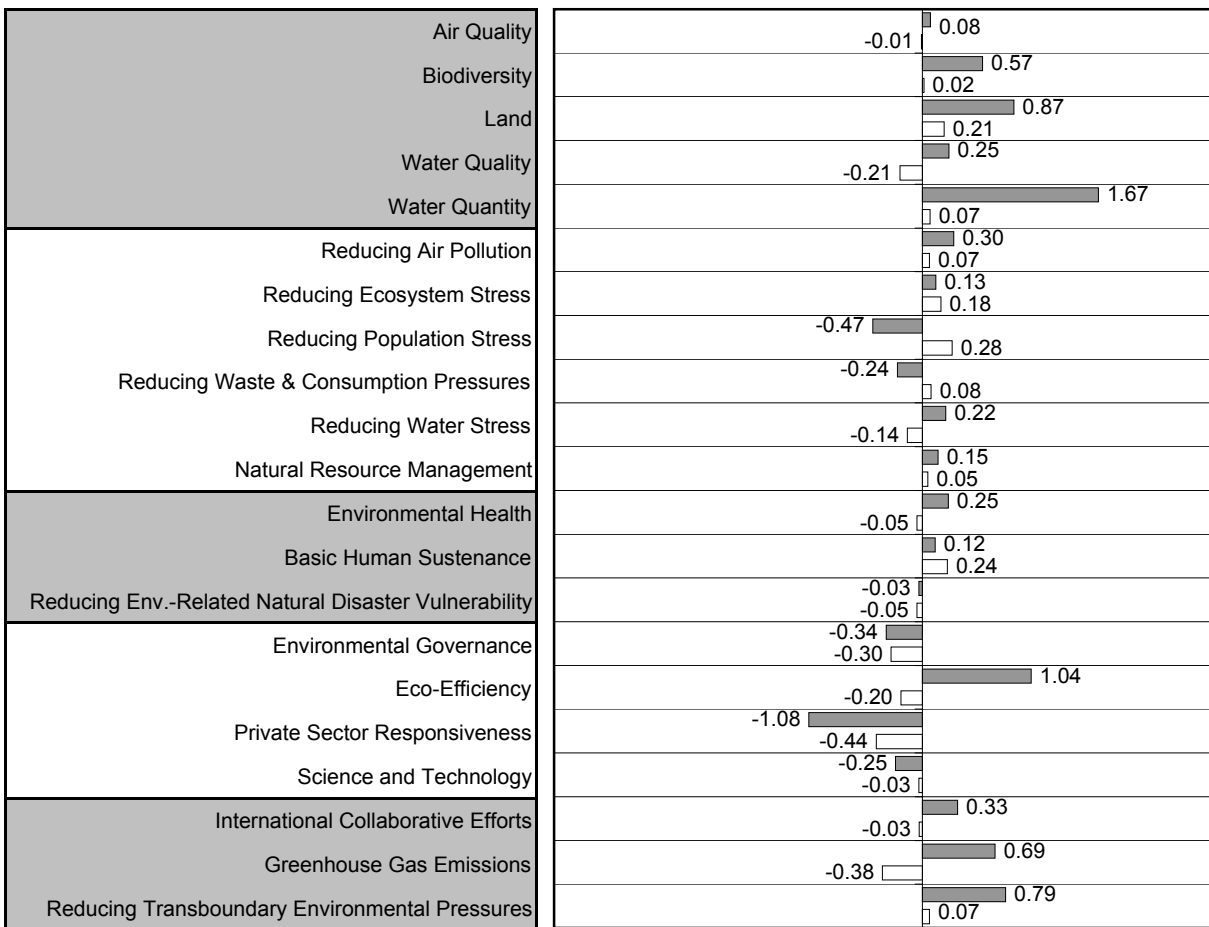
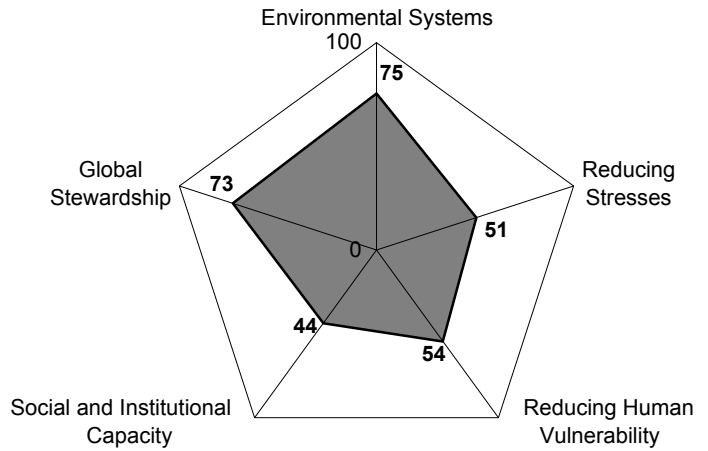
ESI:	55.2
Ranking:	35
GDP/Capita:	\$2,179
Peer group ESI:	46.7
Variable coverage:	52
Missing variables imputed:	14



= Indicator value
 = Reference (average value for peer group)

Paraguay

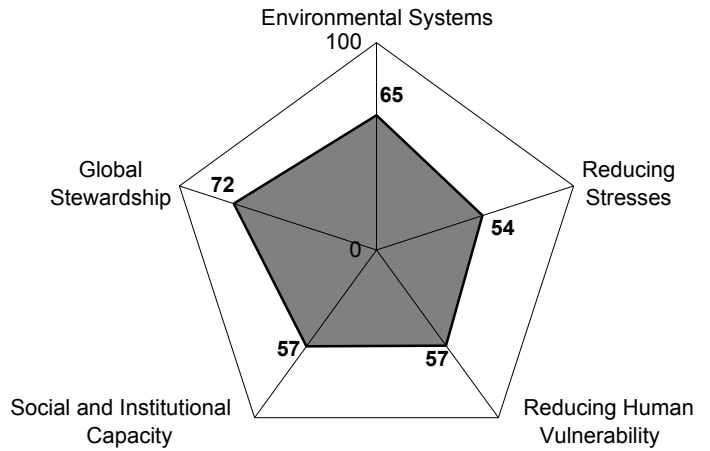
ESI:	59.7
Ranking:	17
GDP/Capita:	\$4,108
Peer group ESI:	48.9
Variable coverage:	61
Missing variables imputed:	7



= Indicator value
 = Reference (average value for peer group)

Peru

ESI:	60.4
Ranking:	16
GDP/Capita:	\$4,580
Peer group ESI:	48.9
Variable coverage:	64
Missing variables imputed:	7

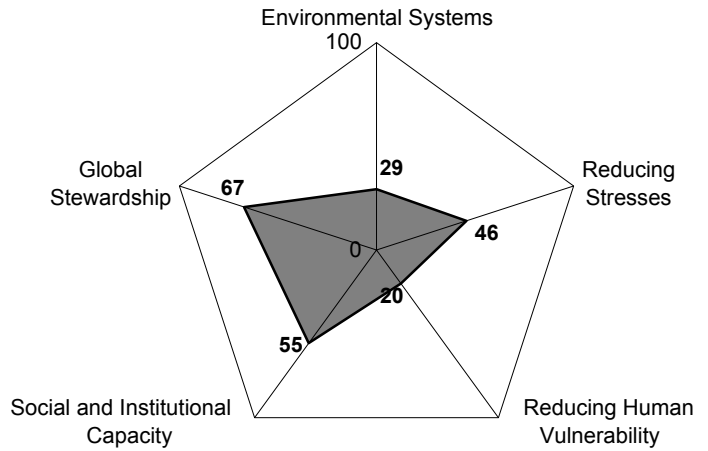


Air Quality	-0.82	-0.01
Biodiversity		0.55
Land		0.02
Water Quality	-0.31	0.88
Water Quantity	-0.21	0.21
Reducing Air Pollution		1.61
Reducing Ecosystem Stress		0.07
Reducing Population Stress		0.53
Reducing Waste & Consumption Pressures		0.16
Reducing Water Stress		0.18
Natural Resource Management	-0.14	0.16
Environmental Health	-0.45	0.28
Basic Human Sustenance		0.08
Reducing Env.-Related Natural Disaster Vulnerability		0.08
Environmental Governance	-0.15	0.08
Eco-Efficiency	-0.11	0.08
Private Sector Responsiveness	-0.30	0.08
Science and Technology		0.08
International Collaborative Efforts		0.08
Greenhouse Gas Emissions	-0.14	0.05
Reducing Transboundary Environmental Pressures	-0.05	0.55
		0.13
		0.24
	-0.15	
	-0.05	
	-0.11	
	-0.30	
		0.74
	-0.20	
		0.16
	-0.44	
	-0.04	
	-0.03	
		0.73
	-0.03	
		0.42
	-0.38	
		0.64
		0.07

= Indicator value
 = Reference (average value for peer group)

Philippines

ESI:	42.3
Ranking:	125
GDP/Capita:	\$3,758
Peer group ESI:	48.9
Variable coverage:	69
Missing variables imputed:	4

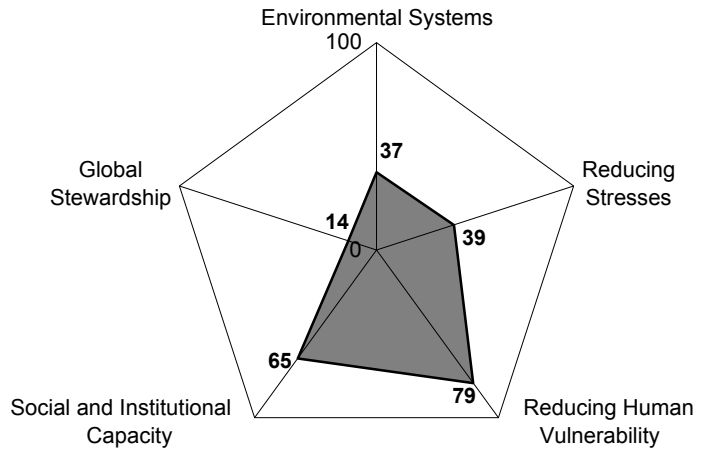


Air Quality	-0.86	-0.01
Biodiversity	-1.39	0.02
Land	-0.27	0.21
Water Quality	-0.08	
Water Quantity	-0.21	
	-0.13	0.07
Reducing Air Pollution	-0.21	0.07
Reducing Ecosystem Stress	-0.15	0.18
Reducing Population Stress	-0.20	0.28
Reducing Waste & Consumption Pressures	-0.01	0.08
Reducing Water Stress	-0.16	
Natural Resource Management	-0.14	0.07
		0.05
Environmental Health	-0.77	-0.05
Basic Human Sustenance	-0.10	0.24
Reducing Env.-Related Natural Disaster Vulnerability	-1.64	-0.05
	-0.15	
Environmental Governance	-0.30	
Eco-Efficiency	-0.20	0.59
Private Sector Responsiveness	-0.44	0.07
Science and Technology	-0.03	0.05
International Collaborative Efforts	-0.03	0.88
Greenhouse Gas Emissions	-0.38	0.15
Reducing Transboundary Environmental Pressures		0.29
		0.07

= Indicator value
 = Reference (average value for peer group)

Poland

ESI:	45.0
Ranking:	102
GDP/Capita:	\$10,108
Peer group ESI:	52.1
Variable coverage:	74
Missing variables imputed:	1

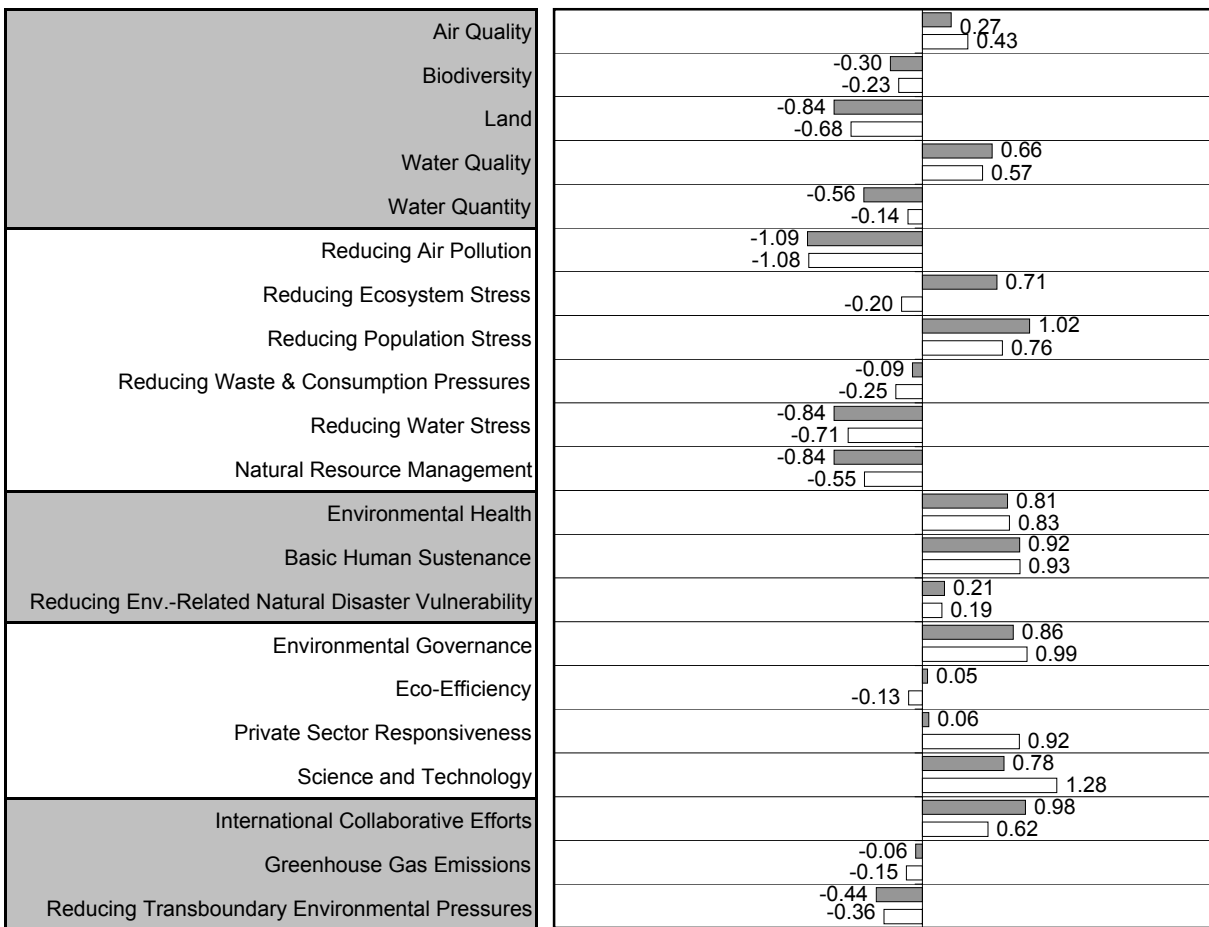
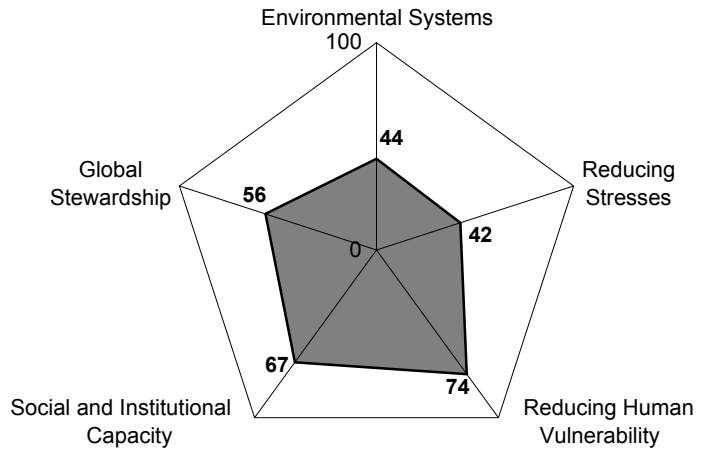


Air Quality	0.40	0.15
Biodiversity	-0.36	-0.02
Land	-0.78	0.02
Water Quality	-0.06	0.03
Water Quantity	-0.81	-0.01
Reducing Air Pollution	-1.05	-0.16
Reducing Ecosystem Stress	-1.43	0.18
Reducing Population Stress	1.10	0.59
Reducing Waste & Consumption Pressures	-0.25	-0.13
Reducing Water Stress	-0.41	-0.20
Natural Resource Management	0.39	0.11
Environmental Health	0.92	0.53
Basic Human Sustenance	1.00	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.53	0.23
Environmental Governance	0.67	0.15
Eco-Efficiency	-0.33	-0.23
Private Sector Responsiveness	0.37	0.16
Science and Technology	0.78	0.21
International Collaborative Efforts	-0.01	0.00
Greenhouse Gas Emissions	-0.94	-0.50
Reducing Transboundary Environmental Pressures	-2.25	-0.51

= Indicator value
 = Reference (average value for peer group)

Portugal

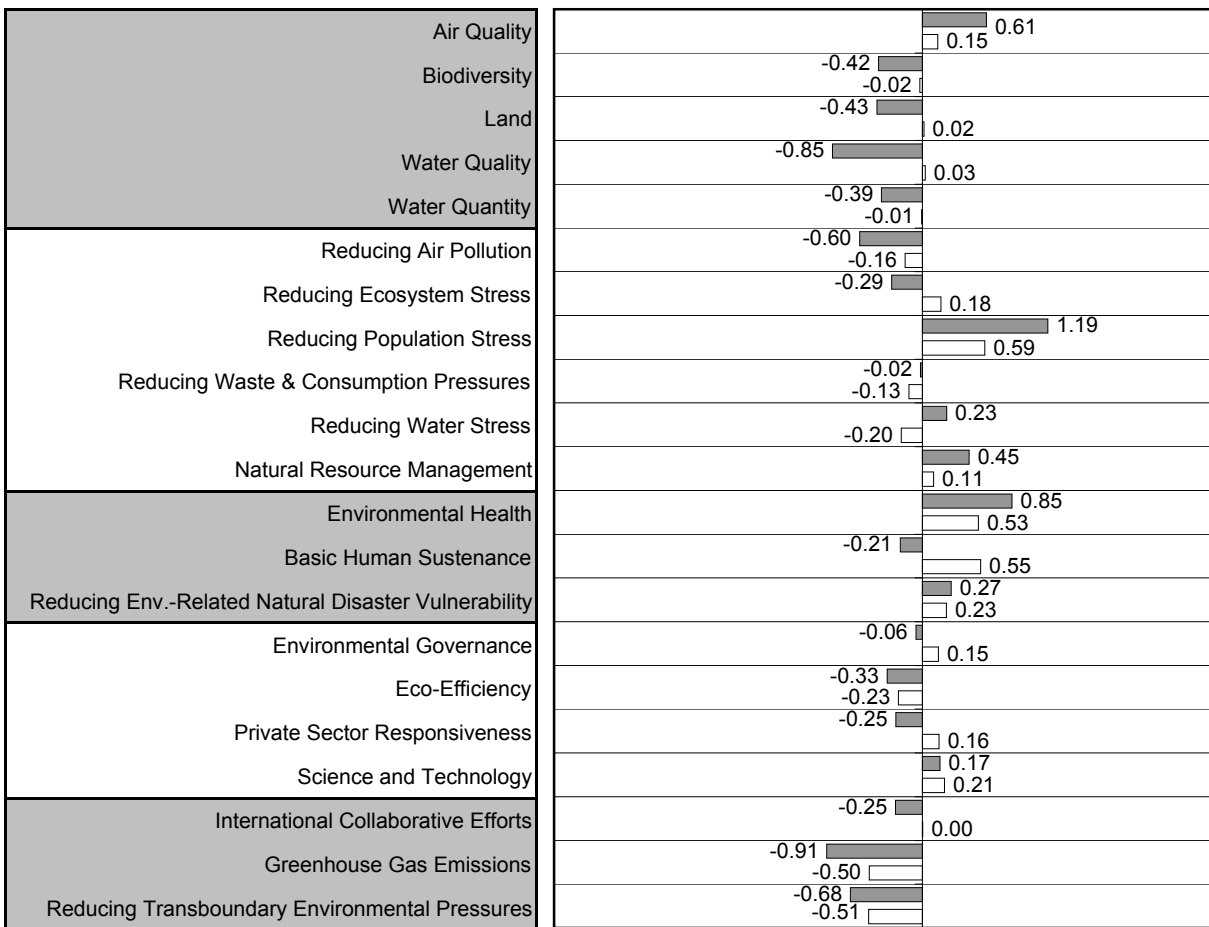
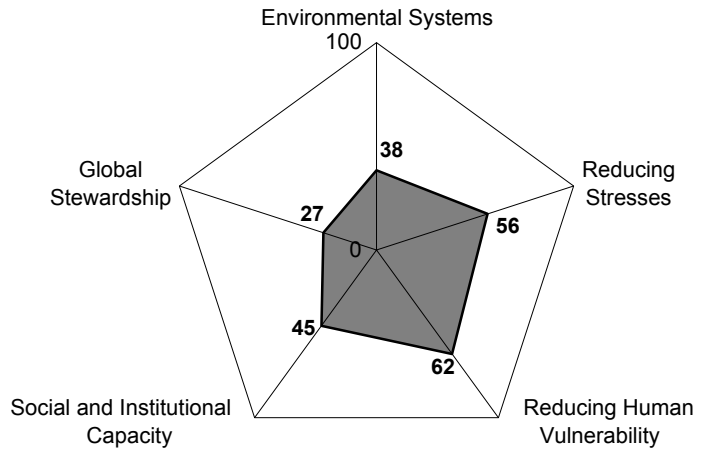
ESI:	54.2
Ranking:	37
GDP/Capita:	\$16,039
Peer group ESI:	55.4
Variable coverage:	72
Missing variables imputed:	3



= Indicator value
 = Reference (average value for peer group)

Romania

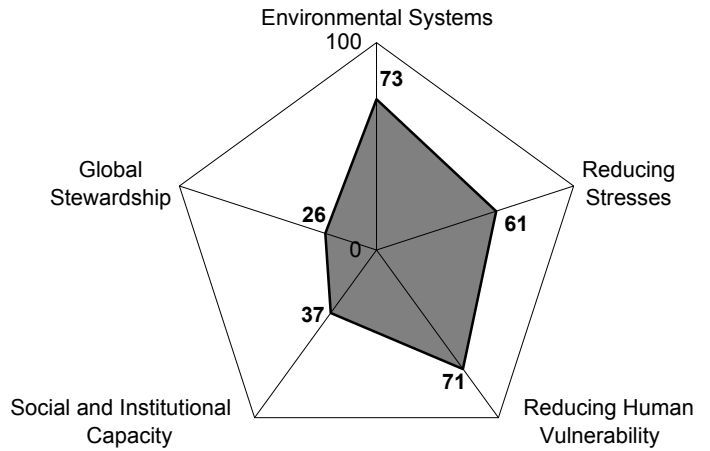
ESI:	46.2
Ranking:	94
GDP/Capita:	\$6,280
Peer group ESI:	52.1
Variable coverage:	67
Missing variables imputed:	3



= Indicator value
 = Reference (average value for peer group)

Russia

ESI:	56.1
Ranking:	33
GDP/Capita:	\$7,997
Peer group ESI:	52.1
Variable coverage:	72
Missing variables imputed:	2

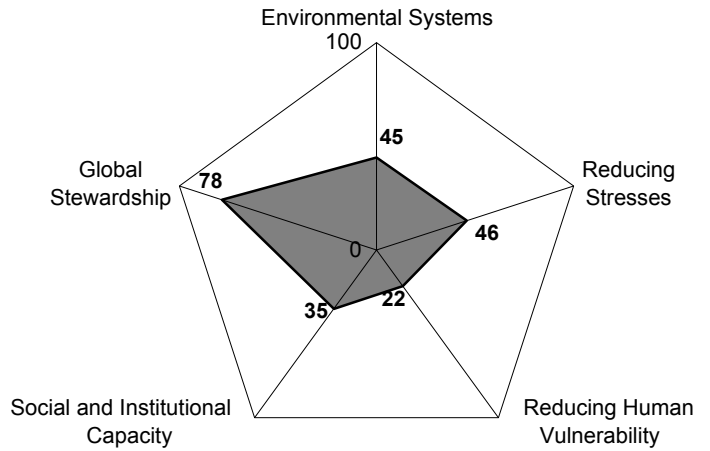


Indicator	Indicator Value	Reference Value (Peer Group)
Air Quality	0.01	0.15
Biodiversity	-0.03	-0.02
Land	1.11	0.02
Water Quality	1.11	0.03
Water Quantity	0.81	-0.01
Reducing Air Pollution	-0.23	-0.16
Reducing Ecosystem Stress	0.67	0.18
Reducing Population Stress	1.08	0.59
Reducing Waste & Consumption Pressures	-1.05	-0.13
Reducing Water Stress	0.69	-0.20
Natural Resource Management	0.46	0.11
Environmental Health	0.26	0.53
Basic Human Sustenance	0.76	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.64	0.23
Environmental Governance	-0.40	0.15
Eco-Efficiency	-1.19	-0.23
Private Sector Responsiveness	-0.86	0.16
Science and Technology	1.16	0.21
International Collaborative Efforts	0.11	0.00
Greenhouse Gas Emissions	-1.25	-0.50
Reducing Transboundary Environmental Pressures	-0.80	-0.51

= Indicator value
 = Reference (average value for peer group)

Rwanda

ESI:	44.8
Ranking:	106
GDP/Capita:	\$1,103
Peer group ESI:	46.4
Variable coverage:	54
Missing variables imputed:	14

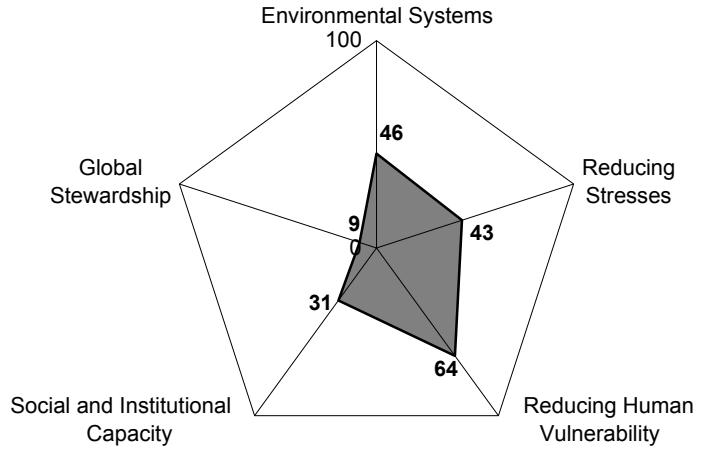


Air Quality	-0.28	0.29
Biodiversity	0.48	0.23
Land	-0.07	0.30
Water Quality	-0.07	-0.19
Water Quantity	-0.73	0.02
Reducing Air Pollution	0.18	0.67
Reducing Ecosystem Stress	-0.93	-0.16
Reducing Population Stress	-1.04	-1.22
Reducing Waste & Consumption Pressures	0.07	0.40
Reducing Water Stress	0.91	0.68
Natural Resource Management	0.18	0.22
Environmental Health	-0.94	-0.96
Basic Human Sustenance	-1.02	-1.17
Reducing Env.-Related Natural Disaster Vulnerability	-0.40	-0.05
Environmental Governance	-0.70	-0.47
Eco-Efficiency	0.43	0.47
Private Sector Responsiveness	-0.60	-0.62
Science and Technology	-0.67	-0.95
International Collaborative Efforts	-0.66	-0.27
Greenhouse Gas Emissions	1.52	0.82
Reducing Transboundary Environmental Pressures	1.50	0.55

= Indicator value
 = Reference (average value for peer group)

Saudi Arabia

ESI:	37.8
Ranking:	136
GDP/Capita:	\$11,377
Peer group ESI:	52.1
Variable coverage:	55
Missing variables imputed:	14

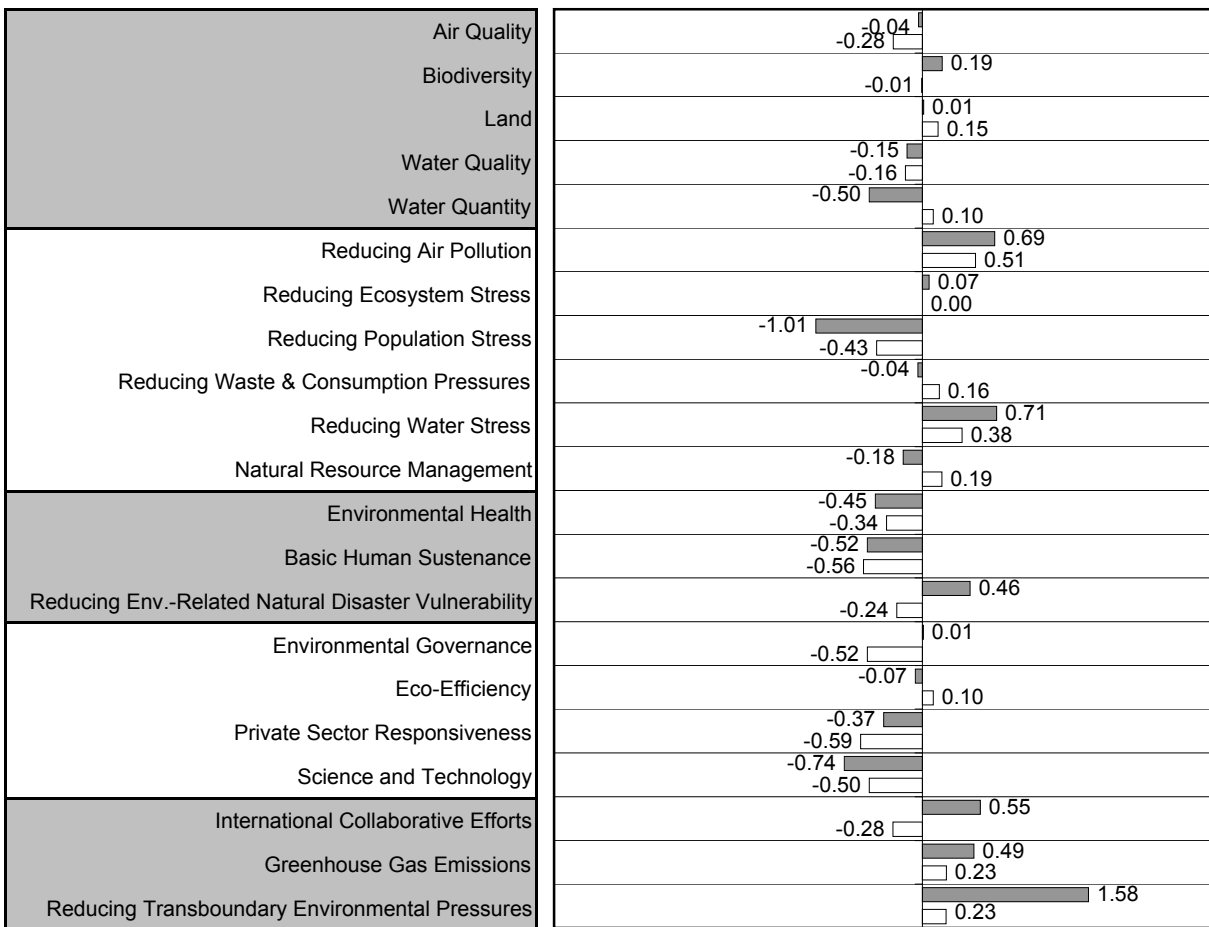
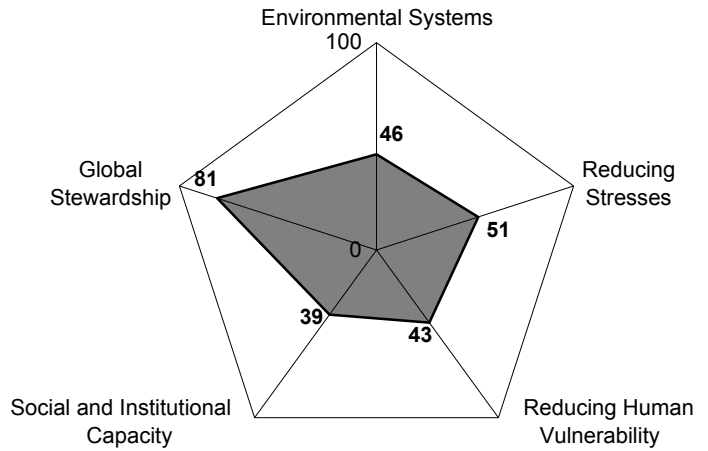


Air Quality	0.57	0.15
Biodiversity	-0.21	-0.02
Land	0.74	0.02
Water Quality	-0.47	0.03
Water Quantity	-1.18	-0.01
Reducing Air Pollution	-0.16	0.10
Reducing Ecosystem Stress	0.28	0.18
Reducing Population Stress	-0.88	0.59
Reducing Waste & Consumption Pressures	-0.16	-0.13
Reducing Water Stress	-0.83	-0.20
Natural Resource Management	0.50	0.11
Environmental Health	-0.23	0.53
Basic Human Sustenance	0.56	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.77	0.23
Environmental Governance	-0.28	0.15
Eco-Efficiency	-1.05	-0.23
Private Sector Responsiveness	-0.32	0.16
Science and Technology	-0.30	0.21
International Collaborative Efforts	-1.31	0.00
Greenhouse Gas Emissions	-1.20	-0.50
Reducing Transboundary Environmental Pressures	-1.57	-0.51

= Indicator value
 = Reference (average value for peer group)

Senegal

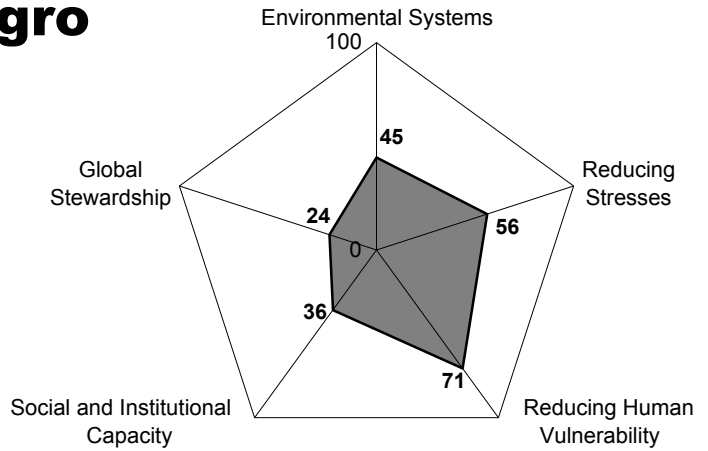
ESI:	51.1
Ranking:	59
GDP/Capita:	\$1,463
Peer group ESI:	46.7
Variable coverage:	61
Missing variables imputed:	8



= Indicator value
 = Reference (average value for peer group)

Serbia & Montenegro

ESI:	47.3
Ranking:	89
GDP/Capita:	\$2,200
Peer group ESI:	46.7
Variable coverage:	47
Missing variables imputed:	17

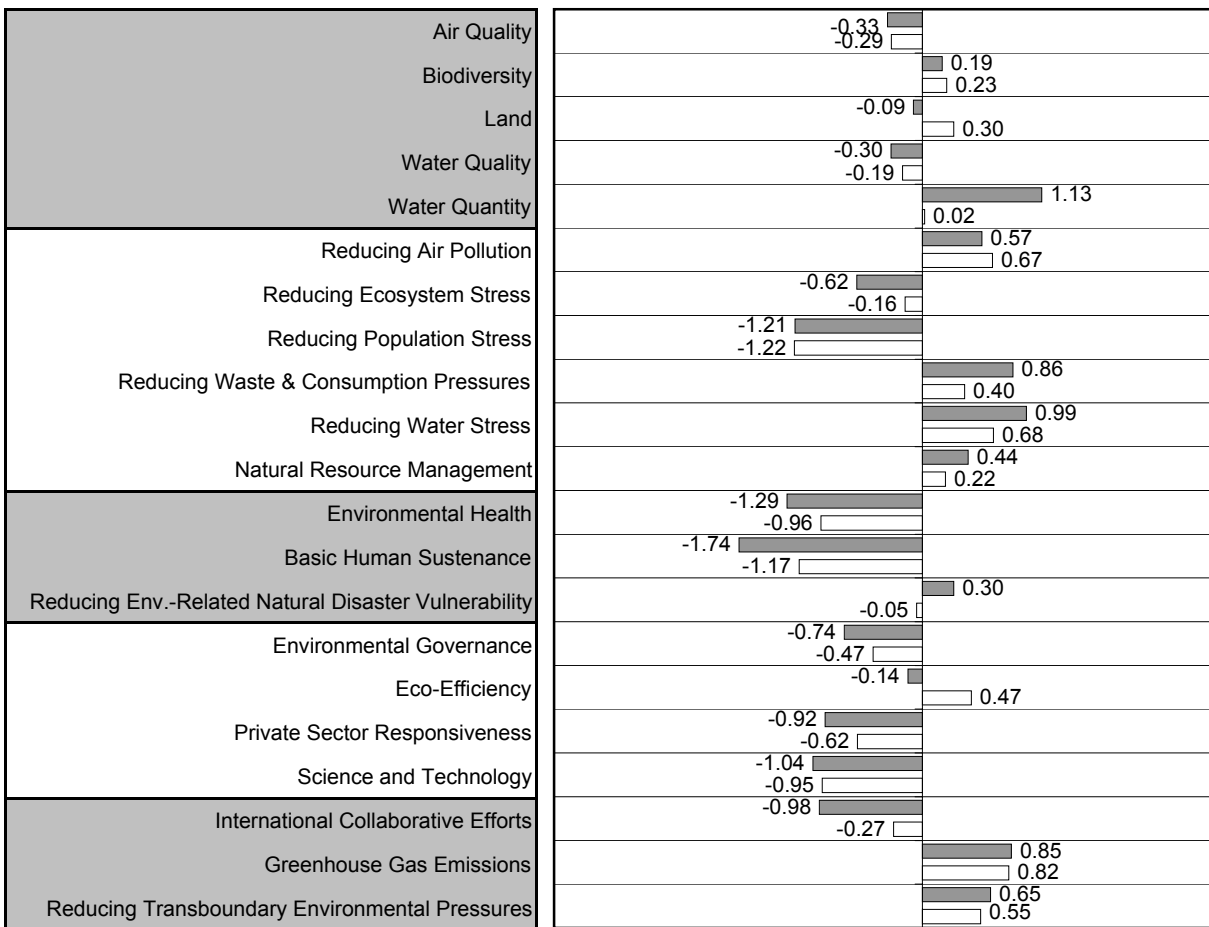
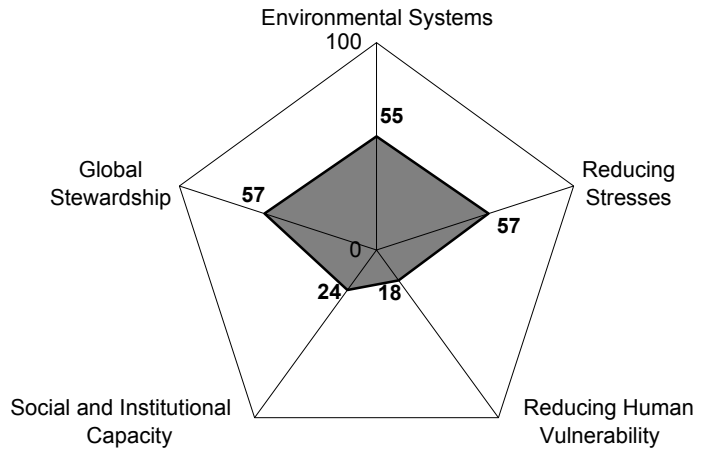


Air Quality	-0.28	0.48
Biodiversity	-0.11	-0.01
Land	-0.64	0.15
Water Quality	-0.71	-0.16
Water Quantity	-0.43	0.32
Reducing Air Pollution	-0.43	0.51
Reducing Ecosystem Stress	0.25	0.00
Reducing Population Stress	-0.43	0.89
Reducing Waste & Consumption Pressures	-0.23	0.16
Reducing Water Stress	0.08	0.38
Natural Resource Management	0.36	0.19
Environmental Health	-0.34	0.59
Basic Human Sustenance	-0.56	0.52
Reducing Env.-Related Natural Disaster Vulnerability	-0.24	0.51
Environmental Governance	-0.52	-0.28
Eco-Efficiency	-0.66	0.10
Private Sector Responsiveness	-0.62	-0.59
Science and Technology	-0.50	0.10
International Collaborative Efforts	-0.91	-0.28
Greenhouse Gas Emissions	-0.92	0.23
Reducing Transboundary Environmental Pressures	-0.29	0.23

= Indicator value
 = Reference (average value for peer group)

Sierra Leone

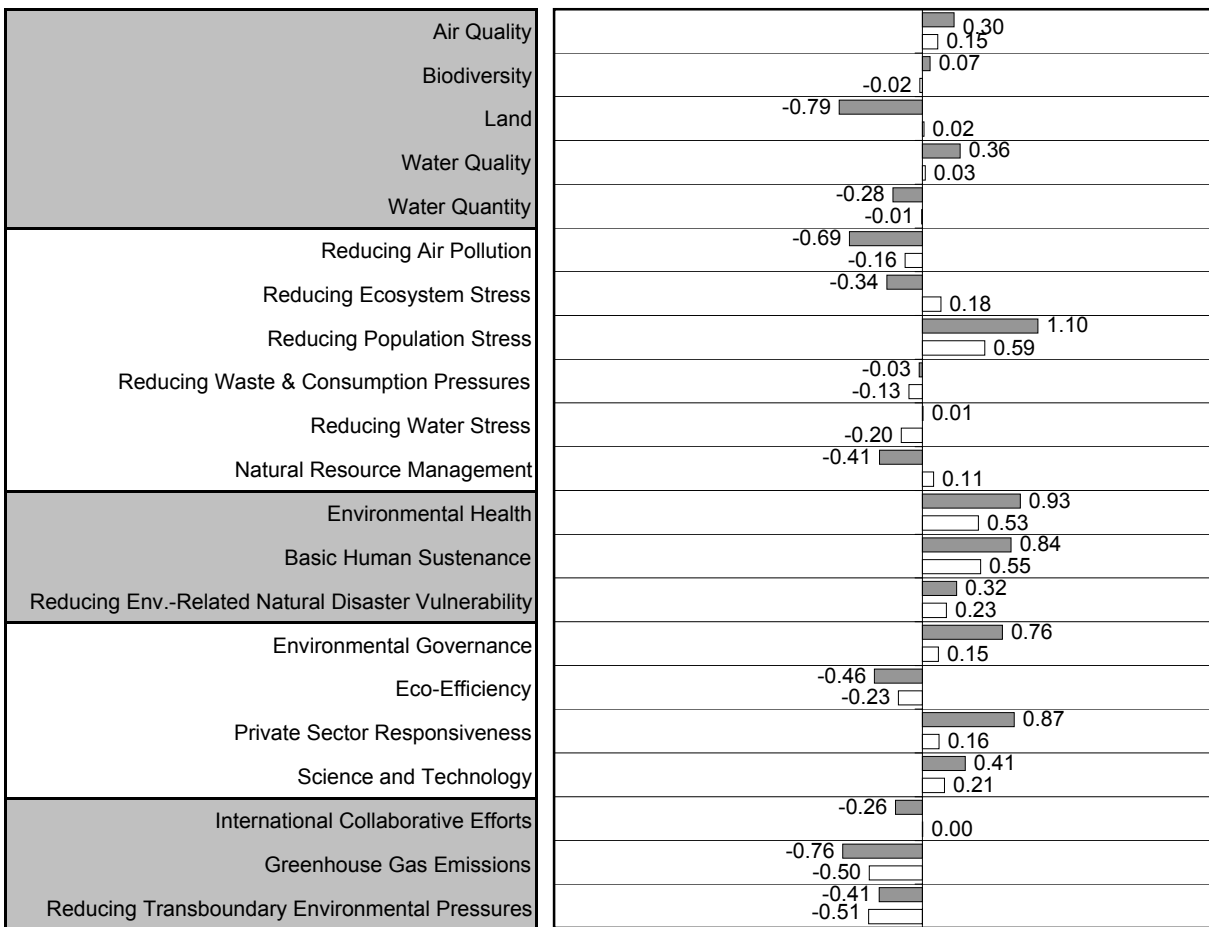
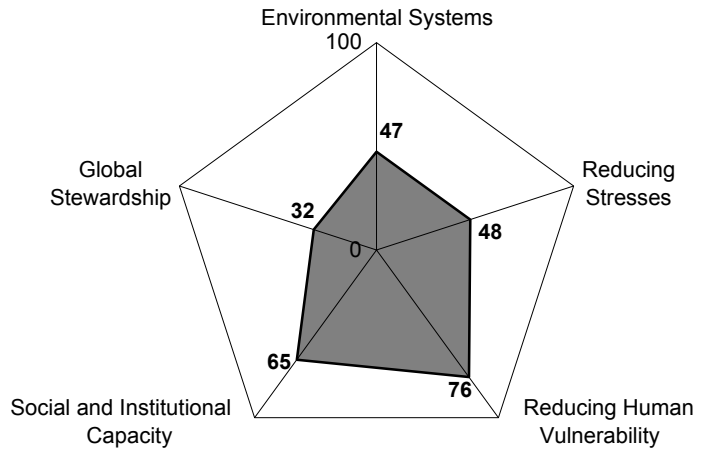
ESI:	43.4
Ranking:	120
GDP/Capita:	\$483
Peer group ESI:	46.4
Variable coverage:	50
Missing variables imputed:	16



= Indicator value
 = Reference (average value for peer group)

Slovakia

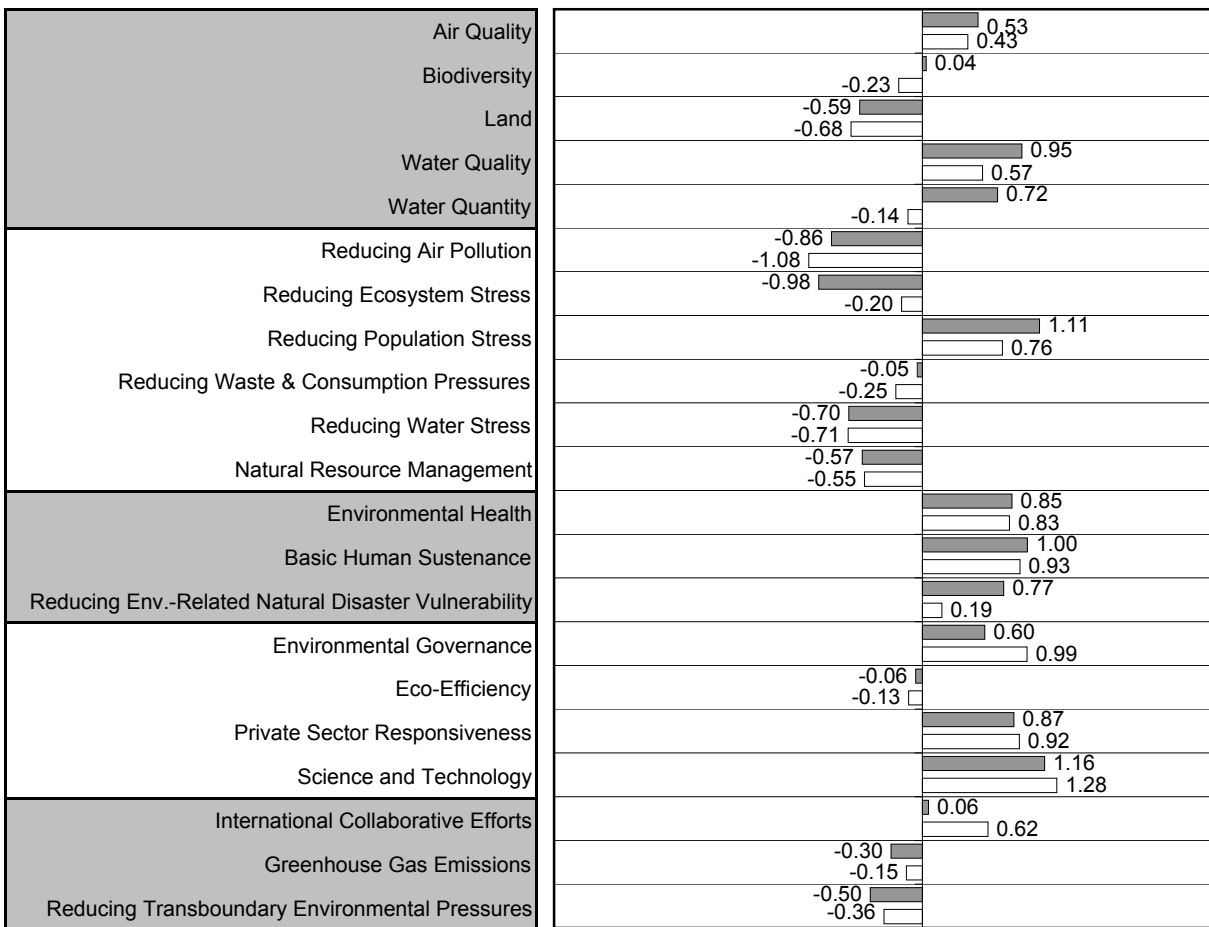
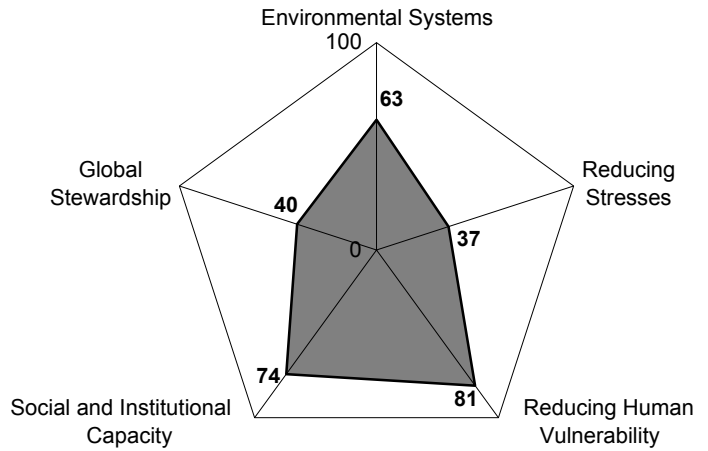
ESI:	52.8
Ranking:	48
GDP/Capita:	\$11,713
Peer group ESI:	52.1
Variable coverage:	71
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Slovenia

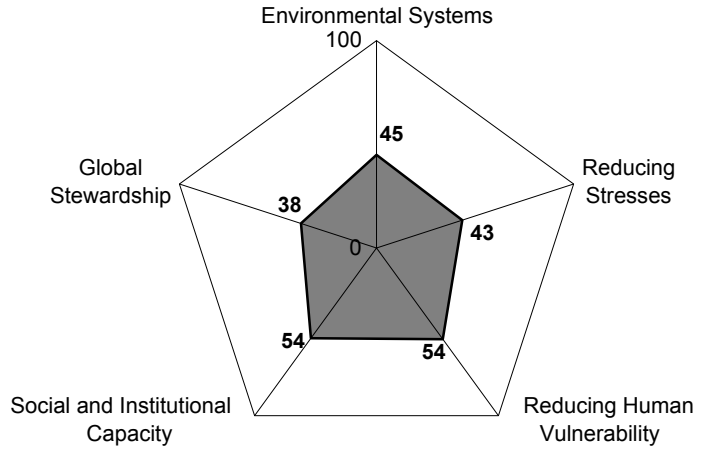
ESI:	57.5
Ranking:	29
GDP/Capita:	\$16,784
Peer group ESI:	55.4
Variable coverage:	71
Missing variables imputed:	2



= Indicator value
 = Reference (average value for peer group)

South Africa

ESI:	46.2
Ranking:	93
GDP/Capita:	\$9,124
Peer group ESI:	52.1
Variable coverage:	63
Missing variables imputed:	7

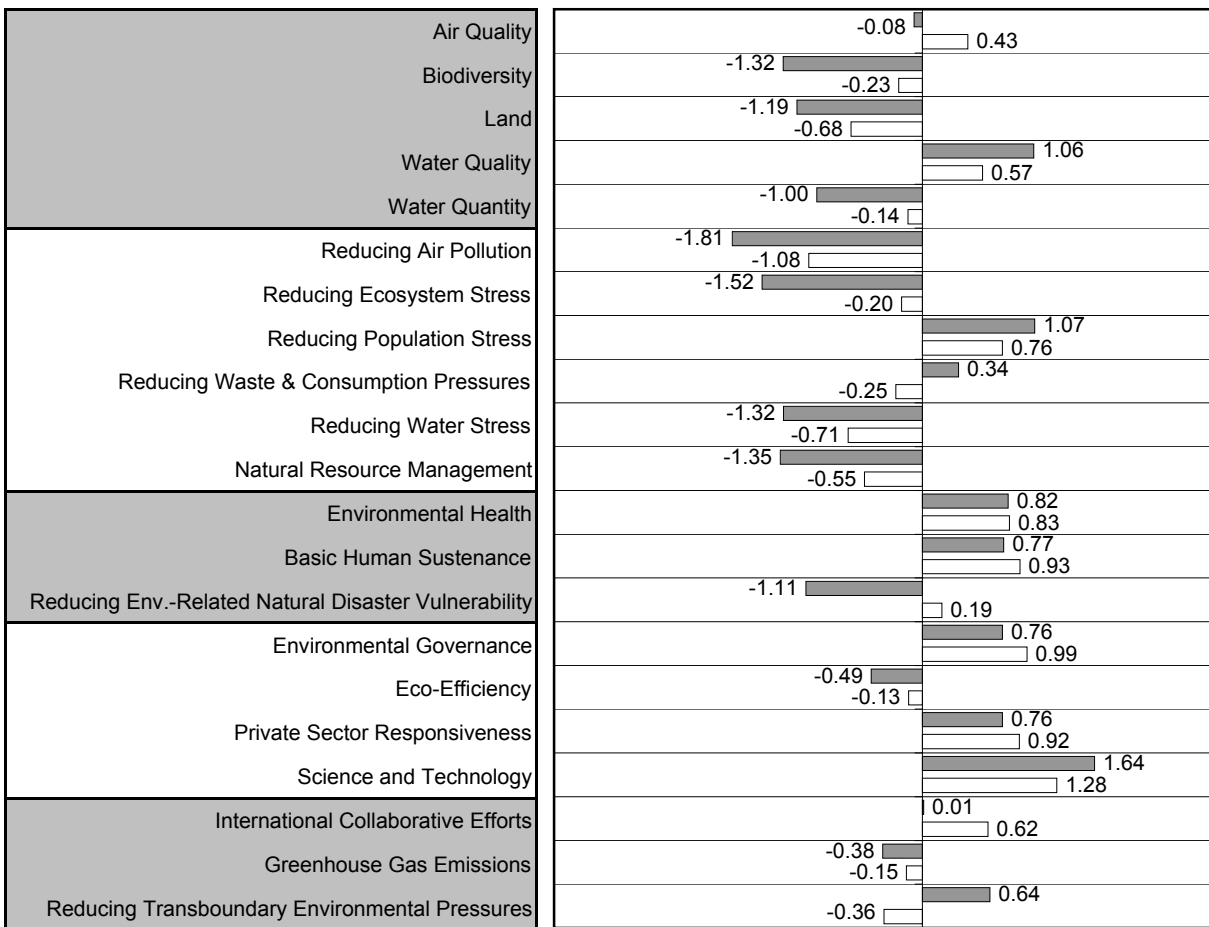
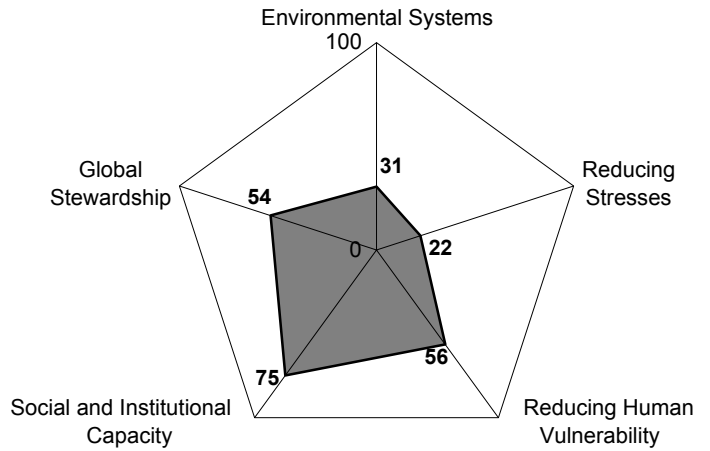


Air Quality	-0.26	0.15
Biodiversity	-0.02	0.16
Land	0.02	0.75
Water Quality	-0.25	0.03
Water Quantity	-1.05	-0.01
Reducing Air Pollution	-0.75	-0.16
Reducing Ecosystem Stress	0.25	0.18
Reducing Population Stress	0.65	0.59
Reducing Waste & Consumption Pressures	-0.63	-0.13
Reducing Water Stress	-0.71	-0.20
Natural Resource Management	0.20	0.11
Environmental Health	0.09	0.53
Basic Human Sustenance	0.18	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.06	0.23
Environmental Governance	0.31	0.15
Eco-Efficiency	-0.45	-0.23
Private Sector Responsiveness	0.58	0.16
Science and Technology	-0.08	0.21
International Collaborative Efforts	0.20	0.00
Greenhouse Gas Emissions	-0.86	-0.50
Reducing Transboundary Environmental Pressures	-0.24	-0.51

= Indicator value
 = Reference (average value for peer group)

South Korea

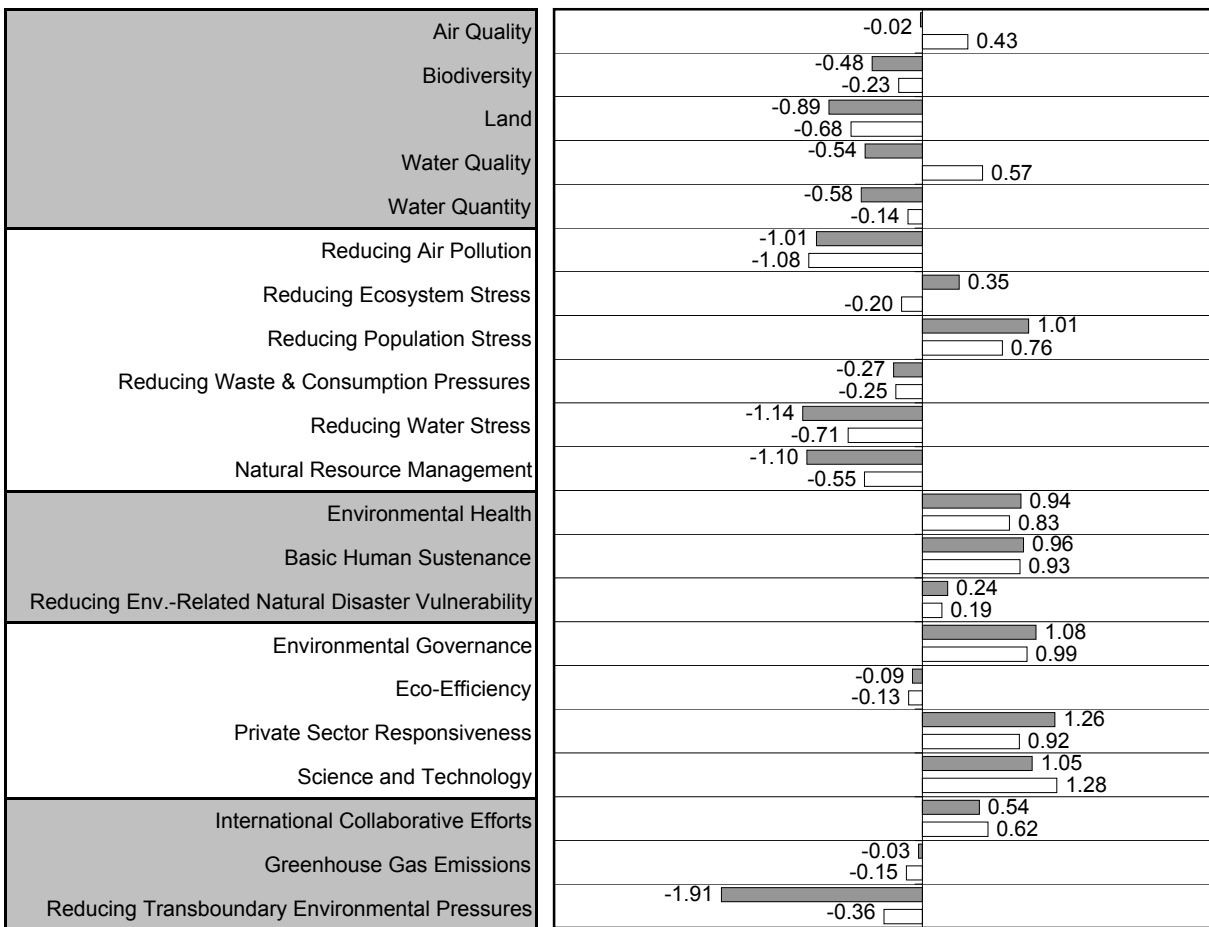
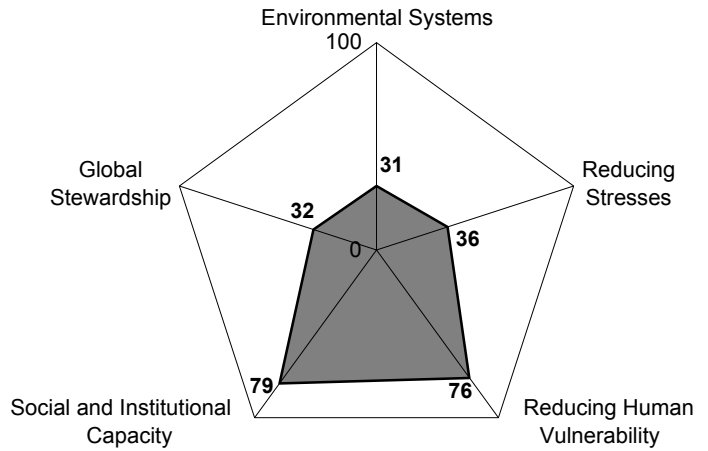
ESI:	43.0
Ranking:	122
GDP/Capita:	\$15,574
Peer group ESI:	55.4
Variable coverage:	73
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Spain

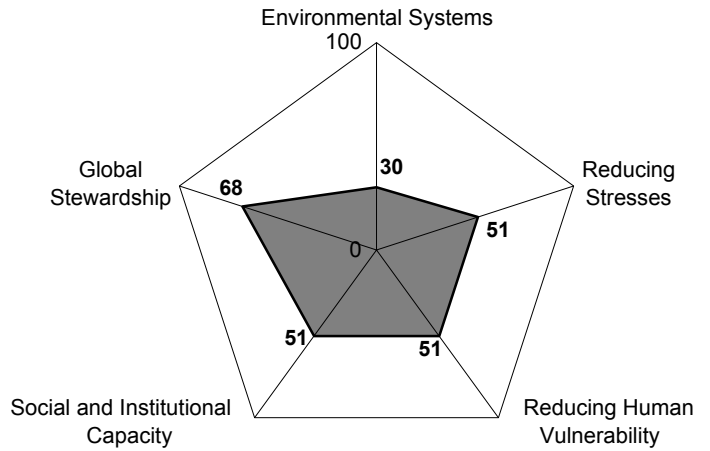
ESI:	48.8
Ranking:	76
GDP/Capita:	\$19,362
Peer group ESI:	55.4
Variable coverage:	72
Missing variables imputed:	2



= Indicator value
 = Reference (average value for peer group)

Sri Lanka

ESI:	48.5
Ranking:	79
GDP/Capita:	\$3,284
Peer group ESI:	48.9
Variable coverage:	64
Missing variables imputed:	8

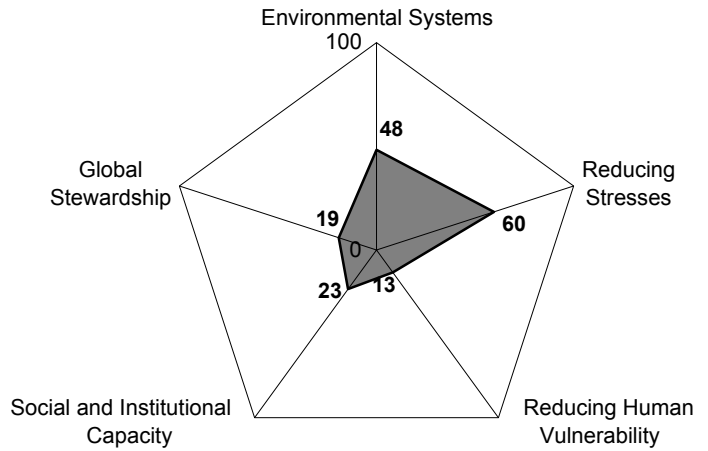


Air Quality	-0.43	-0.01
Biodiversity	-0.84	0.02
Land	-0.39	0.21
Water Quality	-0.19	-0.21
Water Quantity	-0.75	0.07
Reducing Air Pollution	-0.22	0.07
Reducing Ecosystem Stress	-0.22	0.18
Reducing Population Stress	0.72	0.28
Reducing Waste & Consumption Pressures	0.34	0.08
Reducing Water Stress	-0.54	-0.14
Natural Resource Management	-0.09	0.05
Environmental Health	-0.05	0.74
Basic Human Sustenance	-0.39	0.24
Reducing Env.-Related Natural Disaster Vulnerability	-0.24	-0.05
Environmental Governance	-0.30	0.26
Eco-Efficiency	-0.20	0.45
Private Sector Responsiveness	-0.36	-0.44
Science and Technology	-0.24	-0.03
International Collaborative Efforts	-0.04	-0.03
Greenhouse Gas Emissions	-0.38	0.51
Reducing Transboundary Environmental Pressures	-0.38	0.94

= Indicator value
 = Reference (average value for peer group)

Sudan

ESI:	35.9
Ranking:	140
GDP/Capita:	\$1,779
Peer group ESI:	46.7
Variable coverage:	53
Missing variables imputed:	15

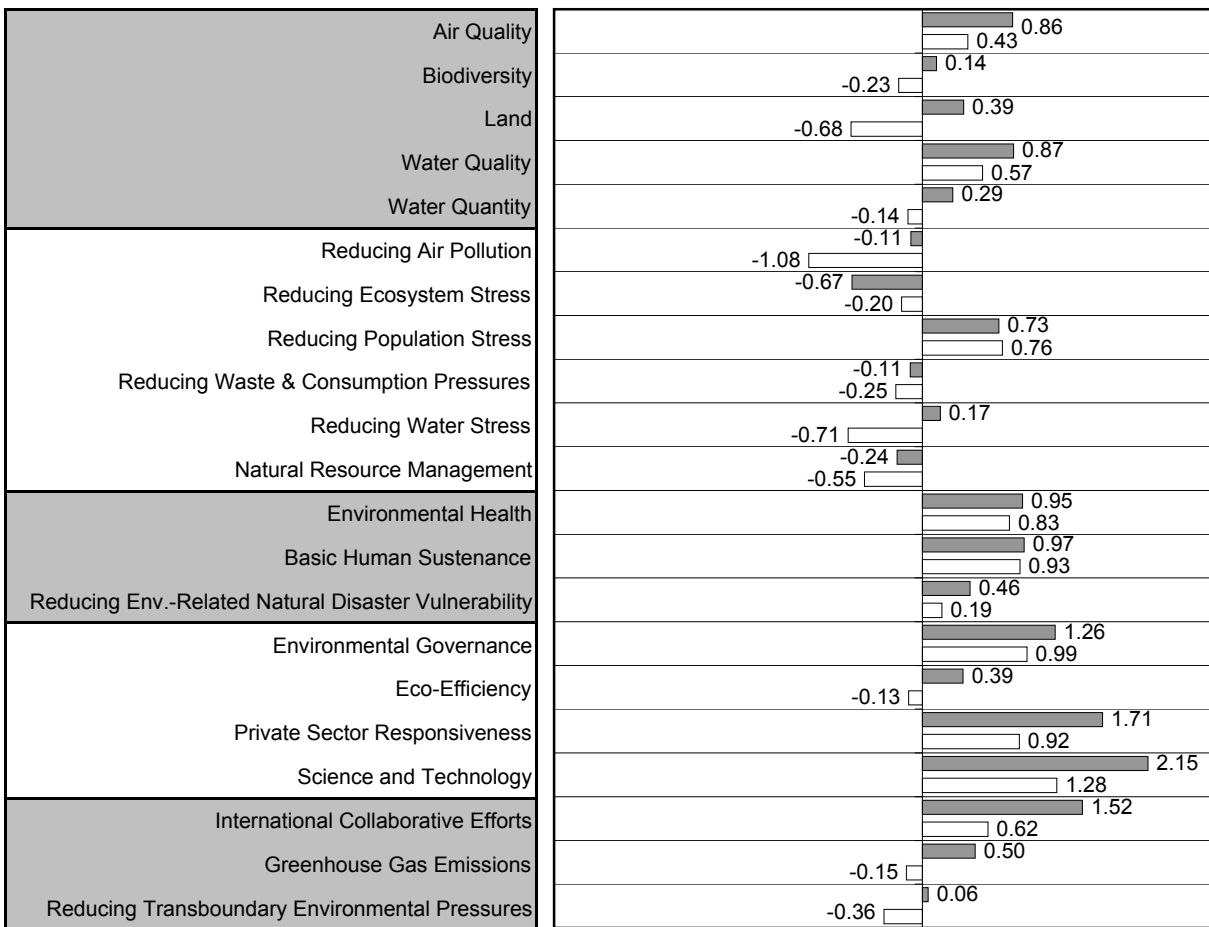
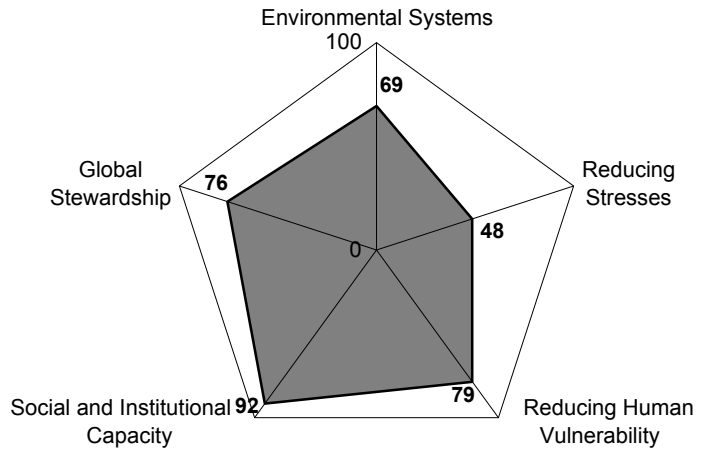


Air Quality	-0.70	-0.28
Biodiversity	0.38	-0.01
Land	0.69	0.15
Water Quality	0.07	-0.16
Water Quantity	0.10	-0.65
Reducing Air Pollution	0.85	0.51
Reducing Ecosystem Stress	0.00	-0.15
Reducing Population Stress	0.00	-1.00
Reducing Waste & Consumption Pressures	0.70	-0.43
Reducing Water Stress	0.65	0.38
Natural Resource Management	0.41	0.19
Environmental Health	-0.57	-0.34
Basic Human Sustenance	-0.64	-0.56
Reducing Env.-Related Natural Disaster Vulnerability	-2.14	-0.24
Environmental Governance	-1.10	-0.52
Eco-Efficiency	0.26	0.10
Private Sector Responsiveness	-0.68	-0.59
Science and Technology	-1.41	-0.50
International Collaborative Efforts	-0.68	-0.28
Greenhouse Gas Emissions	0.93	0.23
Reducing Transboundary Environmental Pressures	-2.87	0.23

= Indicator value
 = Reference (average value for peer group)

Sweden

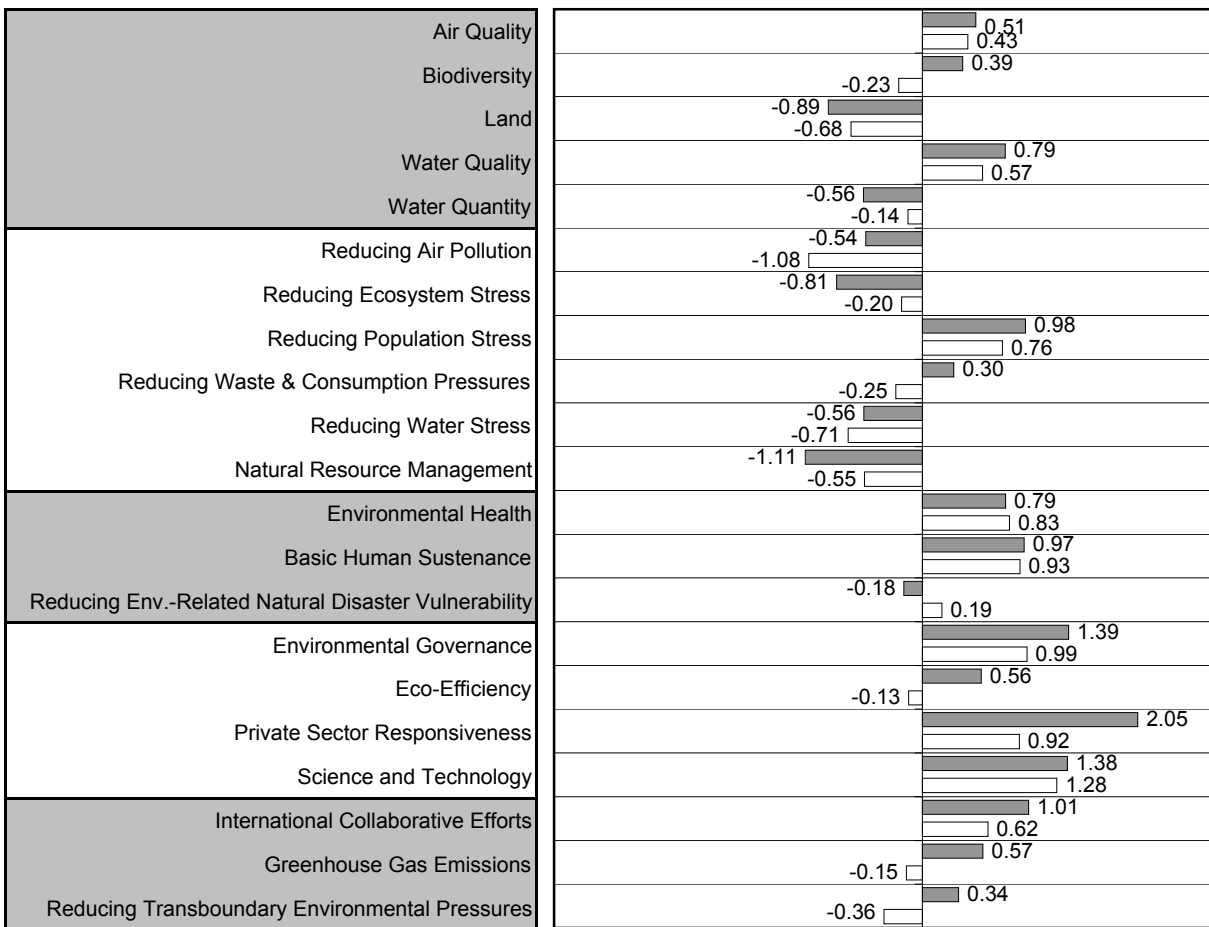
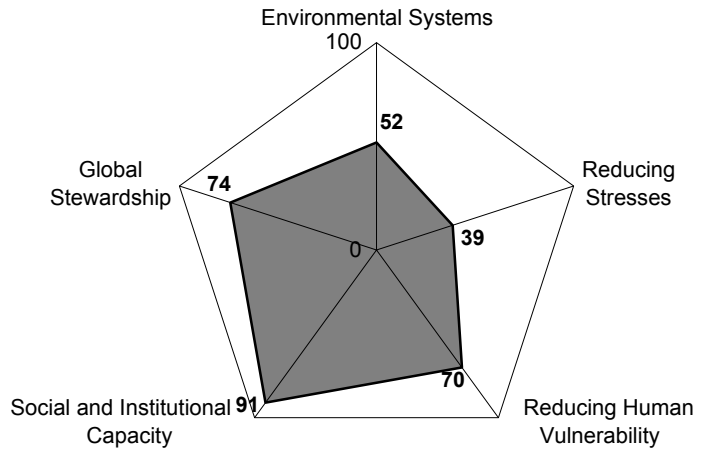
ESI:	71.7
Ranking:	4
GDP/Capita:	\$23,181
Peer group ESI:	55.4
Variable coverage:	72
Missing variables imputed:	1



= Indicator value
 = Reference (average value for peer group)

Switzerland

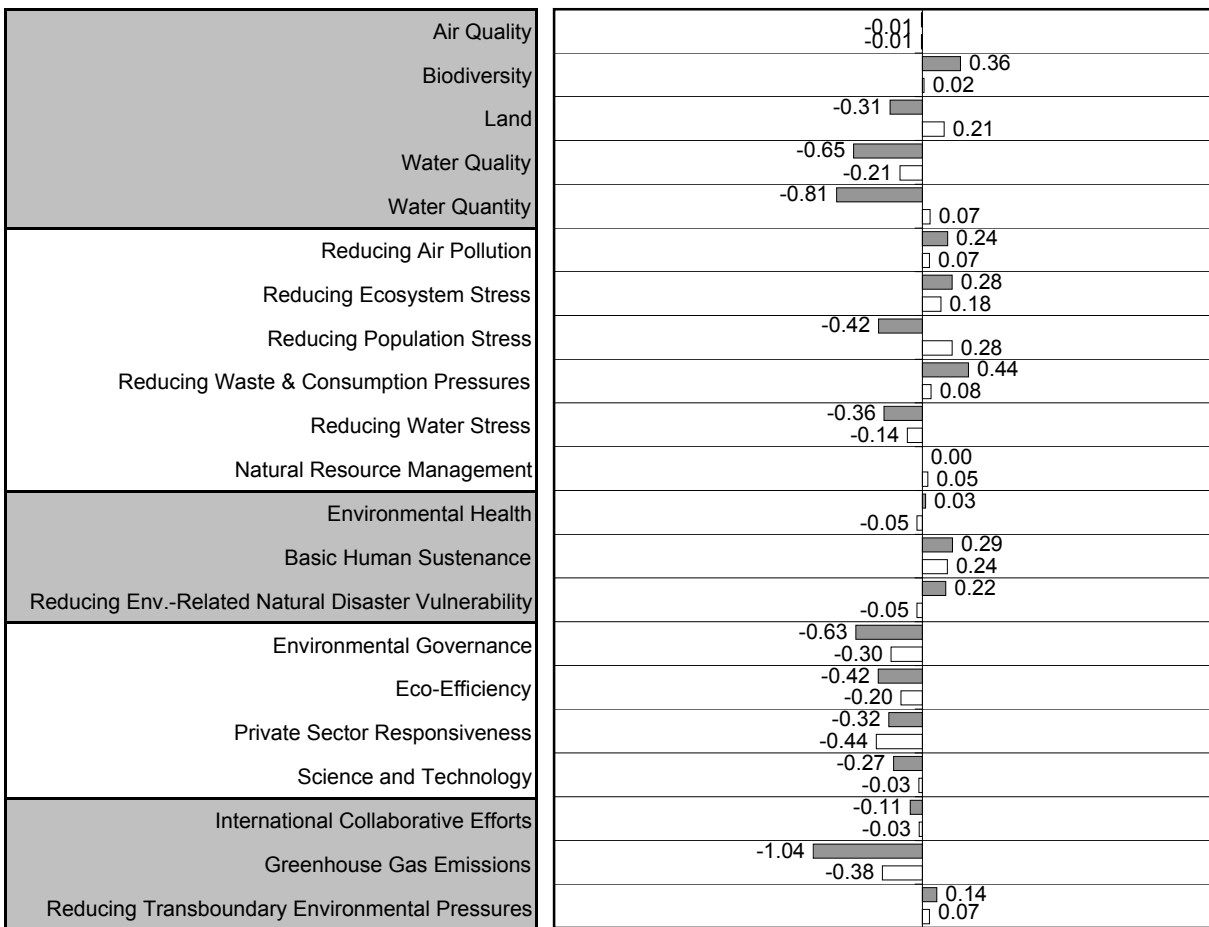
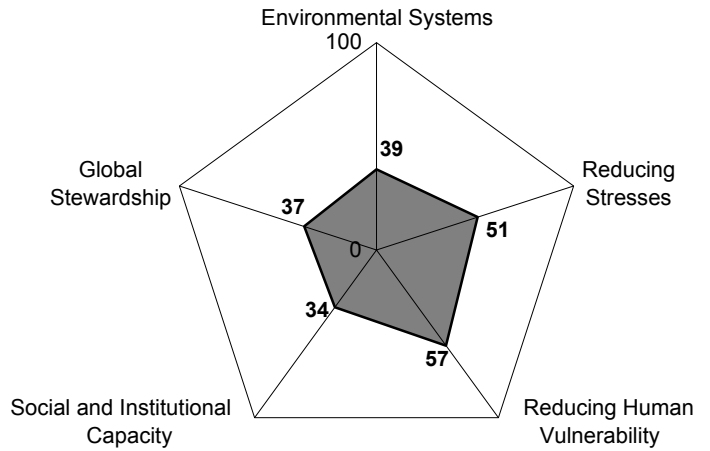
ESI:	63.7
Ranking:	7
GDP/Capita:	\$26,251
Peer group ESI:	55.4
Variable coverage:	72
Missing variables imputed:	2



= Indicator value
 = Reference (average value for peer group)

Syria

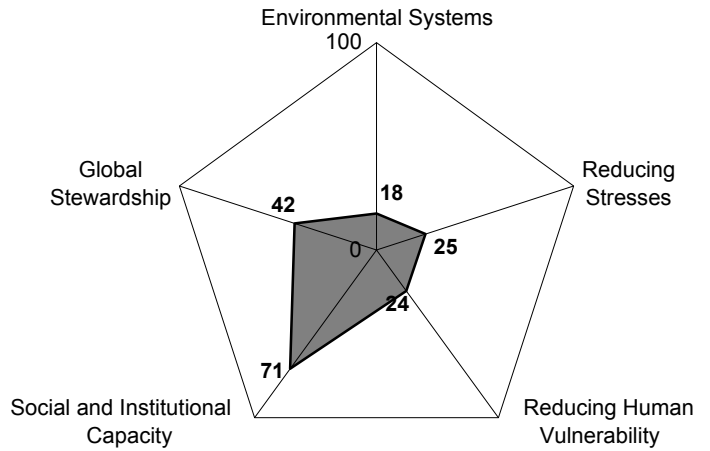
ESI:	43.8
Ranking:	117
GDP/Capita:	\$3,109
Peer group ESI:	48.9
Variable coverage:	59
Missing variables imputed:	13



= Indicator value
 = Reference (average value for peer group)

Taiwan

ESI:	32.7
Ranking:	145
GDP/Capita:	\$23,400
Peer group ESI:	55.4
Variable coverage:	60
Missing variables imputed:	7

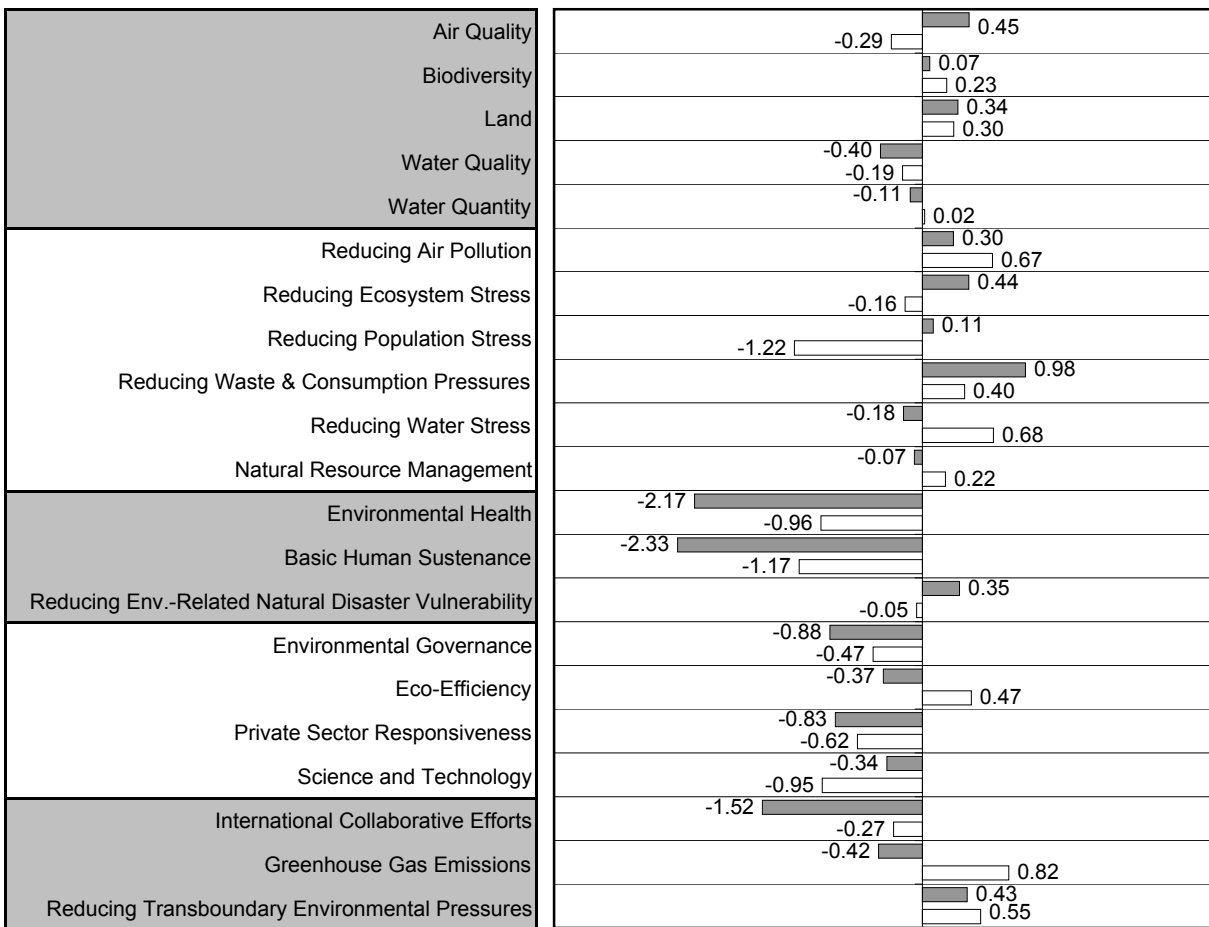
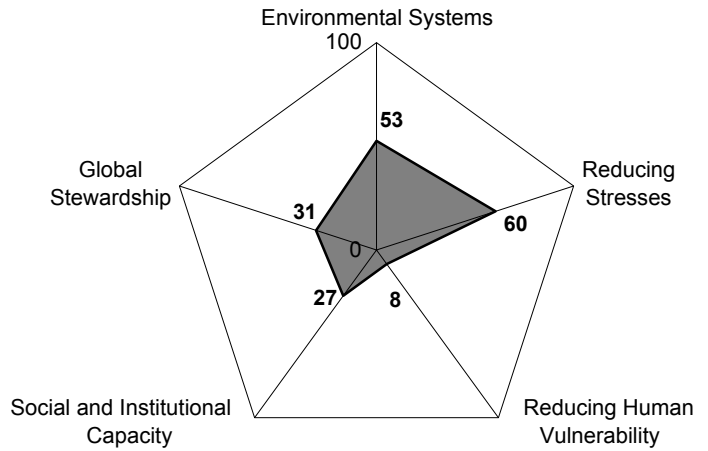


Air Quality	Indicator: 0.18, Reference: 0.43
Biodiversity	Indicator: -0.05, Reference: -0.23
Land	Indicator: -2.31, Reference: -0.68
Water Quality	Indicator: -1.57, Reference: 0.57
Water Quantity	Indicator: -0.91, Reference: -0.14
Reducing Air Pollution	Indicator: -2.49, Reference: -1.08
Reducing Ecosystem Stress	Indicator: 0.45, Reference: -0.20
Reducing Population Stress	Indicator: 1.02, Reference: 0.76
Reducing Waste & Consumption Pressures	Indicator: -0.43, Reference: -0.25
Reducing Water Stress	Indicator: -2.16, Reference: -0.71
Natural Resource Management	Indicator: -0.46, Reference: -0.55
Environmental Health	Indicator: 0.51, Reference: 0.83
Basic Human Sustenance	Indicator: 0.59, Reference: 0.93
Reducing Env.-Related Natural Disaster Vulnerability	Indicator: -3.19, Reference: 0.19
Environmental Governance	Indicator: 0.56, Reference: 0.99
Eco-Efficiency	Indicator: -0.56, Reference: -0.13
Private Sector Responsiveness	Indicator: 0.66, Reference: 0.92
Science and Technology	Indicator: 1.54, Reference: 1.28
International Collaborative Efforts	Indicator: -0.30, Reference: 0.62
Greenhouse Gas Emissions	Indicator: -0.07, Reference: -0.15
Reducing Transboundary Environmental Pressures	Indicator: -0.28, Reference: -0.36

= Indicator value
 = Reference (average value for peer group)

Tajikistan

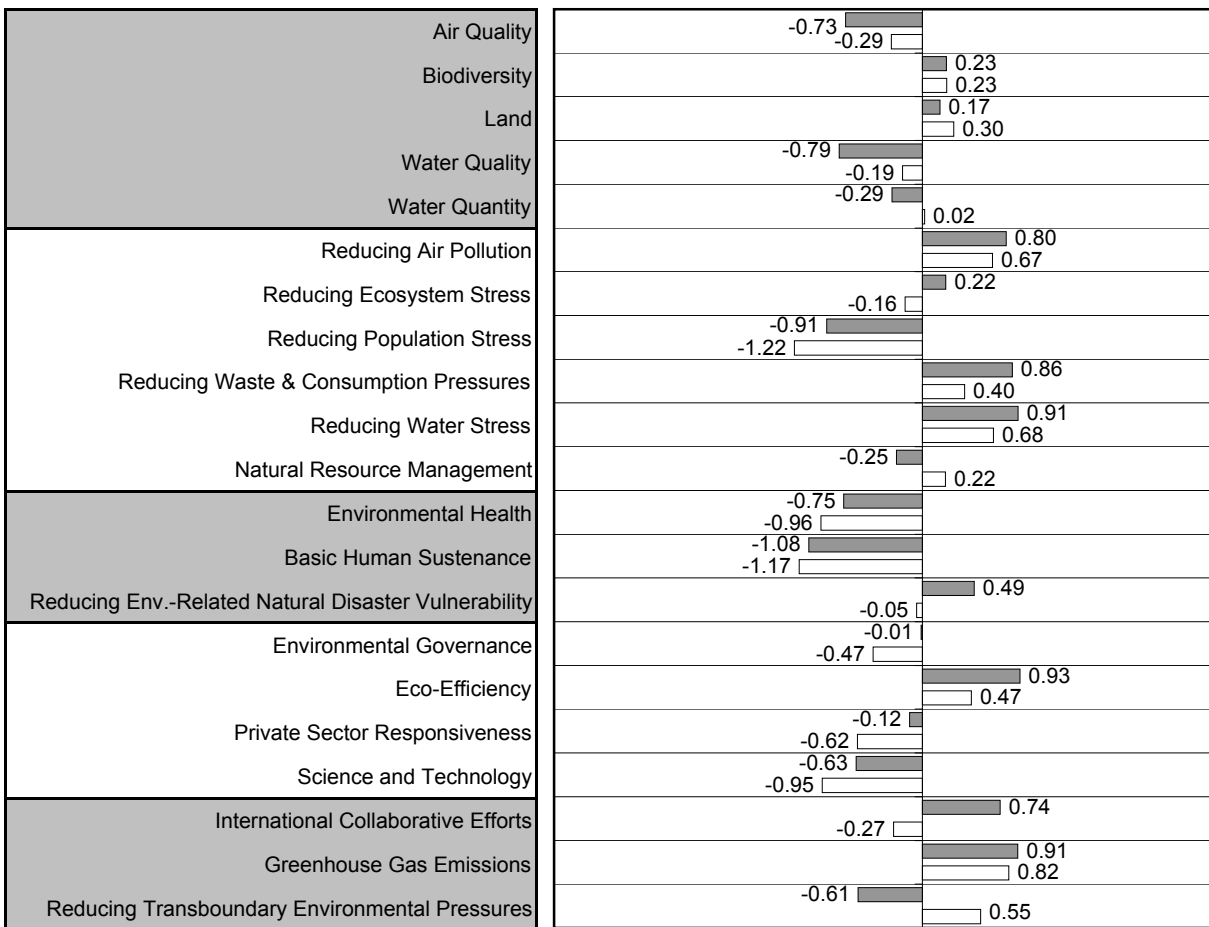
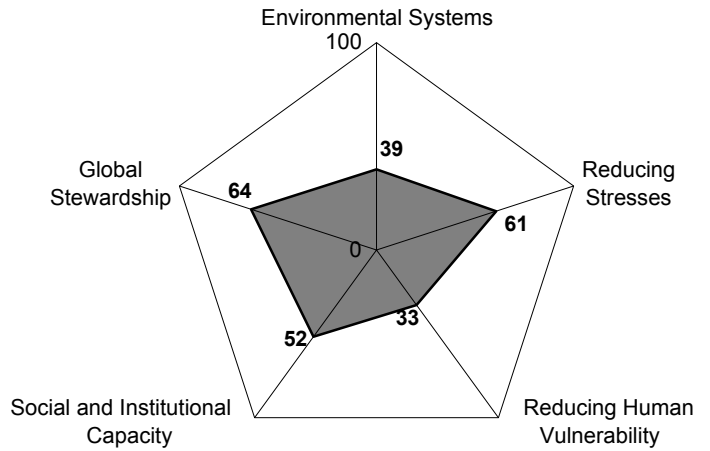
ESI:	38.6
Ranking:	134
GDP/Capita:	\$973
Peer group ESI:	46.4
Variable coverage:	54
Missing variables imputed:	13



= Indicator value
 = Reference (average value for peer group)

Tanzania

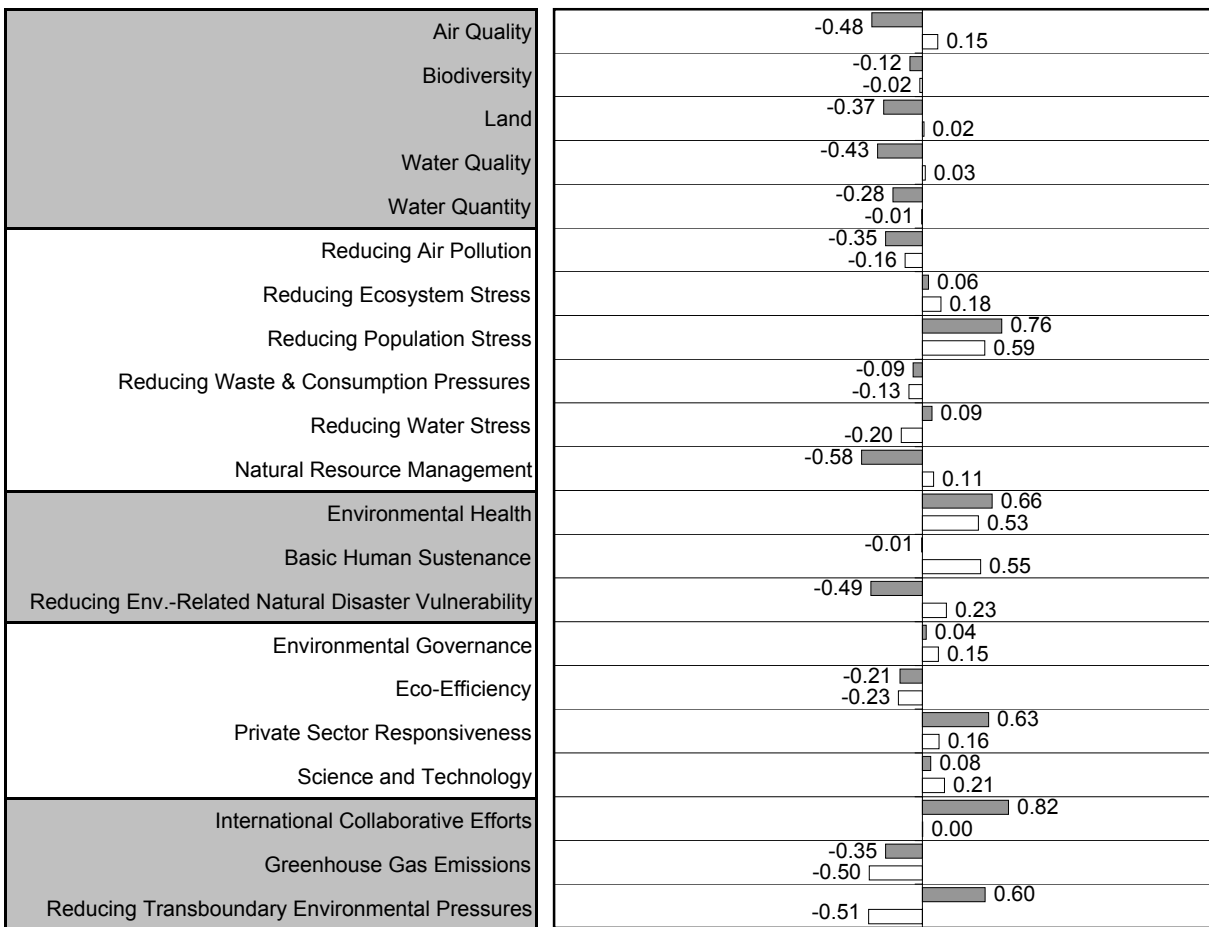
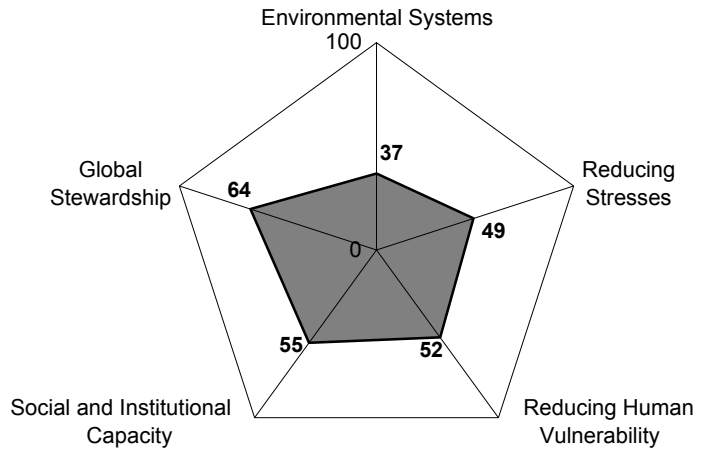
ESI:	50.3
Ranking:	63
GDP/Capita:	\$531
Peer group ESI:	46.4
Variable coverage:	59
Missing variables imputed:	9



= Indicator value
 = Reference (average value for peer group)

Thailand

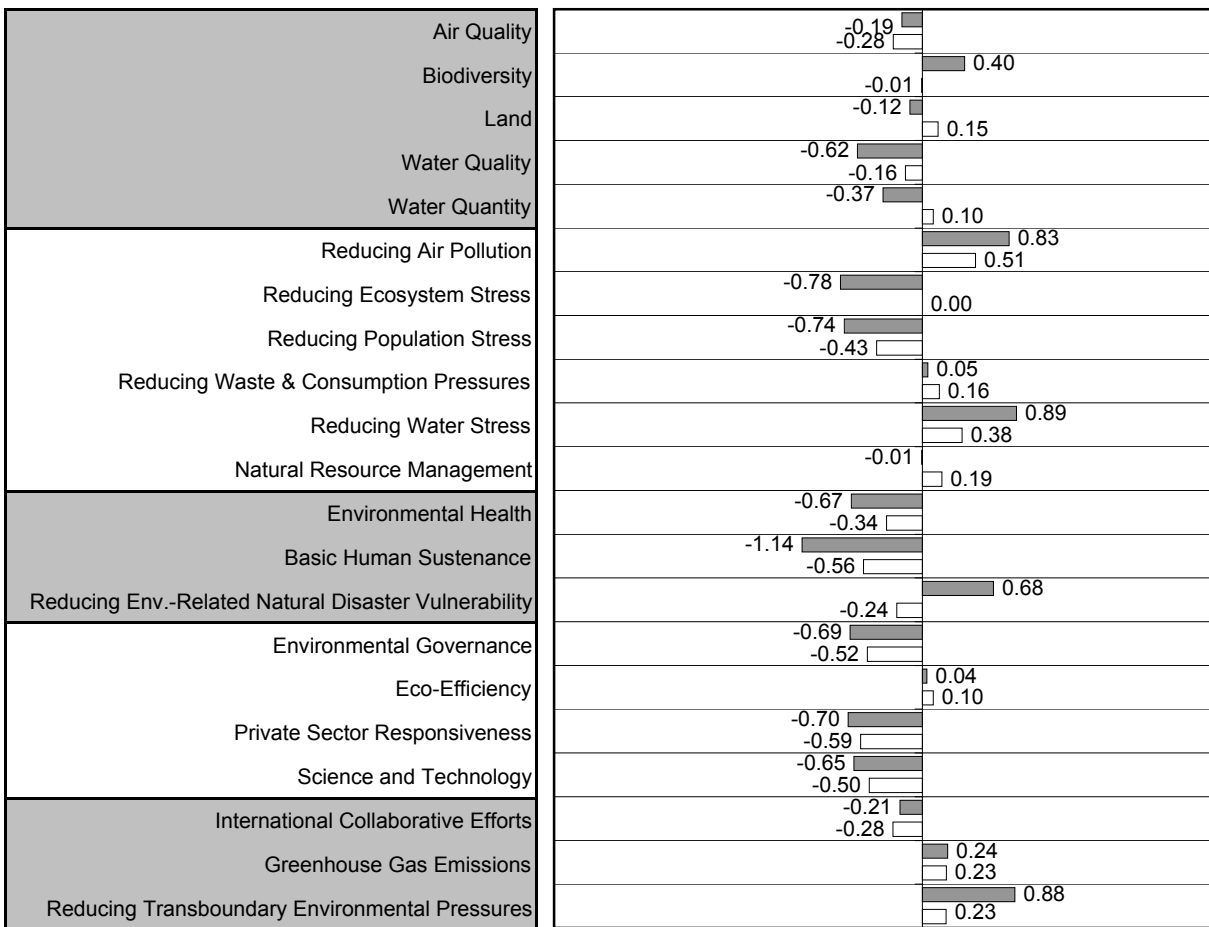
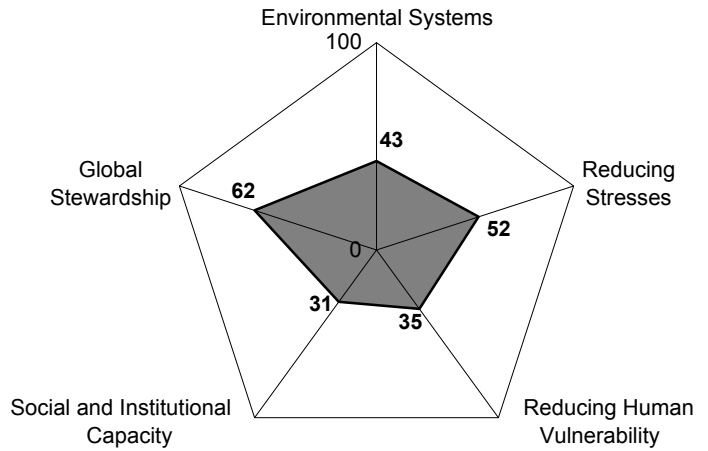
ESI:	49.8
Ranking:	73
GDP/Capita:	\$6,592
Peer group ESI:	52.1
Variable coverage:	66
Missing variables imputed:	6



= Indicator value
 = Reference (average value for peer group)

Togo

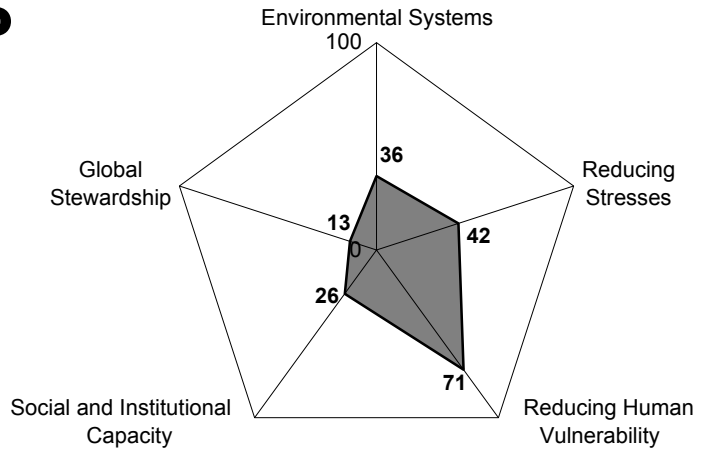
ESI:	44.5
Ranking:	111
GDP/Capita:	\$1,328
Peer group ESI:	46.7
Variable coverage:	55
Missing variables imputed:	14



= Indicator value
 = Reference (average value for peer group)

Trinidad & Tobago

ESI:	36.3
Ranking:	139
GDP/Capita:	\$8,675
Peer group ESI:	52.1
Variable coverage:	63
Missing variables imputed:	6

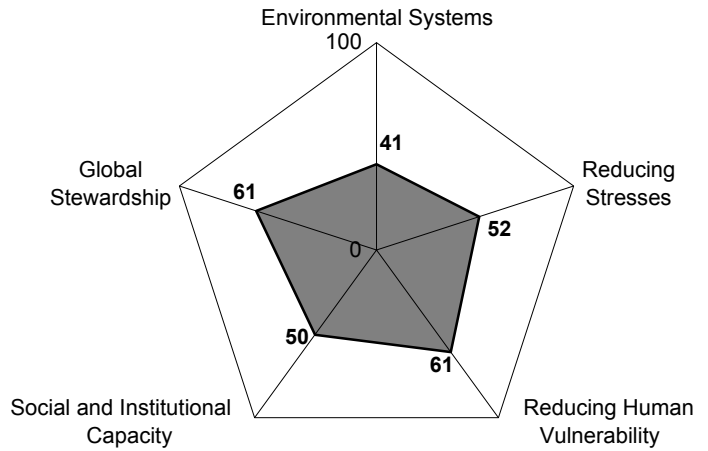


Air Quality	Indicator value: 0.85	Reference: 0.15
Biodiversity	Indicator value: 0.89	Reference: -0.02
Land	Indicator value: -2.52	Reference: 0.02
Water Quality	Indicator value: -0.19	Reference: 0.03
Water Quantity	Indicator value: -0.88	Reference: -0.01
Reducing Air Pollution	Indicator value: -1.32	Reference: -0.16
Reducing Ecosystem Stress	Indicator value: 0.03	Reference: 0.18
Reducing Population Stress	Indicator value: 0.94	Reference: 0.59
Reducing Waste & Consumption Pressures	Indicator value: 0.42	Reference: -0.13
Reducing Water Stress	Indicator value: -1.47	Reference: -0.20
Natural Resource Management	Indicator value: 0.12	Reference: 0.11
Environmental Health	Indicator value: 0.60	Reference: 0.53
Basic Human Sustenance	Indicator value: 0.38	Reference: 0.55
Reducing Env.-Related Natural Disaster Vulnerability	Indicator value: 0.71	Reference: 0.23
Environmental Governance	Indicator value: -0.09	Reference: 0.15
Eco-Efficiency	Indicator value: -2.04	Reference: -0.23
Private Sector Responsiveness	Indicator value: -0.26	Reference: 0.16
Science and Technology	Indicator value: -0.17	Reference: 0.21
International Collaborative Efforts	Indicator value: -0.24	Reference: 0.00
Greenhouse Gas Emissions	Indicator value: -1.53	Reference: -0.50
Reducing Transboundary Environmental Pressures	Indicator value: -1.55	Reference: -0.51

= Indicator value
 = Reference (average value for peer group)

Tunisia

ESI:	51.8
Ranking:	55
GDP/Capita:	\$6,160
Peer group ESI:	52.1
Variable coverage:	61
Missing variables imputed:	9

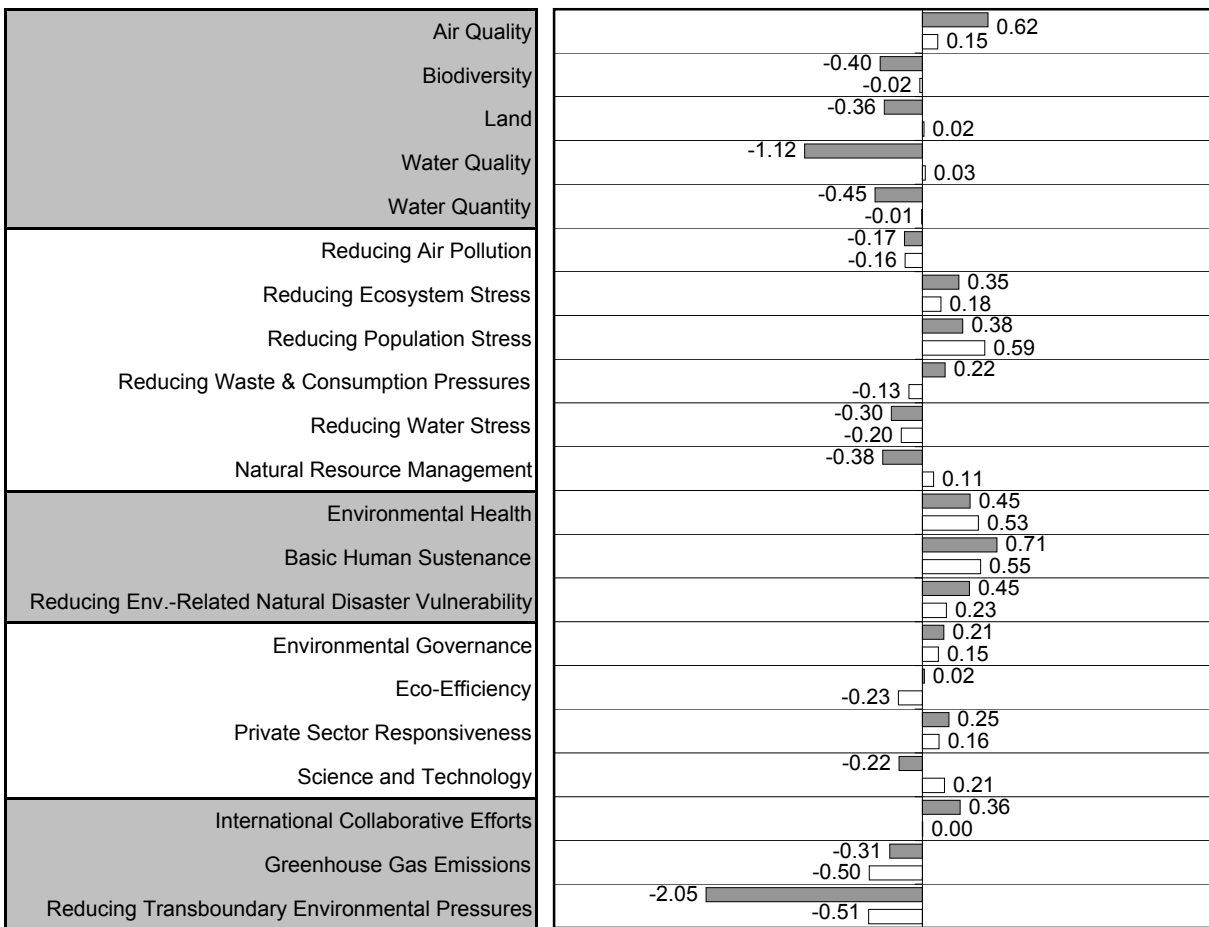
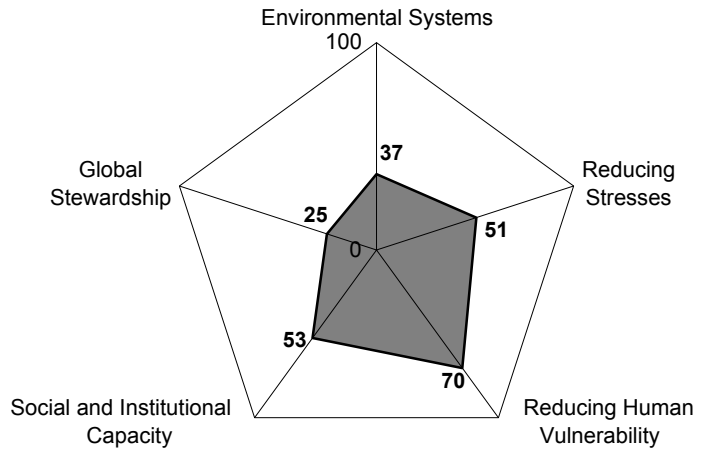


Air Quality	0.17	0.15
Biodiversity	0.00	
Land	-0.02	
Water Quality	0.24	0.02
Water Quantity	-0.42	0.03
Reducing Air Pollution	-1.08	-0.01
Reducing Ecosystem Stress	-0.16	0.15
Reducing Population Stress		0.35
Reducing Waste & Consumption Pressures		0.18
Reducing Water Stress		0.62
Natural Resource Management		0.59
Environmental Health		0.25
Basic Human Sustenance		-0.13
Reducing Env.-Related Natural Disaster Vulnerability		-0.88
Environmental Governance		-0.20
Eco-Efficiency		-0.18
Private Sector Responsiveness		0.11
Science and Technology		0.19
International Collaborative Efforts		0.53
Greenhouse Gas Emissions		0.49
Reducing Transboundary Environmental Pressures		0.55
		0.14
		0.23
		0.15
		0.31
		0.16
		1.00
		0.00
		0.01
		-0.50
		-0.19
		-0.51

= Indicator value
 = Reference (average value for peer group)

Turkey

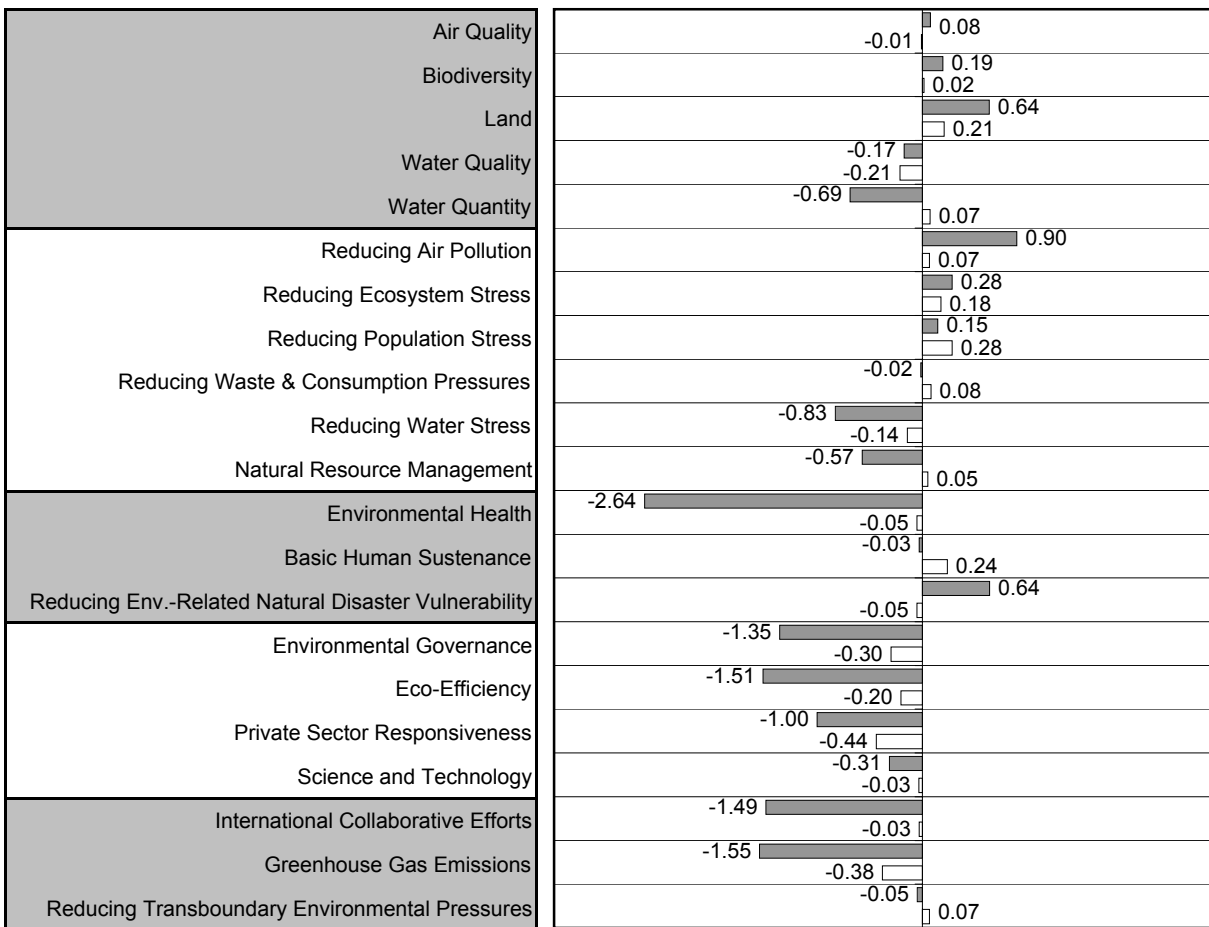
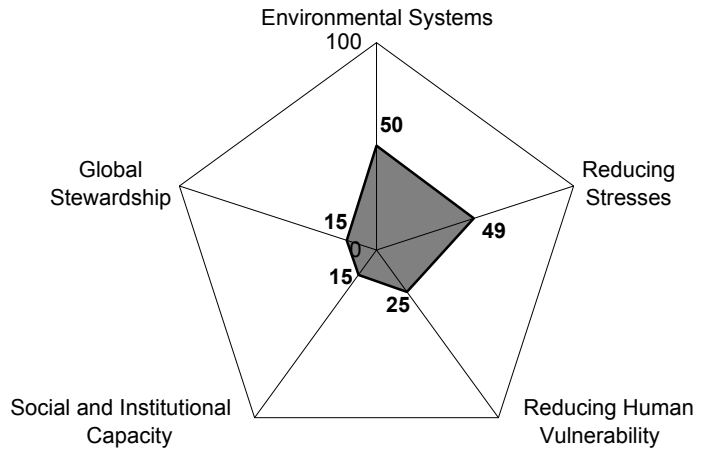
ESI:	46.6
Ranking:	91
GDP/Capita:	\$5,869
Peer group ESI:	52.1
Variable coverage:	71
Missing variables imputed:	2



= Indicator value
 = Reference (average value for peer group)

Turkmenistan

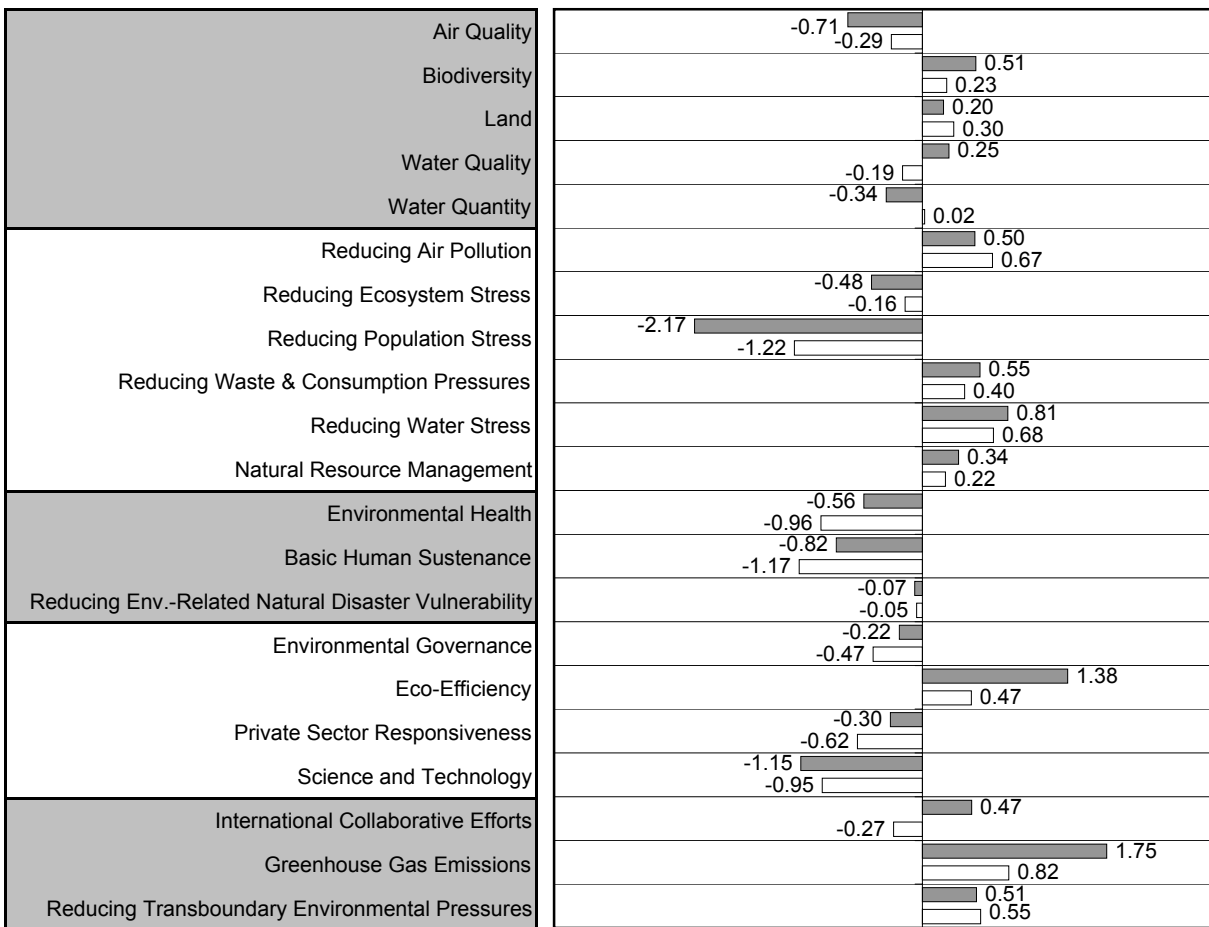
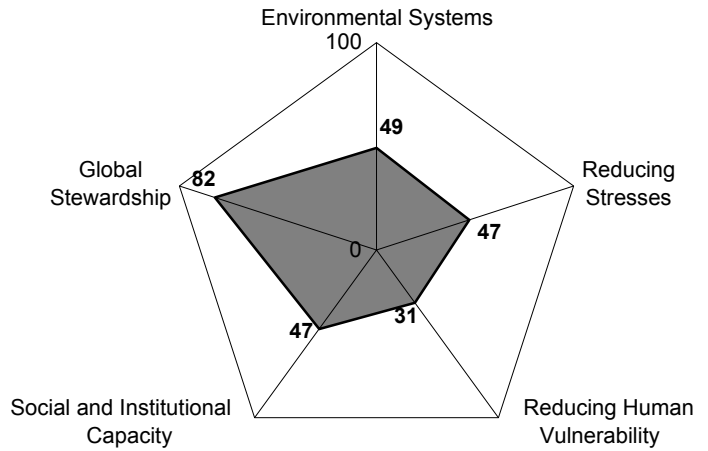
ESI:	33.1
Ranking:	144
GDP/Capita:	\$5,117
Peer group ESI:	48.9
Variable coverage:	49
Missing variables imputed:	16



= Indicator value
 = Reference (average value for peer group)

Uganda

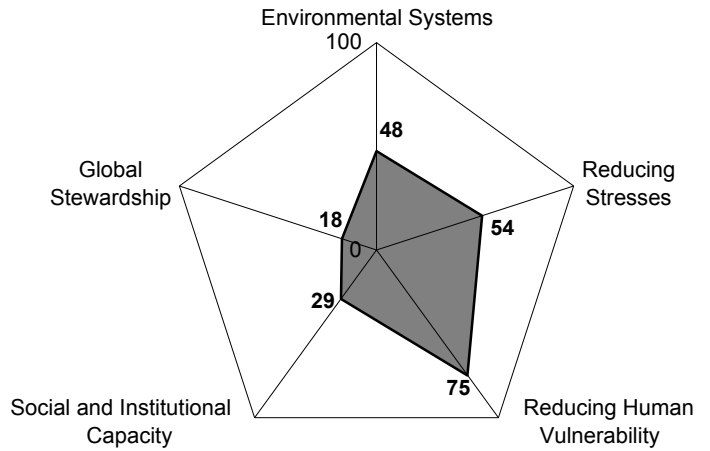
ESI:	51.3
Ranking:	57
GDP/Capita:	\$1,279
Peer group ESI:	46.4
Variable coverage:	61
Missing variables imputed:	10



= Indicator value
 = Reference (average value for peer group)

Ukraine

ESI:	44.7
Ranking:	108
GDP/Capita:	\$4,759
Peer group ESI:	48.9
Variable coverage:	68
Missing variables imputed:	3

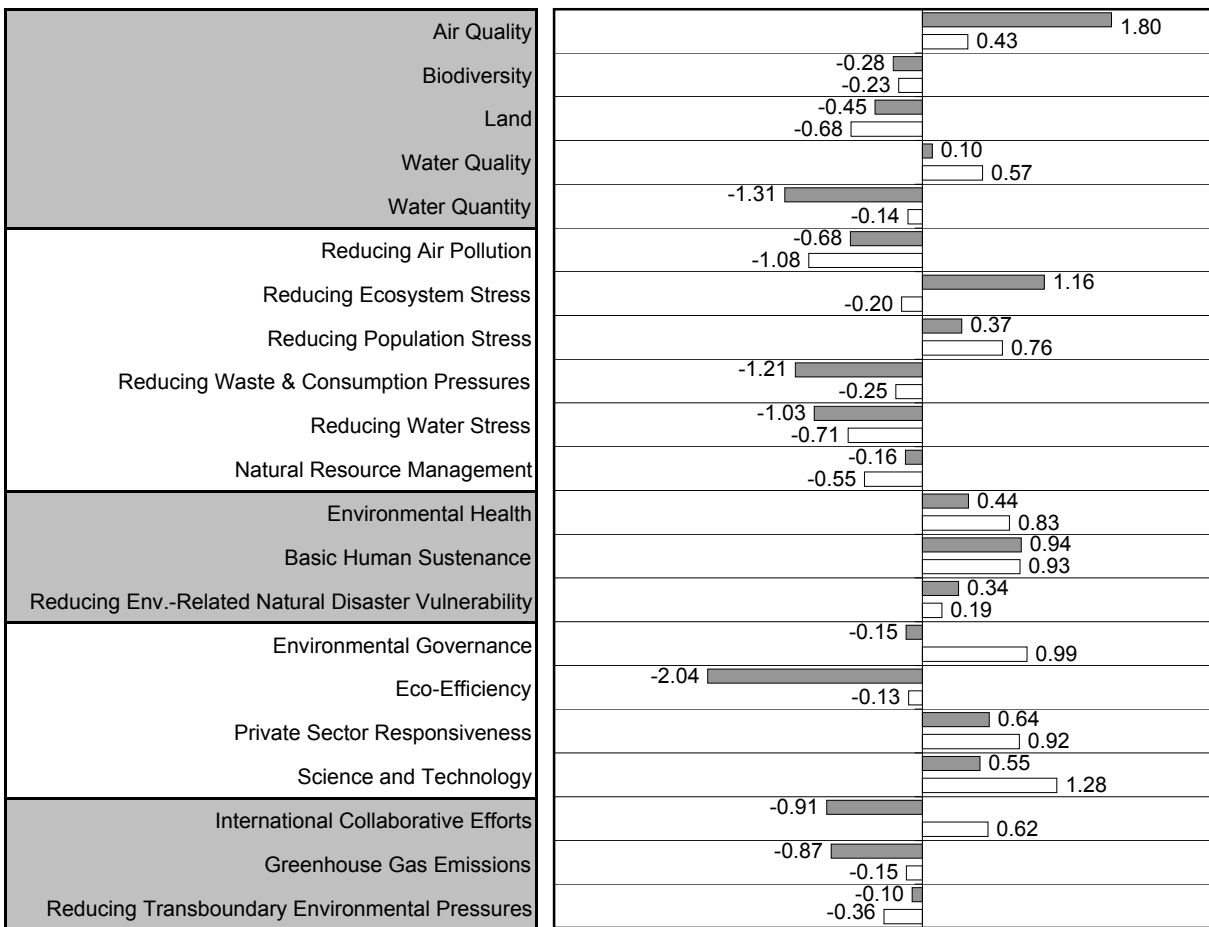
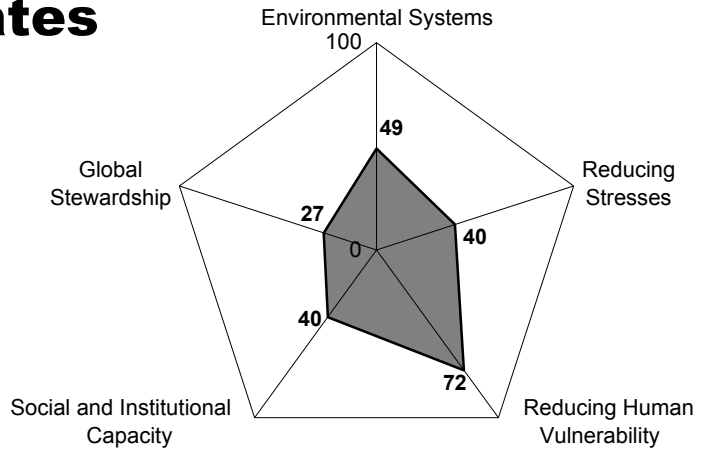


Air Quality	-0.01	1.87
Biodiversity	-0.32	0.02
Land	-0.58	0.21
Water Quality	-0.53	-0.21
Water Quantity	-0.73	0.07
Reducing Air Pollution	-0.38	0.07
Reducing Ecosystem Stress		0.38
Reducing Population Stress		0.18
Reducing Waste & Consumption Pressures	-0.62	1.15
Reducing Water Stress	-0.33	0.28
Natural Resource Management	-0.14	0.08
Environmental Health		0.33
Basic Human Sustenance	-0.05	0.05
Reducing Env.-Related Natural Disaster Vulnerability		0.49
Environmental Governance		0.82
Eco-Efficiency	-1.62	0.24
Private Sector Responsiveness	-0.80	0.69
Science and Technology	-0.44	-0.05
International Collaborative Efforts		-0.34
Greenhouse Gas Emissions	-0.83	-0.30
Reducing Transboundary Environmental Pressures	-1.49	-0.20
	-0.38	-0.44
	-0.48	0.57
		-0.03
		-0.03
		0.07

= Indicator value
 = Reference (average value for peer group)

United Arab Emirates

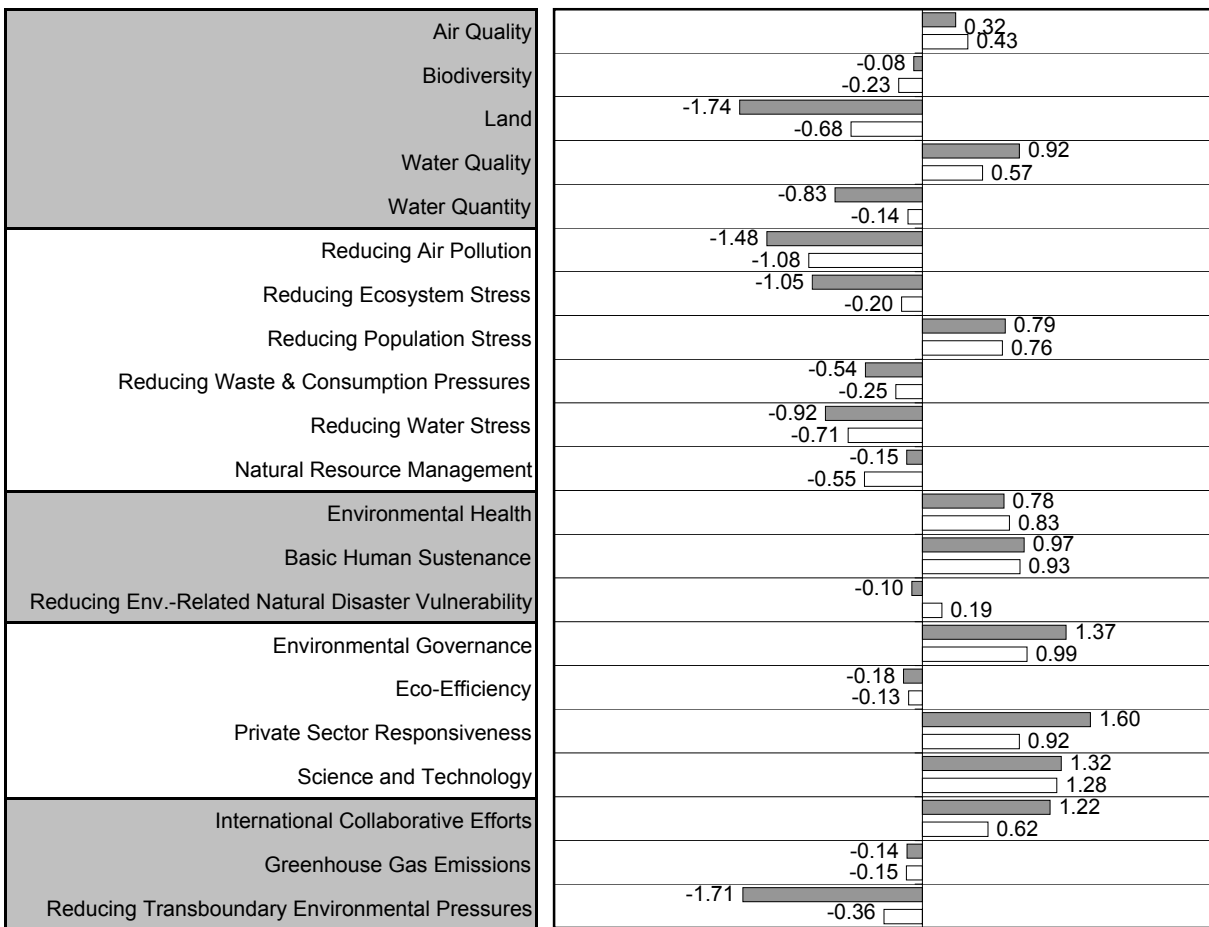
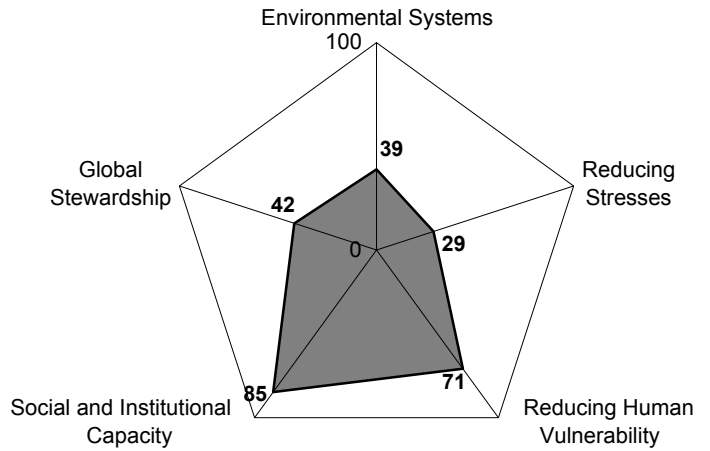
ESI:	44.6
Ranking:	110
GDP/Capita:	\$18,461
Peer group ESI:	55.4
Variable coverage:	56
Missing variables imputed:	13



= Indicator value
 = Reference (average value for peer group)

United Kingdom

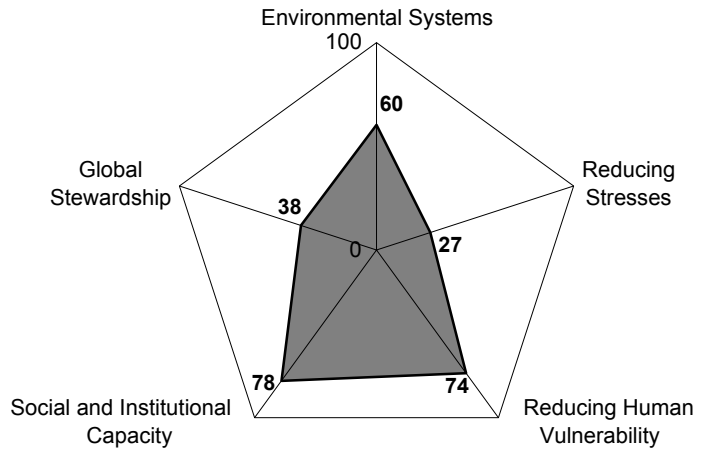
ESI:	50.2
Ranking:	65
GDP/Capita:	\$23,573
Peer group ESI:	55.4
Variable coverage:	74
Missing variables imputed:	2





= Indicator value
 = Reference (average value for peer group)

United States

ESI:	53.0
Ranking:	45
GDP/Capita:	\$32,483
Peer group ESI:	55.4
Variable coverage:	73
Missing variables imputed:	0

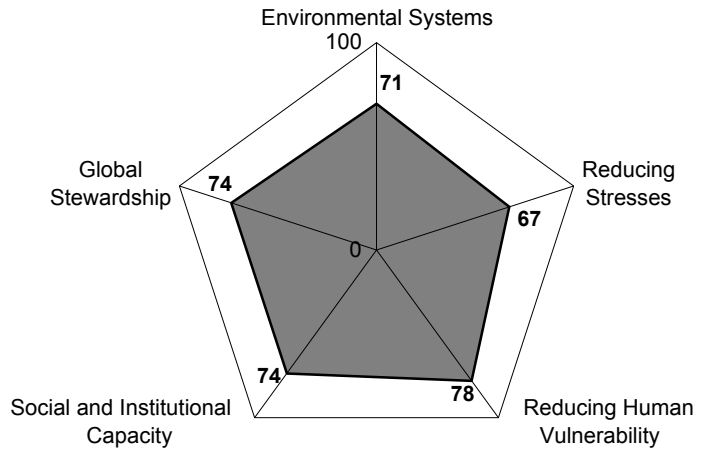


Air Quality	0.01	0.43
Biodiversity	-0.23	0.02
Land	-0.68	0.23
Water Quality	-0.14	0.70
Water Quantity	-1.48	0.57
Reducing Air Pollution	-1.08	0.34
Reducing Ecosystem Stress	-0.11	
Reducing Population Stress	-0.20	
Reducing Waste & Consumption Pressures	-1.40	0.46
Reducing Water Stress	-0.25	0.76
Natural Resource Management	-0.27	
Environmental Health	-0.71	
Basic Human Sustenance	-0.82	
Reducing Env.-Related Natural Disaster Vulnerability	-0.55	
Environmental Governance		0.92
Eco-Efficiency		0.83
Private Sector Responsiveness		0.97
Science and Technology		0.93
International Collaborative Efforts		0.00
Greenhouse Gas Emissions		0.19
Reducing Transboundary Environmental Pressures		0.80
	-0.34	0.99
	-0.13	
		0.65
		0.92
		2.00
		1.28
		0.57
	-0.56	0.62
	-0.15	
	-0.89	
	-0.36	

 = Indicator value
 = Reference (average value for peer group)

Uruguay

ESI:	71.8
Ranking:	3
GDP/Capita:	\$7,201
Peer group ESI:	52.1
Variable coverage:	63
Missing variables imputed:	6

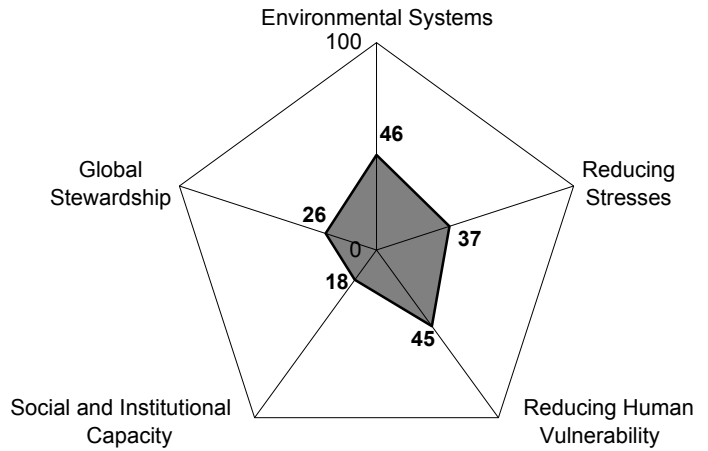


Air Quality	0.42	0.15
Biodiversity	-0.18	-0.02
Land	-0.17	0.02
Water Quality	0.51	0.03
Water Quantity	2.11	-0.01
Reducing Air Pollution	0.71	-0.16
Reducing Ecosystem Stress	1.82	0.18
Reducing Population Stress	0.55	0.59
Reducing Waste & Consumption Pressures	-0.58	-0.13
Reducing Water Stress	0.03	-0.20
Natural Resource Management	0.16	0.11
Environmental Health	0.85	0.53
Basic Human Sustenance	0.85	0.55
Reducing Env.-Related Natural Disaster Vulnerability	0.62	0.23
Environmental Governance	0.40	0.15
Eco-Efficiency	1.37	-0.23
Private Sector Responsiveness	0.51	0.16
Science and Technology	0.25	0.21
International Collaborative Efforts	0.04	0.00
Greenhouse Gas Emissions	0.66	-0.50
Reducing Transboundary Environmental Pressures	1.18	-0.51

= Indicator value
 = Reference (average value for peer group)

Uzbekistan

ESI:	34.4
Ranking:	142
GDP/Capita:	\$1,511
Peer group ESI:	46.7
Variable coverage:	50
Missing variables imputed:	17

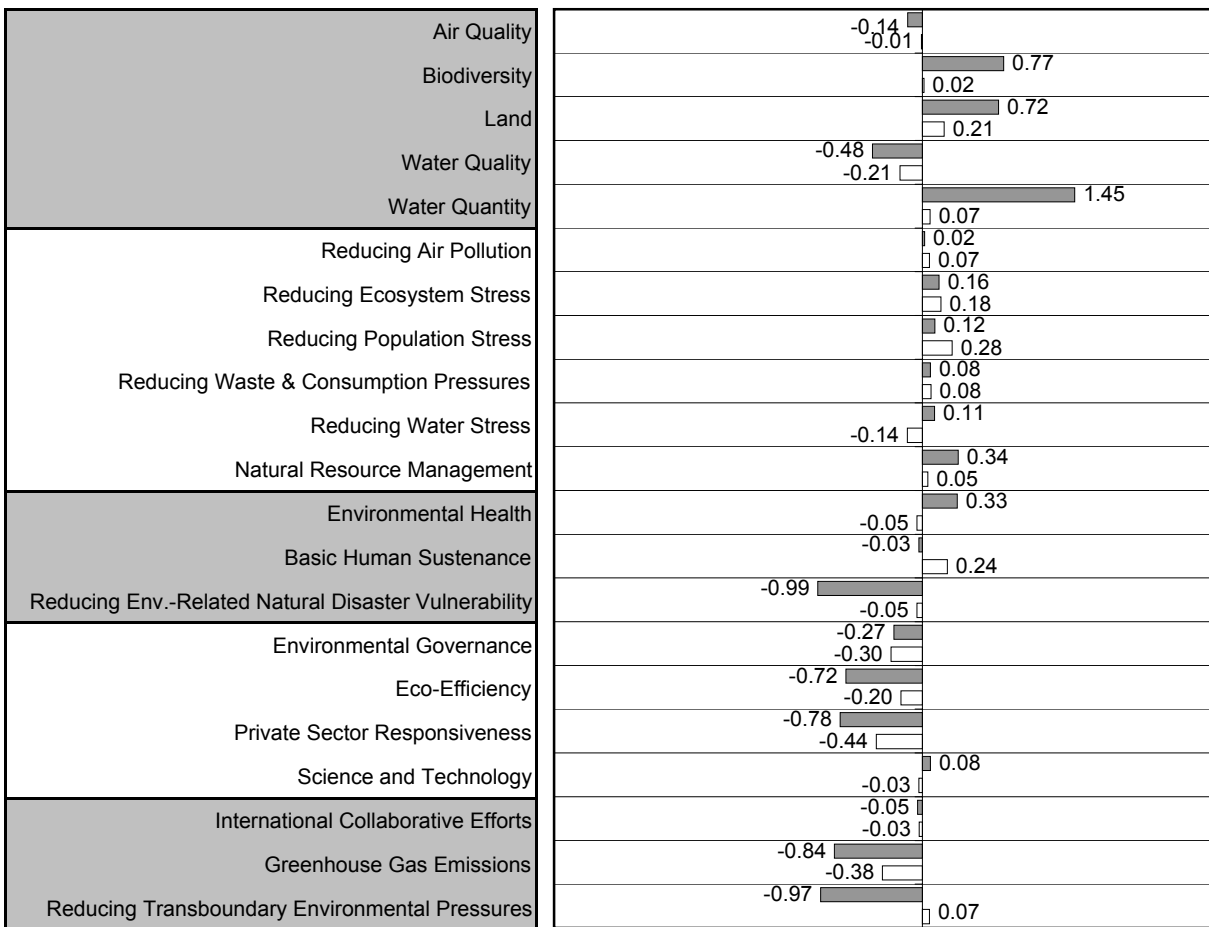
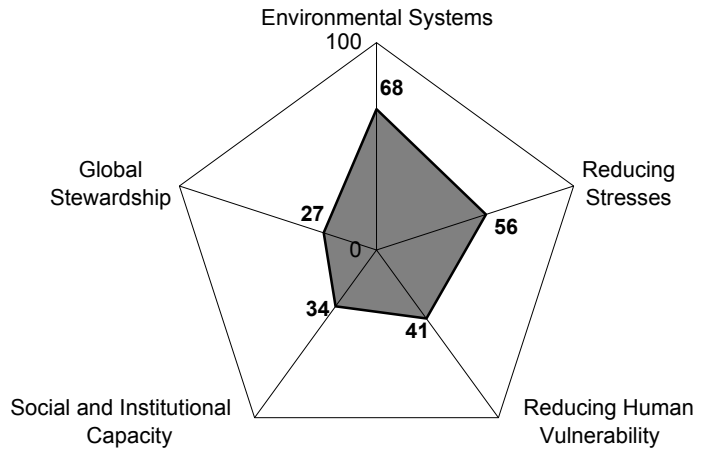


Air Quality	-0.28	0.14
Biodiversity	-0.01	0.30
Land		0.55
Water Quality	-0.78	0.15
Water Quantity	-0.16	0.10
Reducing Air Pollution	-0.73	0.24
Reducing Ecosystem Stress		0.51
Reducing Population Stress		0.35
Reducing Waste & Consumption Pressures	-0.09	0.00
Reducing Water Stress	-0.43	0.16
Natural Resource Management	-0.93	0.38
Environmental Health	-0.86	0.19
Basic Human Sustenance	-0.69	0.74
Reducing Env.-Related Natural Disaster Vulnerability	-0.98	0.24
Environmental Governance	-0.34	0.10
Eco-Efficiency	-0.11	0.10
Private Sector Responsiveness	-0.56	0.04
Science and Technology	-0.24	0.04
International Collaborative Efforts	-1.00	0.23
Greenhouse Gas Emissions	-0.52	0.16
Reducing Transboundary Environmental Pressures	-1.97	0.23

= Indicator value
 = Reference (average value for peer group)

Venezuela

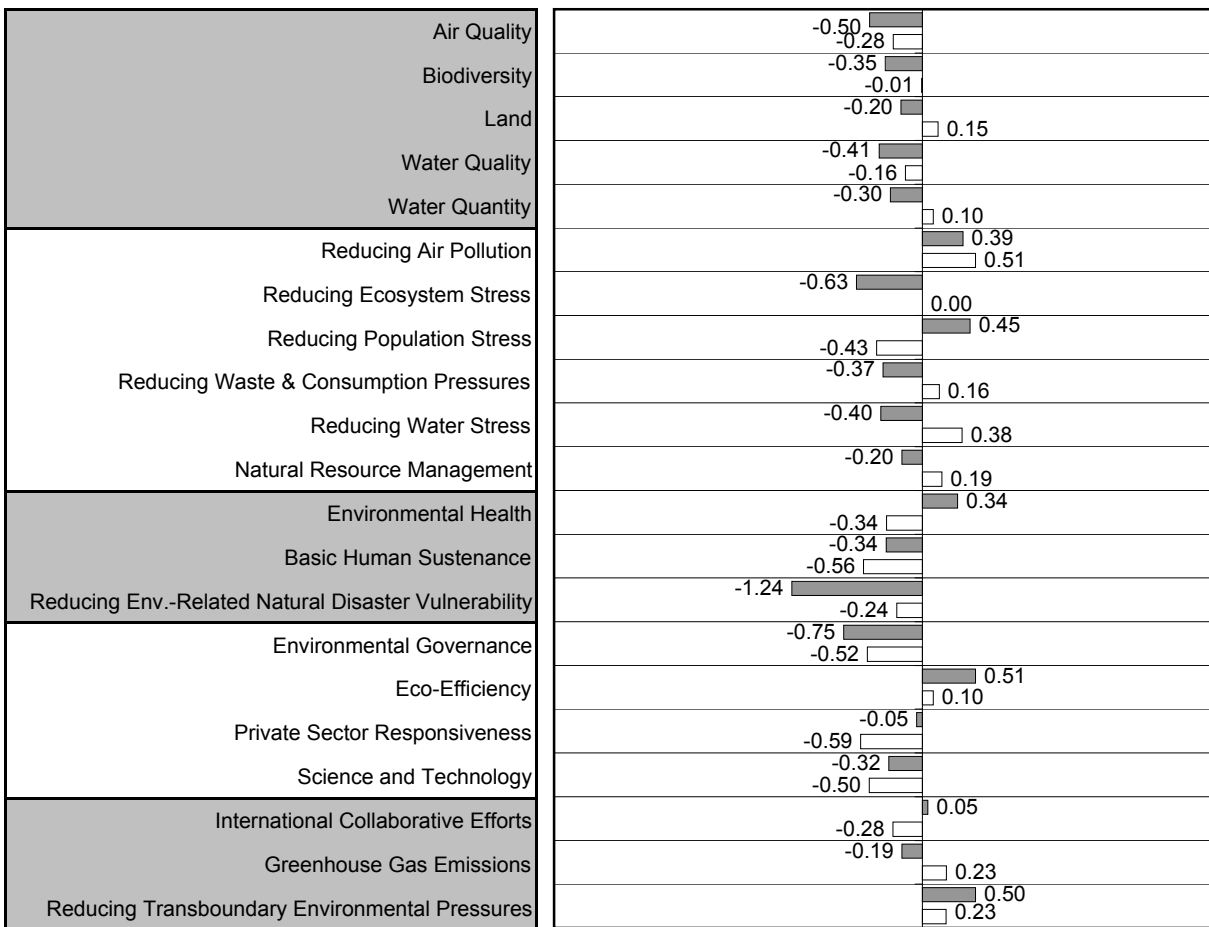
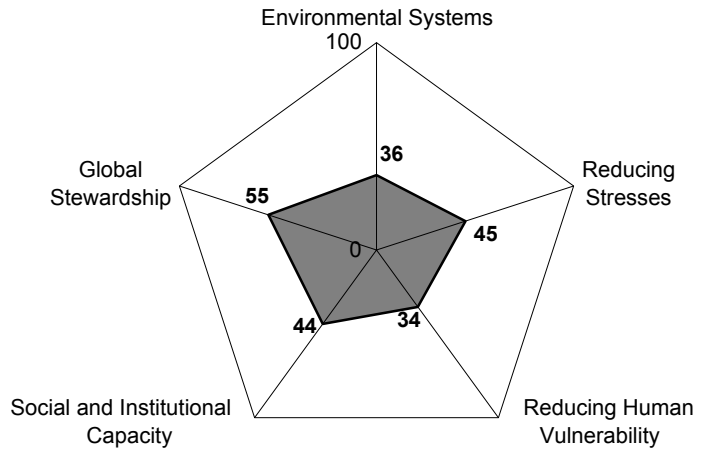
ESI:	48.1
Ranking:	82
GDP/Capita:	\$4,269
Peer group ESI:	48.9
Variable coverage:	68
Missing variables imputed:	3



= Indicator value
 = Reference (average value for peer group)

Viet Nam

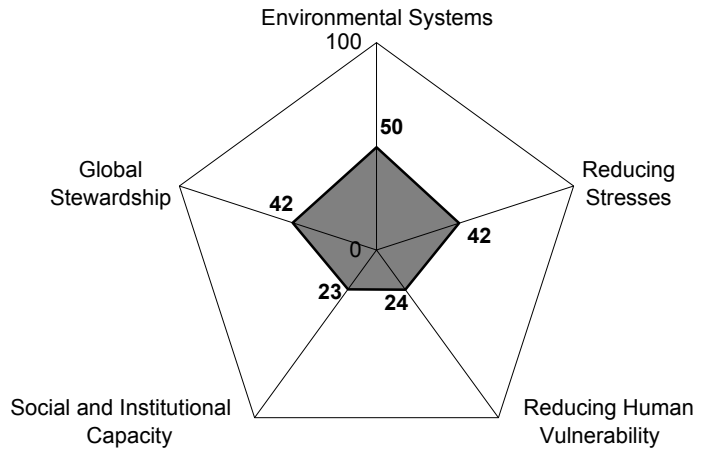
ESI:	42.3
Ranking:	127
GDP/Capita:	\$2,165
Peer group ESI:	46.7
Variable coverage:	64
Missing variables imputed:	8



= Indicator value
 = Reference (average value for peer group)

Yemen

ESI:	37.3
Ranking:	137
GDP/Capita:	\$773
Peer group ESI:	46.4
Variable coverage:	52
Missing variables imputed:	18

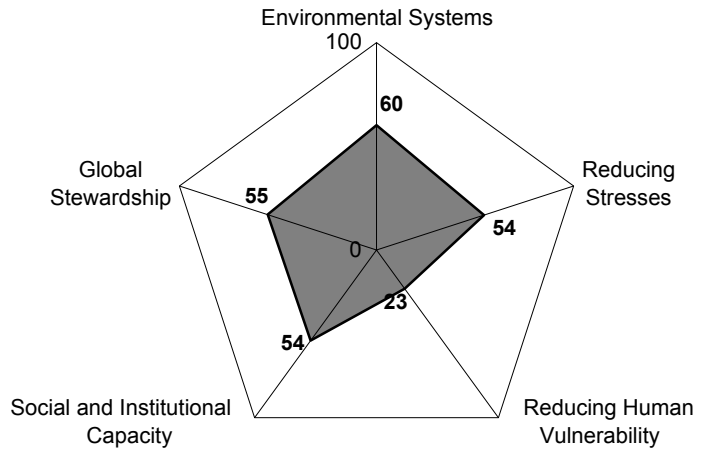


Air Quality	-0.45	
Biodiversity	-0.29	0.23
Land	-0.13	0.77
Water Quality		0.30
Water Quantity	-0.19	0.01
Reducing Air Pollution	-0.25	0.02
Reducing Ecosystem Stress		0.29
Reducing Population Stress	-0.31	0.67
Reducing Waste & Consumption Pressures	-0.16	
Reducing Water Stress	-2.23	-1.22
Natural Resource Management		0.43
Environmental Health		0.40
Basic Human Sustenance	-1.15	
Reducing Env.-Related Natural Disaster Vulnerability	-0.96	
Environmental Governance	-0.88	
Eco-Efficiency	-1.17	
Private Sector Responsiveness	-0.12	
Science and Technology	-0.05	
International Collaborative Efforts	-0.86	
Greenhouse Gas Emissions	-0.47	0.47
Reducing Transboundary Environmental Pressures	-0.42	
	-0.74	
	-0.62	
	-0.87	
	-0.95	
	-0.70	
	-0.27	
		0.09
		0.82
		0.04
		0.55

= Indicator value
 = Reference (average value for peer group)

Zambia

ESI:	51.1
Ranking:	60
GDP/Capita:	\$768
Peer group ESI:	46.4
Variable coverage:	59
Missing variables imputed:	10

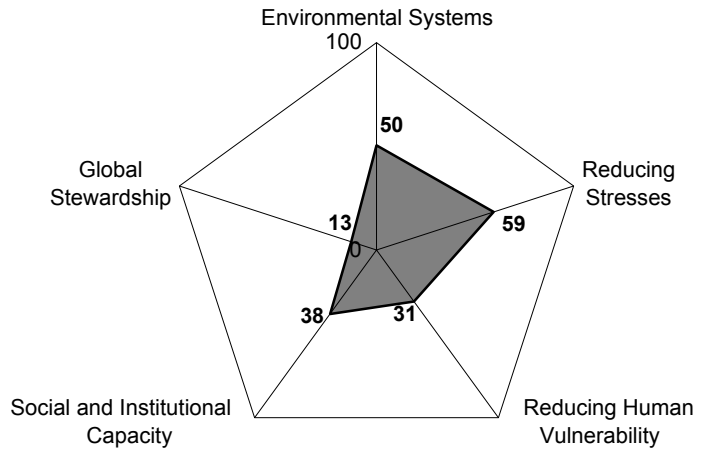


Air Quality	-0.44	0.23
Biodiversity	-0.29	0.77
Land		0.31
Water Quality		0.30
Water Quantity		0.07
Reducing Air Pollution	-0.19	0.57
Reducing Ecosystem Stress		0.02
Reducing Population Stress		0.37
Reducing Waste & Consumption Pressures		0.67
Reducing Water Stress		0.96
Natural Resource Management		0.40
Environmental Health		0.72
Basic Human Sustenance		0.68
Reducing Env.-Related Natural Disaster Vulnerability		0.01
Environmental Governance		0.22
Eco-Efficiency	-0.79	
Private Sector Responsiveness	-0.96	
Science and Technology	-1.80	
International Collaborative Efforts	-1.17	
Greenhouse Gas Emissions		0.39
Reducing Transboundary Environmental Pressures		0.13
	-0.47	
		1.26
		0.47
	-0.08	
	-0.62	
	-0.89	
	-0.95	
	-0.56	
	-0.27	
		1.00
		0.82
	-0.04	
		0.55

= Indicator value
 = Reference (average value for peer group)

Zimbabwe

ESI:	41.2
Ranking:	128
GDP/Capita:	\$2,124
Peer group ESI:	46.7
Variable coverage:	58
Missing variables imputed:	9



Air Quality	-0.31	0.28
Biodiversity	-0.01	0.71
Land	-0.08	0.15
Water Quality	-0.16	0.19
Water Quantity	-0.45	0.10
Reducing Air Pollution	-0.18	0.30
Reducing Ecosystem Stress	-0.18	0.51
Reducing Population Stress	-0.43	0.12
Reducing Waste & Consumption Pressures	-0.43	0.31
Reducing Water Stress	-0.43	0.16
Natural Resource Management	-0.43	0.21
Environmental Health	-0.67	0.38
Basic Human Sustenance	-0.34	0.66
Reducing Env.-Related Natural Disaster Vulnerability	-0.56	0.19
Environmental Governance	-0.17	0.11
Eco-Efficiency	-0.24	0.10
Private Sector Responsiveness	-0.37	0.31
Science and Technology	-0.52	0.10
International Collaborative Efforts	-0.31	0.11
Greenhouse Gas Emissions	-0.59	0.23
Reducing Transboundary Environmental Pressures	-0.64	0.23

= Indicator value
 = Reference (average value for peer group)

2005 Environmental Sustainability Index

Benchmarking National Environmental Stewardship

Appendix C Variable Profiles and Data

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Appendix C: Variable Profiles and Data

This section contains complete variable descriptions along with the original data used to produce the 2005 Environmental Sustainability Index. The variables are listed thematically according to the structure of the ESI shown in Table 10 (Table C.1 shows the variables in alphabetical order by variable code). Each page contains the following:

- The variable number.
- The variable code.
- The reference year (MRYA = Most Recent Year Available for the stated range).
- The variable description.
- The units in which the variable is measured.
- The primary data source*.
- The logic for including the variable in the ESI.
- The methodology used to produce the variable, including any additional processing of the data beyond that of the data providers.
- The observed mean and median values for all countries.
- The observed minimum (min) and maximum (max) values for all countries.
- The 2.5 and 97.5 percentile cut-off values. In calculating the ESI, we truncated extreme values that fell outside the ranges of these values.
- The table with the original and imputed data. Note that where data for a given variable were imputed, the estimated values are shown in brackets.

The Section on Data Quality and Coverage in Appendix A provides further information on our assessment of the quality of the ESI variables.

* A complete list of all data sources, including individual country information, follows the variable profiles.

Table C.1: Variables sorted alphabetically by variable code

Page	Variable Code	Variable Description	Indicator Description
281	ACEXC	Acidification exceedance from anthropogenic sulfur deposition	Reducing Ecosystem Stress
309	AGENDA21	Local Agenda 21 initiatives per million people	Environmental Governance
295	AGSUB	Agricultural subsidies	Natural Resource Management
267	ANTH10	Percentage of total land area (including inland waters) having very low anthropogenic impact	Land
268	ANTH40	Percentage of total land area (including inland waters) having very high anthropogenic impact	Land
287	BODWAT	Industrial organic water pollutant (BOD) emissions per available freshwater	Reducing Water Stress
279	CARSKM	Vehicles in use per populated land area	Reducing Air Pollution
310	CIVLIB	Civil and Political Liberties	Environmental Governance
330	CO2GDP	Carbon emissions per million US dollars GDP	Greenhouse Gas Emissions
331	CO2PC	Carbon emissions per capita	Greenhouse Gas Emissions
275	COALKM	Coal consumption per populated land area	Reducing Air Pollution
311	CSDMIS	Percentage of variables missing from the CGSDI "Rio to Joburg Dashboard"	Environmental Governance
323	DAI	Digital Access Index	Science and Technology
301	DISCAS	Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts	Reducing Environment-Related Natural Disaster Vulnerability
302	DISEXP	Environmental Hazard Exposure Index	Reducing Environment-Related Natural Disaster Vulnerability
296	DISINT	Death rate from intestinal infectious diseases	Environmental Health
297	DISRES	Child death rate from respiratory diseases	Environmental Health
317	DJSGI	Dow Jones Sustainability Group Index (DJSGI)	Private Sector Responsiveness
262	ECORISK	Percentage of country's territory in threatened ecoregions	Biodiversity
318	ECOVAL	Average InnoVest EcoValue rating of firms headquartered in a country	Private Sector Responsiveness
284	EFPC	Ecological Footprint per capita	Reducing Waste & Consumption Pressures
327	EIONUM	Number of memberships in environmental intergovernmental organizations	Participation in International Collaborative Efforts
315	ENEFF	Energy efficiency	Eco-Efficiency
325	ENROL	Gross tertiary enrollment rate	Science and Technology
288	FERTHA	Fertilizer consumption per hectare of arable land	Reducing Water Stress
292	FORCERT	Percentage of total forest area that is certified for sustainable management	Natural Resource Management
280	FOREST	Annual average forest cover change rate from 1990 to 2000	Reducing Ecosystem Stress
328	FUNDING	Contribution to international and bilateral funding of environmental projects and development aid	Participation in International Collaborative Efforts
303	GASPR	Ratio of gasoline price to world average	Environmental Governance
305	GOVEFF	Government effectiveness	Environmental Governance
282	GR2050	Percentage change in projected population 2004-2050	Reducing Population Pressure
304	GRAFT	Corruption measure	Environmental Governance
274	GRDAVL	Internal groundwater availability per capita	Water Quantity
286	HAZWST	Generation of hazardous waste	Reducing Waste & Consumption Pressures
261	INDOOR	Indoor air pollution from solid fuel use	Air Quality
322	INNOV	Innovation Index	Science and Technology
294	IRRSAL	Salinized area due to irrigation as percentage of total arable land	Natural Resource Management
319	ISO14	Number of ISO 14001 certified companies per billion dollars GDP (PPP)	Private Sector Responsiveness
312	IUCN	IUCN member organizations per million population	Environmental Governance
313	KNWLDG	Knowledge creation in environmental science, technology, and policy	Environmental Governance
308	LAW	Rule of law	Environmental Governance
266	NBI	National Biodiversity Index	Biodiversity
258	NO2	Urban population weighted NO ₂ concentration	Air Quality

Page	Variable Code	Variable Description	Indicator Description
276	NOXKM	Anthropogenic NO _x emissions per populated land area	Reducing Air Pollution
291	OVRFSH	Productivity overfishing	Natural Resource Management
329	PARTICIP	Participation in international environmental agreements	Participation in International Collaborative Efforts
324	PECR	Female primary education completion rate	Science and Technology
289	PESTHA	Pesticide consumption per hectare of arable land	Reducing Water Stress
333	POLEXP	Import of polluting goods and raw materials as percentage of total imports of goods and services	Reducing Transboundary Environmental Pressures
314	POLITY	Democracy measure	Environmental Governance
306	PRAREA	Percentage of total land area under protected status	Environmental Governance
265	PRTAMPH	Threatened amphibian species as percentage of known amphibian species in each country	Biodiversity
263	PRTBRD	Threatened bird species as percentage of known breeding bird species in each country	Biodiversity
264	PRTMAM	Threatened mammal species as percentage of known mammal species in each country	Biodiversity
285	RECYCLE	Waste recycling rates	Reducing Waste & Consumption Pressures
316	RENPC	Hydropower and renewable energy production as a percentage of total energy consumption	Eco-Efficiency
321	RESCARE	Participation in the Responsible Care Program of the Chemical Manufacturer's Association	Private Sector Responsiveness
326	RESEARCH	Number of researchers per million inhabitants	Science and Technology
259	SO2	Urban population weighted SO ₂ concentration	Air Quality
332	SO2EXP	SO ₂ Exports	Reducing Transboundary Environmental Pressures
277	SO2KM	Anthropogenic SO ₂ emissions per populated land area	Reducing Air Pollution
283	TFR	Total Fertility Rate	Reducing Population Pressure
260	TSP	Urban population weighted TSP concentration	Air Quality
298	U5MORT	Children under five mortality rate per 1,000 live births	Environmental Health
299	UND_NO	Percentage of undernourished in total population	Basic Human Sustenance
278	VOCKM	Anthropogenic VOC emissions per populated land area	Reducing Air Pollution
273	WATAVL	Freshwater availability per capita	Water Quantity
290	WATSTR	Percentage of country under severe water stress	Reducing Water Stress
300	WATSUP	Percentage of population with access to improved drinking water source	Basic Human Sustenance
307	WEFGOV	World Economic Forum Survey on environmental governance	Environmental Governance
320	WEFPRI	World Economic Forum Survey on private sector environmental innovation	Private Sector Responsiveness
293	WEFSUB	World Economic Forum Survey on subsidies	Natural Resource Management
269	WQ_DO	Dissolved oxygen concentration	Water Quality
270	WQ_EC	Electrical conductivity	Water Quality
271	WQ_PH	Phosphorus concentration	Water Quality
272	WQ_SS	Suspended solids	Water Quality

Variable #:	1	Code:	NO2	Reference Year:	MRYA 1993-2004
Description:	Urban population weighted NO2 concentration				
Units:	Micrograms per cubic meter				
Source*:	Organisation for Economic Co-operation and Development (OECD), United Nations Human Settlement Programme (UNHABITAT), World Health Organization, European Environment Agency, and World Resources Institute, plus country data.				
Logic:	Poor ambient air quality affects both human and ecosystem health. Humans exposed to high NO2 concentrations may suffer respiratory illness and lung damage. NO2 is also a precursor to the formation of ground-level ozone and acid rain. Through reactions of NO2 with other substances such as volatile organic compounds (VOC) in the atmosphere can cause reduced visibility.				
Methodology:	The data from all sources were normalized by city population (in thousands) in each country. The most recent data were used from the OECD, UNHABITAT, and WHO. The EEA data were drawn from the AirBase air quality monitoring database and station coverage was balanced with the need for recent data. If a country has observations from more than one data source, the most recent observation was chosen.				

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	39.22		109.16		0.02		
	36.56		0		76.73		
Albania	[14.74]	Ecuador	[47.74]	Lebanon	[25.81]	Saudi Arabia	[31.01]
Algeria	[43.7]	Egypt	[63.87]	Liberia	[28.53]	Senegal	[26.02]
Angola	[46.96]	El Salvador	70.50	Libya	[42.58]	Serbia and Mont.	[20.69]
Argentina	56.79	Estonia	22.67	Lithuania	22.00	Sierra Leone	[29.94]
Armenia	1.58	Ethiopia	[36.84]	Macedonia	[25.82]	Slovakia	37.44
Australia	16.47	Finland	24.00	Madagascar	[22.81]	Slovenia	32.47
Austria	33.02	France	51.00	Malawi	[27.33]	South Africa	44.03
Azerbaijan	[19.81]	Gabon	[42.43]	Malaysia	[39.53]	South Korea	53.41
Bangladesh	[28.67]	Gambia	[25.47]	Mali	[24.17]	Spain	67.30
Belarus	42.60	Georgia	[28.06]	Mauritania	[33.18]	Sri Lanka	[29.11]
Belgium	41.00	Germany	34.72	Mexico	56.02	Sudan	[42.26]
Benin	[26.56]	Ghana	[30.03]	Moldova	0.01	Sweden	18.20
Bhutan	[11.29]	Greece	58.80	Mongolia	[25.82]	Switzerland	38.57
Bolivia	[42.51]	Guatemala	69.33	Morocco	[47.11]	Syria	[43.74]
Bosnia and Herz.	27.00	Guinea	[33.97]	Mozambique	[23.59]	Taiwan	35.67
Botswana	[32.8]	Guinea-Bissau	[29.83]	Myanmar	[41.95]	Tajikistan	[26.5]
Brazil	51.37	Guyana	[39.8]	Namibia	[31.88]	Tanzania	[33.47]
Bulgaria	9.35	Haiti	[27.48]	Nepal	[23.78]	Thailand	23.00
Burkina Faso	[34.77]	Honduras	29.50	Netherlands	58.00	Togo	[35.89]
Burundi	[31.86]	Hungary	45.85	New Zealand	22.50	Trin. and Tob.	[39.96]
Cambodia	[28.3]	Iceland	29.00	Nicaragua	32.00	Tunisia	[38.08]
Cameroon	[45.41]	India	29.68	Niger	[38.12]	Turkey	9.45
Canada	34.73	Indonesia	[40.72]	Nigeria	[26.59]	Turkmenistan	[42.53]
Central Afr. Rep.	[29.73]	Iran	[53.81]	North Korea	[28.82]	Uganda	[28.66]
Chad	[36.45]	Iraq	[30.09]	Norway	38.00	Ukraine	0.04
Chile	81.00	Ireland	70.00	Oman	[44.32]	United Arab. Em.	0.00
China	71.72	Israel	35.55	P. N. Guinea	[31.46]	United Kingdom	54.87
Colombia	[52.21]	Italy	72.01	Pakistan	[45.02]	United States	60.57
Congo	[44.17]	Jamaica	[24.34]	Panama	42.00	Uruguay	[35.24]
Costa Rica	45.75	Japan	55.00	Paraguay	[46.18]	Uzbekistan	[35.88]
Côte d'Ivoire	[37.56]	Jordan	[47.4]	Peru	[56.29]	Venezuela	57.00
Croatia	[26.1]	Kazakhstan	[28.62]	Philippines	[36.02]	Viet Nam	[31.15]
Cuba	5.00	Kenya	[42.62]	Poland	28.72	Yemen	[41.32]
Czech Rep.	31.53	Kuwait	[19.92]	Portugal	49.69	Zambia	[26.35]
Dem. Rep. Congo	[42.11]	Kyrgyzstan	[24.72]	Romania	16.63	Zimbabwe	[38.55]
Denmark	47.00	Laos	[29.59]	Russia	109.16		
Dominican Rep.	[30.91]	Latvia	22.99	Rwanda	[17.68]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	2	Code:	SO2	Reference Year:	MRYA 1993-2004
Description:	Urban population weighted SO2 concentration				
Units:	Micrograms per cubic meter				
Source*:	Organisation for Economic Co-operation and Development (OECD), United Nations Human Settlement Programme (UNHABITAT), World Health Organization, European Environment Agency, and World Resources Institute, plus country data.				
Logic:	Poor ambient air quality affects both human and ecosystem health. Humans exposed to high SO2 concentrations, especially asthmatics, may suffer from respiratory tract problems and permanent damage to lung tissue as a result of long-term exposure. SO2 is an important precursor to the formation of acid rain and fog, which changes the composition of soils, causes acidification of water bodies, and negatively affects animal and plant growth. In many locations, SO2 particles in the atmosphere are the largest source of haze and impaired visibility.				
Methodology:	The data from all sources were normalized by city population (in thousands) in each country. The most recent data were used from the OECD, UNHABITAT, and WHO. The EEA data were drawn from the AirBase air quality monitoring database and station coverage was balanced with the need for recent data. If a country has observations from more than one data source, the most recent observation was chosen.				

	Mean		Max		2.5 Percentile		0.01
	Median		Min		97.5 Percentile		85.36
Albania	[2.28]	Ecuador	21.52	Lebanon	[1.65]	Saudi Arabia	[3.23]
Algeria	[11.5]	Egypt	69.00	Liberia	[3.45]	Senegal	[1.21]
Angola	[7.37]	El Salvador	[4.23]	Libya	[1.53]	Serbia and Mont.	[3.91]
Argentina	1.02	Estonia	2.00	Lithuania	6.00	Sierra Leone	[6.67]
Armenia	0.43	Ethiopia	[7.48]	Macedonia	24.23	Slovakia	13.40
Australia	13.17	Finland	3.00	Madagascar	[24.65]	Slovenia	8.71
Austria	8.31	France	8.00	Malawi	[3.78]	South Africa	22.37
Azerbaijan	[0.25]	Gabon	[5.79]	Malaysia	20.49	South Korea	23.84
Bangladesh	[6.08]	Gambia	[1.49]	Mali	[8.6]	Spain	7.82
Belarus	0.01	Georgia	[1.25]	Mauritania	[2.66]	Sri Lanka	[6.91]
Belgium	9.70	Germany	5.02	Mexico	46.60	Sudan	[5.91]
Benin	[26.62]	Ghana	[12.98]	Moldova	0.00	Sweden	3.00
Bhutan	[3.97]	Greece	13.16	Mongolia	[0.56]	Switzerland	6.25
Bolivia	[19.25]	Guatemala	[35.39]	Morocco	[12.64]	Syria	[4.84]
Bosnia and Herz.	18.00	Guinea	[9.29]	Mozambique	[2.9]	Taiwan	10.45
Botswana	[1.83]	Guinea-Bissau	[0.93]	Myanmar	[6.85]	Tajikistan	[0.23]
Brazil	75.78	Guyana	[3.81]	Namibia	[19.84]	Tanzania	[17.43]
Bulgaria	17.79	Haiti	[2.32]	Nepal	[9.37]	Thailand	11.00
Burkina Faso	[12]	Honduras	[18.56]	Netherlands	5.15	Togo	[2.47]
Burundi	[10.91]	Hungary	9.00	New Zealand	15.00	Trin. and Tob.	[0.76]
Cambodia	[5.5]	Iceland	2.00	Nicaragua	[2.77]	Tunisia	[3.91]
Cameroon	[9.38]	India	27.55	Niger	[3.22]	Turkey	64.47
Canada	9.32	Indonesia	[39.33]	Nigeria	[10.25]	Turkmenistan	[1.91]
Central Afr. Rep.	[5.6]	Iran	209.00	North Korea	[0.73]	Uganda	[22.49]
Chad	[5.65]	Iraq	[1.55]	Norway	4.00	Ukraine	0.06
Chile	29.00	Ireland	6.69	Oman	[2.02]	United Arab. Em.	0.01
China	97.07	Israel	16.82	P. N. Guinea	[8.63]	United Kingdom	4.64
Colombia	[59.13]	Italy	1.33	Pakistan	[6.37]	United States	15.43
Congo	[8.89]	Jamaica	[4.15]	Panama	[4.38]	Uruguay	[4.97]
Costa Rica	38.84	Japan	19.00	Paraguay	[1.65]	Uzbekistan	[1.57]
Côte d'Ivoire	[11.37]	Jordan	[2.88]	Peru	[76.82]	Venezuela	33.00
Croatia	31.00	Kazakhstan	0.04	Philippines	33.00	Viet Nam	[4.65]
Cuba	1.00	Kenya	[16.64]	Poland	20.56	Yemen	[8.85]
Czech Rep.	9.31	Kuwait	[0.31]	Portugal	6.77	Zambia	[19.52]
Dem. Rep. Congo	[1.05]	Kyrgyzstan	[0.32]	Romania	6.58	Zimbabwe	[5.35]
Denmark	4.00	Laos	[19.84]	Russia	3.00		
Dominican Rep.	[7.33]	Latvia	6.33	Rwanda	[9.33]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	3	Code:	TSP	Reference Year:	MRYA 1993-2002
Description:	Urban population weighted TSP concentration				
Units:	Micrograms TSP per cubic meter				
Source*:	Organisation for Economic Co-operation and Development (OECD), United Nations Human Settlement Programme (UNHABITAT), World Health Organization, European Environment Agency, and World Resources Institute, plus country data.				
Logic:	Poor ambient air quality affects both human and ecosystem health. Many studies have linked exposure to particulate matter (PM) to adverse health effects in humans such as increased asthma attacks, chronic bronchitis, decreased lung function, and premature death. PM can travel over long distances and is a significant contributor to reduced visibility. The deposition of PM can change the nutrient composition of soils and surface waters and affects the diversity of ecosystems.				
Methodology:	The data from all sources were normalized by city population (in thousands) in each country. The most recent data were used from the OECD, UNHABITAT, and WHO. The EEA data were drawn from the AirBase air quality monitoring database and station coverage was balanced with the need for recent data. If a country has observations from more than one data source, the most recent observation was chosen. All data refer to Total Suspended Particulates (TSP) except for the EEA and some individual country data points, which refer to PM10 (aerodynamic diameter less than 10 micrometers). The conversion factor applied to convert from PM10 to TSP is 1.1. TSP value for the USA represents a crude estimate based on information shown in first chart on website, http://www.epa.gov/air/airtrends/aqtrnd01/pmatter.html and its value is not population weighted due to lack of information on the population living near the monitoring sites.				

Mean	80.76	Max	320	2.5 Percentile	0.77		
Median	42.92	Min	0.15	97.5 Percentile	293.3		
Albania	167.42	Ecuador	125.73	Lebanon	[89.48]	Saudi Arabia	[72.39]
Algeria	[116.85]	Egypt	[74.18]	Liberia	[128.6]	Senegal	[167.6]
Angola	[163.85]	El Salvador	[163.77]	Libya	[89.65]	Serbia and Mont.	[113.2]
Argentina	50.01	Estonia	33.73	Lithuania	31.90	Sierra Leone	[136.8]
Armenia	1.02	Ethiopia	[195.14]	Macedonia	[86.25]	Slovakia	49.21
Australia	43.22	Finland	18.92	Madagascar	[215.7]	Slovenia	36.04
Austria	31.63	France	24.00	Malawi	[178.5]	South Africa	[111.9]
Azerbaijan	[105.36]	Gabon	[121.6]	Malaysia	91.58	South Korea	66.05
Bangladesh	[163.84]	Gambia	[141.41]	Mali	[150.0]	Spain	33.51
Belarus	18.40	Georgia	[142.06]	Mauritania	[106.0]	Sri Lanka	[170.4]
Belgium	42.62	Germany	31.95	Mexico	52.55	Sudan	[175.4]
Benin	[165.58]	Ghana	137.00	Moldova	1.08	Sweden	54.67
Bhutan	[150.32]	Greece	58.79	Mongolia	[51.27]	Switzerland	27.77
Bolivia	[60.57]	Guatemala	272.33	Morocco	[148.4]	Syria	[124.8]
Bosnia and Herz.	[97.42]	Guinea	[195.19]	Mozambique	[201.3]	Taiwan	104.21
Botswana	[62.75]	Guinea-Bissau	[119.23]	Myanmar	[161.2]	Tajikistan	[65.07]
Brazil	106.20	Guyana	[48.74]	Namibia	[91.99]	Tanzania	[183.9]
Bulgaria	61.30	Haiti	[215.39]	Nepal	[228.2]	Thailand	223.00
Burkina Faso	[159.62]	Honduras	320.00	Netherlands	38.65	Togo	[106.7]
Burundi	[160.83]	Hungary	40.70	New Zealand	25.00	Trin. and Tob.	[14.62]
Cambodia	[154.72]	Iceland	29.15	Nicaragua	[206.2]	Tunisia	[93.43]
Cameroon	[165.61]	India	277.45	Niger	[126.6]	Turkey	11.35
Canada	11.41	Indonesia	271.00	Nigeria	[207.9]	Turkmenistan	[92.6]
Central Afr. Rep.	[122.64]	Iran	248.00	North Korea	[120.9]	Uganda	[187.1]
Chad	[101.36]	Iraq	[184.35]	Norway	24.20	Ukraine	0.15
Chile	[100.87]	Ireland	24.75	Oman	[56.87]	United Arab. Em.	126.47
China	310.82	Israel	[67.44]	P. N. Guinea	[194.7]	United Kingdom	19.49
Colombia	120.00	Italy	104.50	Pakistan	[135.8]	United States	27.50
Congo	[77.72]	Jamaica	[104.98]	Panama	[109.9]	Uruguay	[76.34]
Costa Rica	226.30	Japan	40.00	Paraguay	[57.69]	Uzbekistan	[64.71]
Côte d'Ivoire	[160.66]	Jordan	[77.14]	Peru	[139.6]	Venezuela	53.00
Croatia	71.00	Kazakhstan	0.50	Philippines	200.00	Viet Nam	[182.8]
Cuba	[138.12]	Kenya	69.00	Poland	40.85	Yemen	[152.2]
Czech Rep.	42.39	Kuwait	[106.6]	Portugal	38.57	Zambia	[147.0]
Dem. Rep. Congo	[200.37]	Kyrgyzstan	[119.12]	Romania	82.00	Zimbabwe	[144.6]
Denmark	32.18	Laos	[183.44]	Russia	20.84		
Dominican Rep.	[133.32]	Latvia	63.80	Rwanda	[150.9]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 4 **Code:** INDOOR **Reference Year:** 2004

Description: Indoor air pollution from solid fuel use

Units: Percentage of households using solid fuels, adjusted for ventilation

Source*: World Health Organization.

Logic: The public health community has drawn attention to the deleterious effects of indoor air pollution, especially on women who cook inside using solid fuels. High exposure to the fumes from solid fuel combustion is dangerous to human health. Solid fuel use has further consequences for deforestation and soil depletion because of dung collection.

Methodology: Solid fuel use is defined as the household combustion of coal or biomass (such as dung, charcoal, wood, or crop residues). The approach taken in WHO guidelines is based on a binary classification scheme for exposure levels, separating the study population into those exposed to solid fuel use and those not exposed followed by the application of relative risks derived from a comprehensive review of the current epidemiological literature on solid fuel use. Central estimates were used. For China, original data was provided separately for children and adults and these values were averaged. A single value was provided and applied to both Ethiopia and Eritrea. Corrections are made for variation in prevailing ventilation practices.

	Mean	45.17	Max	100	2.5 Percentile	0	
	Median	40	Min	0	97.5 Percentile	100	
Albania	15.00	Ecuador	28.00	Lebanon	9.00	Saudi Arabia	0.00
Algeria	4.00	Egypt	8.00	Liberia	83.00	Senegal	79.00
Angola	100.00	El Salvador	65.00	Libya	3.00	Serbia and Mont.	14.00
Argentina	0.00	Estonia	8.00	Lithuania	8.00	Sierra Leone	92.00
Armenia	66.00	Ethiopia	97.00	Macedonia	12.00	Slovakia	5.00
Australia	0.00	Finland	0.00	Madagascar	99.00	Slovenia	0.00
Austria	0.00	France	0.00	Malawi	99.00	South Africa	28.00
Azerbaijan	37.00	Gabon	34.00	Malaysia	29.00	South Korea	0.00
Bangladesh	96.00	Gambia	98.00	Mali	100.00	Spain	0.00
Belarus	2.00	Georgia	71.00	Mauritania	69.00	Sri Lanka	89.00
Belgium	0.00	Germany	0.00	Mexico	22.00	Sudan	100.00
Benin	88.00	Ghana	95.00	Moldova	14.00	Sweden	0.00
Bhutan	[95.58]	Greece	0.00	Mongolia	67.00	Switzerland	0.00
Bolivia	61.00	Guatemala	73.00	Morocco	11.00	Syria	19.00
Bosnia and Herz.	15.00	Guinea	99.00	Mozambique	87.00	Taiwan	[4.18]
Botswana	65.00	Guinea-Bissau	95.00	Myanmar	100.00	Tajikistan	100.00
Brazil	27.00	Guyana	[41.56]	Namibia	83.00	Tanzania	96.00
Bulgaria	6.00	Haiti	82.00	Nepal	97.00	Thailand	72.00
Burkina Faso	97.00	Honduras	66.00	Netherlands	0.00	Togo	96.00
Burundi	100.00	Hungary	5.00	New Zealand	0.00	Trin. and Tob.	0.00
Cambodia	100.00	Iceland	[12.11]	Nicaragua	73.00	Tunisia	29.00
Cameroon	77.00	India	81.00	Niger	98.00	Turkey	11.00
Canada	0.00	Indonesia	63.00	Nigeria	67.00	Turkmenistan	50.00
Central Afr. Rep.	99.00	Iran	2.00	North Korea	68.00	Uganda	97.00
Chad	100.00	Iraq	2.00	Norway	0.00	Ukraine	11.00
Chile	15.00	Ireland	0.00	Oman	0.00	United Arab. Em.	0.00
China	30.00	Israel	0.00	P. N. Guinea	97.00	United Kingdom	0.00
Colombia	36.00	Italy	0.00	Pakistan	76.00	United States	0.00
Congo	100.00	Jamaica	47.00	Panama	37.00	Uruguay	0.00
Costa Rica	58.00	Japan	0.00	Paraguay	64.00	Uzbekistan	79.00
Côte d'Ivoire	93.00	Jordan	10.00	Peru	40.00	Venezuela	0.00
Croatia	3.00	Kazakhstan	51.00	Philippines	85.00	Viet Nam	98.00
Cuba	42.00	Kenya	85.00	Poland	7.00	Yemen	66.00
Czech Rep.	0.00	Kuwait	0.00	Portugal	0.00	Zambia	87.00
Dem. Rep. Congo	100.00	Kyrgyzstan	96.00	Romania	9.00	Zimbabwe	67.00
Denmark	0.00	Laos	95.00	Russia	1.00		
Dominican Rep.	48.00	Latvia	4.00	Rwanda	100.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 5 **Code:** ECORISK **Reference Year:** 2004

Description: Percentage of country's territory in threatened ecoregions

Units: Percentage of country's territory in threatened ecoregions

Source*: The Nature Conservancy and World Wildlife Fund.

Logic: Species extinction is just one aspect of the threats to biodiversity. Whole biomes (plant and animal assemblages) are also at significant risk of disappearing. Habitat conversion exceeds habitat protection by a ratio of 8:1 in temperate grasslands and Mediterranean biomes, and 10:1 in more than 140 ecoregions. These regions include some of the most biologically distinctive, species rich ecosystems on earth, as well as the last home of many threatened and endangered species.

Methodology: The authors identify the world's terrestrial biomes and ecoregions in which biodiversity and ecological function is at greatest risk because of extensive habitat conversion and limited habitat protection. Threatened ecoregions are ecoregions with high ratios of habitat conversion to habitat protection that are classified as vulnerable, endangered, or critical. This yields the land area of terrestrial ecosystems that is threatened, and the percent land area in each country that is in a threatened ecoregion. The original data distinguished between Gaza Strip and West Bank; between Montenegro and Serbia; between Jan Mayen and Svalbard. These have been combined by normalizing the percent area of ecoregions in crisis by their land area. Furthermore, the figures for France exclude the overseas territories of French Southern and Antarctic Lands. The figures for the United Kingdom exclude Guernsey, Jersey, and Isle of Man. The figures for the United States of America exclude Howland Island, Jarvis Island, Johnston Atoll, Midway Islands, and Wake Island.

	Mean		Max		2.5 Percentile		0
	Median		Min		97.5 Percentile		100
Albania	100.00	Ecuador	36.10	Lebanon	100.00	Saudi Arabia	0.00
Algeria	5.78	Egypt	5.06	Liberia	100.00	Senegal	100.00
Angola	4.09	El Salvador	95.14	Libya	0.77	Serbia and Mont.	100.00
Argentina	39.07	Estonia	100.00	Lithuania	100.00	Sierra Leone	100.00
Armenia	100.00	Ethiopia	44.92	Macedonia	100.00	Slovakia	100.00
Australia	16.23	Finland	1.16	Madagascar	45.35	Slovenia	81.47
Austria	42.21	France	93.24	Malawi	10.56	South Africa	29.83
Azerbaijan	100.00	Gabon	0.00	Malaysia	83.27	South Korea	94.04
Bangladesh	100.00	Gambia	100.00	Mali	58.24	Spain	84.31
Belarus	100.00	Georgia	100.00	Mauritania	36.07	Sri Lanka	100.00
Belgium	100.00	Germany	99.02	Mexico	23.10	Sudan	52.42
Benin	100.00	Ghana	99.30	Moldova	100.00	Sweden	29.03
Bhutan	56.29	Greece	100.00	Mongolia	38.72	Switzerland	42.75
Bolivia	0.55	Guatemala	49.30	Morocco	59.80	Syria	27.59
Bosnia and Herz.	100.00	Guinea	100.00	Mozambique	0.04	Taiwan	0.00
Botswana	8.01	Guinea-Bissau	100.00	Myanmar	88.82	Tajikistan	48.93
Brazil	51.69	Guyana	0.00	Namibia	9.96	Tanzania	1.75
Bulgaria	100.00	Haiti	63.62	Nepal	75.66	Thailand	97.52
Burkina Faso	100.00	Honduras	87.27	Netherlands	100.00	Togo	100.00
Burundi	12.74	Hungary	100.00	New Zealand	67.34	Trin. and Tob.	4.97
Cambodia	82.76	Iceland	0.00	Nicaragua	70.28	Tunisia	41.05
Cameroon	7.75	India	93.70	Niger	46.90	Turkey	97.80
Canada	6.88	Indonesia	69.59	Nigeria	95.28	Turkmenistan	16.22
Central Afr. Rep.	2.14	Iran	7.60	North Korea	23.09	Uganda	50.31
Chad	45.66	Iraq	0.27	Norway	2.91	Ukraine	100.00
Chile	20.75	Ireland	0.00	Oman	0.00	United Arab. Em.	0.00
China	38.02	Israel	34.94	P. N. Guinea	37.76	United Kingdom	18.72
Colombia	30.19	Italy	72.65	Pakistan	74.91	United States	37.96
Congo	0.00	Jamaica	75.76	Panama	33.93	Uruguay	100.00
Costa Rica	47.71	Japan	49.70	Paraguay	55.81	Uzbekistan	17.73
Côte d'Ivoire	100.00	Jordan	10.76	Peru	2.95	Venezuela	5.38
Croatia	100.00	Kazakhstan	40.92	Philippines	92.51	Viet Nam	96.14
Cuba	86.10	Kenya	2.17	Poland	100.00	Yemen	0.87
Czech Rep.	100.00	Kuwait	0.00	Portugal	80.53	Zambia	0.00
Dem. Rep. Congo	0.19	Kyrgyzstan	55.57	Romania	100.00	Zimbabwe	15.86
Denmark	100.00	Laos	84.77	Russia	17.59		
Dominican Rep.	59.58	Latvia	100.00	Rwanda	53.51		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	6	Code:	PRTBRD	Reference Year:	MRYA 2002-2003		
Description:	Threatened bird species as percentage of known breeding bird species in each country						
Units:	Threatened bird species as percentage of known breeding bird species in each country						
Source*:	IUCN-The World Conservation Union Species Survival Commission.						
Logic:	The percent of breeding birds threatened gives an estimate of a country's success at preserving its biodiversity.						
Methodology:	The number of bird species threatened divided by known breeding bird species in the country, expressed as a percent. Threatened species include those that are listed as "Critically Endangered, Endangered, or Vulnerable," but excludes sub-species, introduced species, species whose status is insufficiently known (categorized by the World Conservation Union or IUCN as "data deficient"), those known to be extinct, and those for which status has not been assessed (categorized by IUCN as "not evaluated"). The number of species that are globally listed as Critically Endangered are known to occur in the country but do not imply that the species are threatened within the country itself.						
Mean	4.6	Max	42	2.5 Percentile	0.12		
Median	2.62	Min	0	97.5 Percentile	19.67		
Albania	1.30	Ecuador	4.47	Lebanon	4.55	Saudi Arabia	9.68
Algeria	3.13	Egypt	4.58	Liberia	2.96	Senegal	1.04
Angola	1.96	El Salvador	0.00	Libya	1.10	Serbia and Mont.	2.23
Argentina	4.35	Estonia	1.41	Lithuania	1.98	Sierra Leone	2.15
Armenia	1.65	Ethiopia	2.56	Macedonia	1.43	Slovakia	1.91
Australia	5.39	Finland	1.21	Madagascar	13.37	Slovenia	0.48
Austria	1.41	France	1.86	Malawi	2.11	South Africa	4.70
Azerbaijan	3.23	Gabon	1.07	Malaysia	7.28	South Korea	22.32
Bangladesh	7.80	Gambia	0.71	Mali	1.01	Spain	2.52
Belarus	1.36	Georgia	..	Mauritania	0.73	Sri Lanka	5.60
Belgium	1.11	Germany	2.09	Mexico	5.18	Sudan	0.88
Benin	0.65	Ghana	1.51	Moldova	2.82	Sweden	0.80
Bhutan	2.68	Greece	2.79	Mongolia	3.76	Switzerland	1.04
Bolivia	..	Guatemala	1.31	Morocco	4.29	Syria	3.92
Bosnia and Herz.	1.38	Guinea	2.44	Mozambique	3.21	Taiwan	4.20
Botswana	1.81	Guinea-Bissau	0.00	Myanmar	4.04	Tajikistan	..
Brazil	7.53	Guyana	0.29	Namibia	2.35	Tanzania	3.99
Bulgaria	4.17	Haiti	18.67	Nepal	4.09	Thailand	6.01
Burkina Faso	0.60	Honduras	1.18	Netherlands	2.09	Togo	0.00
Burundi	1.55	Hungary	3.90	New Zealand	42.00	Trin. and Tob.	0.38
Cambodia	6.19	Iceland	0.00	Nicaragua	1.04	Tunisia	2.89
Cameroon	2.17	India	7.78	Niger	1.00	Turkey	3.64
Canada	1.88	Indonesia	7.45	Nigeria	1.32	Turkmenistan	..
Central Afr. Rep.	0.56	Iran	4.02	North Korea	16.52	Uganda	1.57
Chad	1.35	Iraq	6.40	Norway	0.82	Ukraine	3.04
Chile	7.43	Ireland	0.70	Oman	9.35	United Arab. Em.	11.94
China	6.80	Israel	6.67	P. N. Guinea	4.90	United Kingdom	0.87
Colombia	4.59	Italy	2.14	Pakistan	4.53	United States	8.62
Congo	0.67	Jamaica	10.62	Panama	2.19	Uruguay	4.64
Costa Rica	2.17	Japan	14.00	Paraguay	4.68	Uzbekistan	..
Côte d'Ivoire	2.24	Jordan	5.67	Peru	4.93	Venezuela	1.79
Croatia	1.79	Kazakhstan	3.79	Philippines	34.18	Viet Nam	6.92
Cuba	13.14	Kenya	2.83	Poland	1.76	Yemen	8.39
Czech Rep.	1.01	Kuwait	35.00	Portugal	3.38	Zambia	1.82
Dem. Rep. Congo	3.01	Kyrgyzstan	..	Romania	3.24	Zimbabwe	1.88
Denmark	0.51	Laos	4.11	Russia	6.05		
Dominican Rep.	11.03	Latvia	1.38	Rwanda	1.75		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	7	Code:	PRTMAM	Reference Year:	MRYA 2002-2003		
Description:	Threatened mammal species as percentage of known mammal species in each country						
Units:	Threatened mammal species as percentage of known mammal species in each country						
Source*:	IUCN-The World Conservation Union Species Survival Commission.						
Logic:	The percent of mammals threatened gives an estimate of a country's success at preserving its biodiversity.						
Methodology:	The number of mammal species threatened was divided by known mammal species in the country, and expressed as a percent. Mammals threatened were normalized by mammals known in each country. Mammals species and number threatened includes all species of mammals that are recorded as threatened and that are known to occur in a given country. Threatened species include those that are listed as "Critically Endangered, Endangered, or Vulnerable," but excludes sub-species, introduced species, species whose status is insufficiently known (categorized by the World Conservation Union or IUCN as "data deficient"), those known to be extinct, and those for which status has not been assessed (categorized by IUCN as "not evaluated"). Number of mammal species refers to the total number of mammal species identified and documented in a particular country or region, but excludes data on cetaceans. Total numbers include both endemic and non-endemic species. The total number of known species may include introduced species. The exclusion of cetaceans may therefore lead to overestimation for coastal countries with threatened whale and porpoise populations. The number of species that are globally listed as Critically Endangered are known to occur in the country but do not imply that the species are threatened within the country itself.						
Mean	14.91	Max	133.33	2.5 Percentile	2.80		
Median	11.19	Min	1.00	97.5 Percentile	41.62		
Albania	4.41	Ecuador	11.26	Lebanon	10.53	Saudi Arabia	11.69
Algeria	14.13	Egypt	13.27	Liberia	8.29	Senegal	6.25
Angola	6.88	El Salvador	1.48	Libya	10.53	Serbia and Mont.	12.50
Argentina	10.00	Estonia	7.69	Lithuania	8.82	Sierra Leone	8.16
Armenia	13.10	Ethiopia	13.73	Macedonia	14.10	Slovakia	10.59
Australia	24.23	Finland	6.67	Madagascar	35.46	Slovenia	12.00
Austria	8.43	France	19.35	Malawi	4.10	South Africa	14.12
Azerbaijan	13.13	Gabon	7.37	Malaysia	16.67	South Korea	26.53
Bangladesh	20.18	Gambia	2.56	Mali	9.49	Spain	29.27
Belarus	9.46	Georgia	12.15	Mauritania	16.39	Sri Lanka	25.00
Belgium	18.97	Germany	14.47	Mexico	14.66	Sudan	8.24
Benin	4.79	Ghana	6.31	Moldova	8.82	Sweden	10.00
Bhutan	22.22	Greece	13.68	Mongolia	10.53	Switzerland	6.67
Bolivia	7.91	Guatemala	2.80	Morocco	15.24	Syria	6.35
Bosnia and Herz.	13.89	Guinea	6.32	Mozambique	8.38	Taiwan	17.14
Botswana	4.27	Guinea-Bissau	2.78	Myanmar	15.54	Tajikistan	10.71
Brazil	17.75	Guyana	6.74	Namibia	5.60	Tanzania	12.97
Bulgaria	17.28	Haiti	133.33	Nepal	16.02	Thailand	13.96
Burkina Faso	4.76	Honduras	5.78	Netherlands	18.18	Togo	4.59
Burundi	5.61	Hungary	10.84	New Zealand	80.00	Trin. and Tob.	1.00
Cambodia	19.51	Iceland	63.64	Nicaragua	3.00	Tunisia	14.10
Cameroon	9.29	India	27.22	Niger	8.40	Turkey	14.66
Canada	8.29	Indonesia	32.17	Nigeria	9.85	Turkmenistan	12.62
Central Afr. Rep.	6.70	Iran	15.71	North Korea	..	Uganda	5.92
Chad	11.19	Iraq	13.58	Norway	18.52	Ukraine	14.81
Chile	23.08	Ireland	24.00	Oman	19.64	United Arab. Em.	16.00
China	20.25	Israel	12.93	P. N. Guinea	26.13	United Kingdom	24.00
Colombia	10.86	Italy	15.56	Pakistan	11.26	United States	9.03
Congo	7.50	Jamaica	20.83	Panama	7.80	Uruguay	7.41
Costa Rica	6.83	Japan	19.68	Paraguay	3.28	Uzbekistan	9.28
Côte d'Ivoire	8.26	Jordan	12.68	Peru	10.00	Venezuela	6.97
Croatia	11.84	Kazakhstan	9.55	Philippines	31.65	Viet Nam	19.72
Cuba	35.48	Kenya	13.93	Poland	16.67	Yemen	9.09
Czech Rep.	9.88	Kuwait	4.76	Portugal	26.98	Zambia	4.72
Dem. Rep. Congo	8.89	Kyrgyzstan	8.43	Romania	20.24	Zimbabwe	4.07
Denmark	11.63	Laos	18.02	Russia	16.73		
Dominican Rep.	25.00	Latvia	6.02	Rwanda	5.30		

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #:	8	Code:	PRTAMPH	Reference Year:	2004		
Description:	Threatened amphibian species as percentage of known amphibian species in each country						
Units:	Threatened amphibian species as percentage of known breeding amphibian species in each country						
Source*:	IUCN-The World Conservation Union Species Survival Commission, Conservation International-Center for Applied Biodiversity Science, and NatureServe.						
Logic:	The percent of amphibians threatened gives an estimate of a country's success at preserving its biodiversity.						
Methodology:	The number of amphibian species threatened divided by known amphibian species in the country, expressed as a percent. Threatened species include those that are listed as "Critically Endangered, Endangered, or Vulnerable," but excludes sub-species, introduced species, species whose status is insufficiently known (categorized by the World Conservation Union or IUCN as "data deficient"), those known to be extinct, and those for which status has not been assessed (categorized by IUCN as "not evaluated").						
Mean	13.08	Max	100	2.5 Percentile	0		
Median	4.22	Min	0	97.5 Percentile	74.4		
Albania	12.50	Ecuador	36.47	Lebanon	0.00	Saudi Arabia	0.00
Algeria	10.00	Egypt	0.00	Liberia	7.27	Senegal	0.00
Angola	0.00	El Salvador	25.81	Libya	0.00	Serbia and Mont.	4.17
Argentina	19.35	Estonia	0.00	Lithuania	0.00	Sierra Leone	3.64
Armenia	0.00	Ethiopia	14.29	Macedonia	0.00	Slovakia	0.00
Australia	21.86	Finland	0.00	Madagascar	24.77	Slovenia	10.00
Austria	0.00	France	8.33	Malawi	6.58	South Africa	18.42
Azerbaijan	0.00	Gabon	2.41	Malaysia	22.61	South Korea	6.67
Bangladesh	0.00	Gambia	0.00	Mali	0.00	Spain	11.43
Belarus	0.00	Georgia	8.33	Mauritania	0.00	Sri Lanka	46.81
Belgium	0.00	Germany	0.00	Mexico	54.42	Sudan	0.00
Benin	0.00	Ghana	14.08	Moldova	0.00	Sweden	0.00
Bhutan	14.29	Greece	20.00	Mongolia	0.00	Switzerland	4.76
Bolivia	10.45	Guatemala	54.81	Morocco	16.67	Syria	0.00
Bosnia and Herz.	5.56	Guinea	6.94	Mozambique	4.48	Taiwan	27.27
Botswana	0.00	Guinea-Bissau	0.00	Myanmar	0.00	Tajikistan	0.00
Brazil	15.05	Guyana	5.22	Namibia	2.08	Tanzania	25.48
Bulgaria	0.00	Haiti	92.00	Nepal	6.52	Thailand	2.34
Burkina Faso	0.00	Honduras	45.69	Netherlands	0.00	Togo	14.29
Burundi	23.08	Hungary	0.00	New Zealand	100.00	Trin. and Tob.	27.27
Cambodia	6.98	Iceland	..	Nicaragua	14.71	Tunisia	0.00
Cameroon	26.46	India	28.21	Niger	0.00	Turkey	23.81
Canada	2.27	Indonesia	9.71	Nigeria	12.62	Turkmenistan	0.00
Central Afr. Rep.	0.00	Iran	21.05	North Korea	7.69	Uganda	9.84
Chad	0.00	Iraq	16.67	Norway	0.00	Ukraine	0.00
Chile	37.74	Ireland	0.00	Oman	0.00	United Arab. Em.	0.00
China	27.30	Israel	0.00	P. N. Guinea	4.22	United Kingdom	0.00
Colombia	29.80	Italy	16.67	Pakistan	0.00	United States	19.39
Congo	0.00	Jamaica	80.95	Panama	27.51	Uruguay	9.30
Costa Rica	34.08	Japan	36.36	Paraguay	1.28	Uzbekistan	0.00
Côte d'Ivoire	16.28	Jordan	0.00	Peru	19.60	Venezuela	23.21
Croatia	10.00	Kazakhstan	9.09	Philippines	48.98	Viet Nam	11.11
Cuba	81.03	Kenya	5.26	Poland	0.00	Yemen	16.67
Czech Rep.	0.00	Kuwait	..	Portugal	0.00	Zambia	1.19
Dem. Rep. Congo	6.19	Kyrgyzstan	0.00	Romania	0.00	Zimbabwe	9.38
Denmark	0.00	Laos	6.15	Russia	0.00		
Dominican Rep.	86.11	Latvia	0.00	Rwanda	21.62		

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #:	9	Code:	NBI	Reference Year:	2001		
Description:	National Biodiversity Index						
Units:	Score between 0 and 1 with large values corresponding to high levels of species abundance and small values reflecting low levels of species abundance						
Source*:	Convention on Biological Diversity.						
Logic:	Biodiversity cannot be measured solely in terms of threat. A country's extent of biodiversity is also important to assess. The NBI assesses a country's species richness by measuring species abundance.						
Methodology:	This index represents estimates of a country's richness and endemism in four terrestrial vertebrate classes and vascular plants; vertebrates and plants are ranked equally; index values range between 1 (maximum: Indonesia) and 0 (minimum: Greenland). The NBI includes some adjustment allowing for country size. Countries with land area less than 5,000 km ² are excluded. Overseas territories and dependencies are excluded.						
Mean	0.55	Max	1	2.5 Percentile	0.28		
Median	0.55	Min	0.11	97.5 Percentile	0.87		
Albania	0.53	Ecuador	0.87	Lebanon	0.57	Saudi Arabia	0.28
Algeria	0.31	Egypt	0.33	Liberia	0.56	Senegal	0.51
Angola	0.64	El Salvador	0.62	Libya	0.24	Serbia and Mont.	..
Argentina	0.62	Estonia	0.44	Lithuania	0.42	Sierra Leone	0.65
Armenia	0.56	Ethiopia	0.59	Macedonia	0.55	Slovakia	0.59
Australia	0.85	Finland	0.29	Madagascar	0.81	Slovenia	0.56
Austria	0.47	France	0.42	Malawi	0.63	South Africa	0.71
Azerbaijan	0.53	Gabon	0.64	Malaysia	0.81	South Korea	0.42
Bangladesh	0.54	Gambia	0.60	Mali	0.38	Spain	0.49
Belarus	0.37	Georgia	0.55	Mauritania	0.34	Sri Lanka	0.66
Belgium	0.45	Germany	0.37	Mexico	0.93	Sudan	0.54
Benin	0.62	Ghana	0.65	Moldova	0.45	Sweden	0.30
Bhutan	0.61	Greece	0.55	Mongolia	0.36	Switzerland	0.50
Bolivia	0.72	Guatemala	0.74	Morocco	0.46	Syria	0.47
Bosnia and Herz.	0.53	Guinea	0.60	Mozambique	0.52	Taiwan	..
Botswana	0.46	Guinea-Bissau	0.59	Myanmar	0.63	Tajikistan	0.46
Brazil	0.88	Guyana	0.69	Namibia	0.55	Tanzania	0.67
Bulgaria	0.49	Haiti	0.68	Nepal	0.64	Thailand	0.67
Burkina Faso	0.53	Honduras	0.65	Netherlands	0.41	Togo	0.69
Burundi	0.68	Hungary	0.44	New Zealand	0.52	Trin. and Tob.	0.69
Cambodia	0.57	Iceland	0.11	Nicaragua	0.64	Tunisia	0.41
Cameroon	0.69	India	0.73	Niger	0.41	Turkey	0.57
Canada	0.30	Indonesia	1.00	Nigeria	0.55	Turkmenistan	0.45
Central Afr. Rep.	0.51	Iran	0.47	North Korea	0.37	Uganda	0.66
Chad	0.36	Iraq	0.43	Norway	0.30	Ukraine	0.42
Chile	0.57	Ireland	0.28	Oman	0.36	United Arab. Em.	0.39
China	0.84	Israel	0.60	P. N. Guinea	0.78	United Kingdom	0.32
Colombia	0.94	Italy	0.51	Pakistan	0.50	United States	0.68
Congo	0.65	Jamaica	0.67	Panama	0.79	Uruguay	0.49
Costa Rica	0.82	Japan	0.64	Paraguay	0.61	Uzbekistan	0.44
Côte d'Ivoire	0.63	Jordan	0.47	Peru	0.84	Venezuela	0.85
Croatia	0.54	Kazakhstan	0.44	Philippines	0.79	Viet Nam	0.68
Cuba	0.70	Kenya	0.64	Poland	0.37	Yemen	0.39
Czech Rep.	0.50	Kuwait	0.22	Portugal	0.51	Zambia	0.54
Dem. Rep. Congo	0.65	Kyrgyzstan	0.41	Romania	0.42	Zimbabwe	0.59
Denmark	0.40	Laos	0.62	Russia	0.45		
Dominican Rep.	0.66	Latvia	0.42	Rwanda	0.73		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 10 **Code:** ANTH10 **Reference Year:** 2004

Description: Percentage of total land area (including inland waters) having very low anthropogenic impact

Units: Percentage of a country's land and inland waters having very low anthropogenic impact ("wildness" score of 9 or below on the Human Impact Index 58-point scale)

Source*: Center for International Earth Science Information Network (CIESIN), Columbia University.

Logic: Agricultural activities and the built environment have high impacts on the natural environment. The conversion of natural vegetation for human activity has important ecological implications. The percentage of a country's land area that has low anthropogenic impact is a measure of the degree to which wild lands, which are important for biodiversity conservation, still exist in that country.

Methodology: The HII measures anthropogenic impact of land and inland waters based on human land uses, human access from roads, railways or major rivers, electrical infrastructure, and population density. A scoring system is applied to each of 9 gridded data sets according to the degree of "wildness" of the grid tile. The 9 individual scores are then aggregated and normalized using the total area of the country. Areas that receive less than or equal to 9 points (out of a total of 58 points) on the scoring metric are included. The underlying data sets are: World Roads (US Dept. of Defense National Imaging and Mapping Agency, NIMA, VMAP0), World Railroads (NIMA, VMAP0), Navigable Rivers (NIMA, VMAP0-hydropoly data set), Coastlines (NIMA, coastline data), GPW3 Population Density Data (CIESIN Gridded Population of the World v3 Population Density Grid adjusted to match UN figures), GRUMP v1 Urban Extent Data (CIESIN Gridded Rural Urban Mapping Project, Urban extent data), DMSP Nighttime Stable Lights (US Dept. of Defense, Defense Meteorological Satellite Program), and Cropland Data (SAGE Navin Ramankutty, Center for Sustainability and Global Environment). The data are not directly comparable to the ANTH10 data shown in the 2002 ESI report due to improvements and changes in the underlying data sources.

Mean	20.56	Max	100	2.5 Percentile	0
Median	3.51	Min	0	97.5 Percentile	92.18

Albania	0.44	Ecuador	32.87	Lebanon	0.00	Saudi Arabia	49.29
Algeria	84.25	Egypt	86.37	Liberia	8.13	Senegal	7.47
Angola	49.04	El Salvador	0.02	Libya	92.46	Serbia and Mont.	0.08
Argentina	46.51	Estonia	4.18	Lithuania	0.00	Sierra Leone	0.02
Armenia	2.65	Ethiopia	18.49	Macedonia	3.44	Slovakia	0.33
Australia	86.84	Finland	40.46	Madagascar	20.45	Slovenia	2.41
Austria	0.02	France	4.37	Malawi	24.28	South Africa	55.56
Azerbaijan	46.68	Gabon	80.78	Malaysia	29.48	South Korea	0.04
Bangladesh	0.21	Gambia	0.00	Mali	64.55	Spain	2.78
Belarus	0.01	Georgia	0.46	Mauritania	93.84	Sri Lanka	0.22
Belgium	0.00	Germany	0.07	Mexico	24.17	Sudan	44.24
Benin	1.54	Ghana	0.98	Moldova	0.00	Sweden	43.62
Bhutan	2.49	Greece	0.71	Mongolia	91.93	Switzerland	3.41
Bolivia	66.63	Guatemala	7.98	Morocco	17.90	Syria	0.21
Bosnia and Herz.	0.00	Guinea	0.11	Mozambique	31.55	Taiwan	0.10
Botswana	77.19	Guinea-Bissau	4.59	Myanmar	16.80	Tajikistan	32.83
Brazil	51.70	Guyana	85.12	Namibia	91.10	Tanzania	14.35
Bulgaria	0.01	Haiti	0.20	Nepal	7.16	Thailand	0.87
Burkina Faso	3.33	Honduras	15.00	Netherlands	0.00	Togo	0.00
Burundi	3.63	Hungary	0.12	New Zealand	48.04	Trin. and Tob.	0.56
Cambodia	14.08	Iceland	86.88	Nicaragua	18.62	Tunisia	33.98
Cameroon	16.49	India	3.82	Niger	77.06	Turkey	0.72
Canada	88.23	Indonesia	39.95	Nigeria	0.81	Turkmenistan	43.69
Central Afr. Rep.	62.35	Iran	18.40	North Korea	0.09	Uganda	17.56
Chad	65.66	Iraq	9.51	Norway	41.00	Ukraine	0.36
Chile	53.64	Ireland	0.10	Oman	76.24	United Arab. Em.	0.46
China	35.55	Israel	0.67	P. N. Guinea	46.17	United Kingdom	0.13
Colombia	51.68	Italy	0.53	Pakistan	12.26	United States	45.32
Congo	76.27	Jamaica	0.13	Panama	16.91	Uruguay	2.03
Costa Rica	0.11	Japan	1.00	Paraguay	56.45	Uzbekistan	48.06
Côte d'Ivoire	4.00	Jordan	46.61	Peru	56.76	Venezuela	52.01
Croatia	1.65	Kazakhstan	55.55	Philippines	0.85	Viet Nam	0.12
Cuba	1.36	Kenya	45.95	Poland	0.03	Yemen	49.09
Czech Rep.	0.00	Kuwait	0.05	Portugal	0.63	Zambia	22.87
Dem. Rep. Congo	25.84	Kyrgyzstan	18.23	Romania	0.12	Zimbabwe	2.51
Denmark	0.55	Laos	6.92	Russia	72.38		
Dominican Rep.	0.12	Latvia	0.55	Rwanda	1.85		

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #: 11 **Code:** ANTH40 **Reference Year:** 2004

Description: Percentage of total land area (including inland waters) having very high anthropogenic impact

Units: Percentage of a country's land and inland waters having very high anthropogenic impact ("wildness" score of 36 or higher on the Human Impact Index 58-point scale)

Source*: Center for International Earth Science Information Network (CIESIN), Columbia University.

Logic: Agricultural activities and the built environment have high impacts on the natural environment. The conversion of natural vegetation for human activity has important ecological implications. The percentage of a country's land area that has high anthropogenic impact is a measure of the degree to which a country's land area is dominated by high intensity land-uses.

Methodology: The HII measures anthropogenic impact of land and inland waters based on human land uses, human access from roads, railways or major rivers, electrical infrastructure, and population density. A scoring system is applied to each of 9 gridded data sets according to the degree of "wildness" of the grid tile. The 9 individual scores are then aggregated and normalized using the total area of the country. Areas that receive greater or equal to 36 points (out of a total of 58) on the scoring metric are included. The underlying data sets are: World Roads (US Dept. of Defense National Imaging and Mapping Agency, NIMA, VMAP0), World Railroads (NIMA, VMAP0), Navigable Rivers (NIMA, VMAP0-hydrology data set), Coastlines (NIMA, coastline data), GPW3 Population Density Data (CIESIN Gridded Population of the World v3 Population Density Grid adjusted to match UN figures), GRUMP v1 Urban Extent Data (CIESIN Gridded Rural Urban Mapping Project, Urban extent data), DMSP Nighttime Stable Lights (US Dept. of Defense, Defense Meteorological Satellite Program), and Cropland Data (SAGE Navin Ramankutty, Center for Sustainability and Global Environment). The data are not directly comparable to the ANTH40 data shown in the 2002 ESI report due to improvements and changes in the underlying data sources.

Mean	8.38	Max	100	2.5 Percentile	0
Median	1.53	Min	0	97.5 Percentile	66.3

Albania	3.25	Ecuador	2.19	Lebanon	18.08	Saudi Arabia	0.58
Algeria	0.58	Egypt	1.85	Liberia	0.06	Senegal	0.58
Angola	0.04	El Salvador	11.19	Libya	0.27	Serbia and Mont.	7.44
Argentina	1.00	Estonia	3.97	Lithuania	5.79	Sierra Leone	0.19
Armenia	2.47	Ethiopia	0.07	Macedonia	6.63	Slovakia	9.44
Australia	0.24	Finland	2.56	Madagascar	0.04	Slovenia	7.35
Austria	7.75	France	10.99	Malawi	0.33	South Africa	1.85
Azerbaijan	3.03	Gabon	0.07	Malaysia	2.94	South Korea	14.60
Bangladesh	4.67	Gambia	4.15	Mali	0.04	Spain	11.27
Belarus	4.43	Georgia	2.21	Mauritania	0.02	Sri Lanka	4.25
Belgium	28.57	Germany	12.29	Mexico	2.50	Sudan	0.11
Benin	0.31	Ghana	0.93	Moldova	6.03	Sweden	3.77
Bhutan	0.00	Greece	11.21	Mongolia	0.01	Switzerland	11.47
Bolivia	0.12	Guatemala	2.41	Morocco	2.04	Syria	3.10
Bosnia and Herz.	1.74	Guinea	0.11	Mozambique	0.12	Taiwan	29.18
Botswana	0.08	Guinea-Bissau	0.22	Myanmar	0.62	Tajikistan	2.08
Brazil	0.81	Guyana	0.12	Namibia	0.04	Tanzania	0.14
Bulgaria	6.66	Haiti	1.39	Nepal	1.08	Thailand	4.06
Burkina Faso	0.12	Honduras	1.44	Netherlands	28.30	Togo	0.59
Burundi	0.51	Hungary	11.13	New Zealand	1.93	Trin. and Tob.	32.06
Cambodia	0.24	Iceland	0.41	Nicaragua	1.19	Tunisia	3.57
Cameroon	0.10	India	4.63	Niger	0.02	Turkey	3.94
Canada	0.82	Indonesia	1.33	Nigeria	0.57	Turkmenistan	0.63
Central Afr. Rep.	0.01	Iran	1.80	North Korea	0.80	Uganda	0.40
Chad	0.01	Iraq	2.08	Norway	3.02	Ukraine	6.64
Chile	1.09	Ireland	8.23	Oman	0.73	United Arab. Em.	5.02
China	1.09	Israel	21.65	P. N. Guinea	0.08	United Kingdom	21.71
Colombia	1.48	Italy	17.76	Pakistan	2.88	United States	6.24
Congo	0.11	Jamaica	17.20	Panama	3.64	Uruguay	1.68
Costa Rica	5.92	Japan	21.96	Paraguay	0.47	Uzbekistan	2.70
Côte d'Ivoire	0.31	Jordan	1.65	Peru	0.45	Venezuela	1.37
Croatia	6.91	Kazakhstan	0.39	Philippines	2.73	Viet Nam	1.74
Cuba	6.34	Kenya	0.31	Poland	9.22	Yemen	0.17
Czech Rep.	11.52	Kuwait	10.47	Portugal	10.12	Zambia	0.21
Dem. Rep. Congo	0.06	Kyrgyzstan	1.08	Romania	4.72	Zimbabwe	0.68
Denmark	21.19	Laos	0.25	Russia	0.91		
Dominican Rep.	5.39	Latvia	3.61	Rwanda	0.43		

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #:	12	Code:	WQ_DO	Reference Year:	MRYA 1993-2002
Description:	Dissolved oxygen concentration				
Units:	Milligrams dissolved oxygen per liter water				
Source*:	United Nations Environment Programme (UNEP), Organisation for Economic Co-operation and Development (OECD), European Environment Agency (EEA), plus country data.				
Logic:	A measure of eutrophication, which has an important impact on the health of aquatic resources and ecosystems. High levels correspond to low eutrophication.				
Methodology:	For GEMS water data: for Dissolved Oxygen (DO), three codes are chosen: 08101, 08102 and 08107. Among them, 08101 was used in the ESI 2002 report and 08107 was used only by New Zealand. The value for each country was the mean of all the stations. For those countries that had both 08101 and 08102 values, the mean of both values was calculated as the value for the country. The data range from 1994 to 2002. OECD data range from 1997 to 1999. EEA data cover the period between 2000 and 2002. For some countries, the original data contained a detection flag if the data fell below the detection limit, or the smallest concentration of a substance that can still be detected with at least 95% probability. The limit of determination was the smallest concentration of a substance that can still be determined as being different from 0 with at least 95% probability. If the limit of detection flag was set, it can be assumed with probability $\geq 95\%$ that the substance was not in the water. In order to do the calculations, those observations were set to 0. GEMS water data was the main data source and OECD data and EEA data were used to fill in the blanks. If a country had both OECD and EEA values, OECD data were used. For water quality of lakes, Oxygen Concentration as equivalent to DO was used. For Romania no OECD data were available and the EEA value of zero was used instead.				

Mean	8.67	Max	13.76	2.5 Percentile	3.46		
Median	9.17	Min	0	97.5 Percentile	11.31		
Albania	[7.94]	Ecuador	[8.02]	Lebanon	[7.97]	Saudi Arabia	[8.21]
Algeria	[7.14]	Egypt	[8.13]	Liberia	[6.15]	Senegal	[8.82]
Angola	[5.82]	El Salvador	[6.39]	Libya	[7.04]	Serbia and Mont.	[6.95]
Argentina	8.53	Estonia	10.08	Lithuania	3.86	Sierra Leone	[5.1]
Armenia	[6.6]	Ethiopia	[5.09]	Macedonia	8.83	Slovakia	9.99
Australia	[9.38]	Finland	10.97	Madagascar	[4.7]	Slovenia	10.57
Austria	10.45	France	10.18	Malawi	[7.22]	South Africa	[8.6]
Azerbaijan	[6.85]	Gabon	[8.31]	Malaysia	[7.51]	South Korea	11.01
Bangladesh	6.70	Gambia	[7.24]	Mali	8.47	Spain	8.34
Belarus	[6.81]	Georgia	[6.88]	Mauritania	[8.32]	Sri Lanka	[8.13]
Belgium	8.55	Germany	10.07	Mexico	6.10	Sudan	[7.61]
Benin	[5.54]	Ghana	6.80	Moldova	[4.7]	Sweden	9.73
Bhutan	[6.63]	Greece	11.30	Mongolia	[7.4]	Switzerland	10.99
Bolivia	[8.67]	Guatemala	[7.93]	Morocco	6.34	Syria	[7.13]
Bosnia and Herz.	9.51	Guinea	[6.8]	Mozambique	[5.22]	Taiwan	6.10
Botswana	[8.21]	Guinea-Bissau	[6.75]	Myanmar	[6.03]	Tajikistan	[4.67]
Brazil	[8.14]	Guyana	[8.47]	Namibia	[8.44]	Tanzania	[6.28]
Bulgaria	8.28	Haiti	[4.61]	Nepal	[6.68]	Thailand	[6.29]
Burkina Faso	[6.55]	Honduras	[6.76]	Netherlands	9.78	Togo	[7.07]
Burundi	[4.68]	Hungary	5.50	New Zealand	10.72	Trin. and Tob.	[8.22]
Cambodia	[5.82]	Iceland	[11.51]	Nicaragua	[9.13]	Tunisia	[6.78]
Cameroon	[7.54]	India	6.43	Niger	[6.4]	Turkey	7.43
Canada	8.13	Indonesia	3.31	Nigeria	[4.53]	Turkmenistan	[7.34]
Central Afr. Rep.	[7.03]	Iran	[6.68]	North Korea	[7.43]	Uganda	[8]
Chad	[6.08]	Iraq	[5.35]	Norway	[11.83]	Ukraine	[6.78]
Chile	[7.69]	Ireland	10.90	Oman	[10.35]	United Arab. Em.	[8.78]
China	8.62	Israel	[9.56]	P. N. Guinea	[5.89]	United Kingdom	10.38
Colombia	[7.78]	Italy	9.77	Pakistan	6.77	United States	11.32
Congo	[7.9]	Jamaica	[7.26]	Panama	[8.53]	Uruguay	[8.3]
Costa Rica	[8.79]	Japan	9.80	Paraguay	[7.79]	Uzbekistan	[6.75]
Côte d'Ivoire	[7.16]	Jordan	10.50	Peru	[6.86]	Venezuela	[6.91]
Croatia	[8.28]	Kazakhstan	[7.17]	Philippines	7.42	Viet Nam	5.30
Cuba	8.10	Kenya	[6.09]	Poland	10.12	Yemen	[7.29]
Czech Rep.	10.40	Kuwait	[9.2]	Portugal	13.76	Zambia	[6.02]
Dem. Rep. Congo	[6.08]	Kyrgyzstan	[8.03]	Romania	0.00	Zimbabwe	[7.38]
Denmark	10.42	Laos	6.96	Russia	9.50		
Dominican Rep.	[7.65]	Latvia	8.58	Rwanda	[5.95]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 13 **Code:** WQ_EC **Reference Year:** MRYA 1994-2002

Description: Electrical conductivity

Units: Micro-Siemens per centimeter

Source*: United Nations Environment Programme (UNEP) and European Environment Agency (EEA), plus country data.

Logic: A widely used bulk measure of metals concentration and salinity. High levels of conductivity correspond to high concentrations of metals.

Methodology: For GEMS water data: for Electrical Conductivity (EC), three codes were chosen: 02040, 02041 and 02049. Among them, 02041 was used in the ESI 2002 report and 02049 was used only by New Zealand. The value for each country was the average across all stations. For countries that have both 02040 and 02041 values, the average of both values was calculated. OECD data do not include data for the European Community and the EEA data only cover lakes for the European Community.

	Mean		Max		2.5 Percentile		22.7
	Median		Min		97.5 Percentile		2243.67
Albania	[716.23]	Ecuador	[338.08]	Lebanon	[1084.23]	Saudi Arabia	[1305.8]
Algeria	[854.22]	Egypt	[1092.39]	Liberia	[565.87]	Senegal	729.63
Angola	[362.45]	El Salvador	[310.47]	Libya	[696.53]	Serbia and Mont.	[1099.14]
Argentina	118.62	Estonia	[598.03]	Lithuania	607.00	Sierra Leone	[280.49]
Armenia	[662.96]	Ethiopia	[571.52]	Macedonia	[579.19]	Slovakia	[497.32]
Australia	[267.23]	Finland	53.14	Madagascar	[-18.36]	Slovenia	[369.59]
Austria	317.03	France	321.57	Malawi	[302]	South Africa	[863.71]
Azerbaijan	[934.89]	Gabon	[149.19]	Malaysia	[504.48]	South Korea	145.29
Bangladesh	231.60	Gambia	[478.01]	Mali	120.77	Spain	1086.9
Belarus	[547.75]	Georgia	[560.12]	Mauritania	[500.81]	Sri Lanka	[722.22]
Belgium	573.62	Germany	863.30	Mexico	1239.63]	Sudan	[346.54]
Benin	[621.56]	Ghana	[722.62]	Moldova	[883.1]	Sweden	152.97
Bhutan	[616.32]	Greece	385.96	Mongolia	[525.36]	Switzerland	285.95
Bolivia	[235.33]	Guatemala	[648.12]	Morocco	1620.5	Syria	[683.3]
Bosnia and Herz.	[836.08]	Guinea	[314.35]	Mozambique	[-7.88]	Taiwan	2244.0
Botswana	[341.58]	Guinea-Bissau	[347.2]	Myanmar	[233.22]	Tajikistan	[553.91]
Brazil	[296.74]	Guyana	[46.38]	Namibia	[319.41]	Tanzania	[922.37]
Bulgaria	[543.5]	Haiti	[363.24]	Nepal	[637.2]	Thailand	[490.41]
Burkina Faso	[842.34]	Honduras	[770.5]	Netherlands	623.12	Togo	[714.14]
Burundi	[683.86]	Hungary	711.71	New Zealand	111.54	Trin. and Tob.	[880.37]
Cambodia	13.62	Iceland	[85.58]	Nicaragua	[-30.81]	Tunisia	[850.13]
Cameroon	[306.19]	India	2240.70	Niger	[588.14]	Turkey	2247.4
Canada	153.29	Indonesia	167.13	Nigeria	[232.63]	Turkmenistan	[897.86]
Central Afr. Rep.	[182.76]	Iran	[627.04]	North Korea	[1168.8]	Uganda	[35.71]
Chad	[279.66]	Iraq	[1057.17]	Norway	[-173.27]	Ukraine	[1190.95]
Chile	[417.36]	Ireland	457.10	Oman	[613.53]	United Arab. Em.	[849.43]
China	522.78	Israel	[730.53]	P. N. Guinea	[-51.86]	United Kingdom	368.07
Colombia	[565.76]	Italy	505.52	Pakistan	492.46	United States	663.27
Congo	[-23.12]	Jamaica	[309.51]	Panama	[367.93]	Uruguay	[380.05]
Costa Rica	[146.88]	Japan	163.43	Paraguay	[59.16]	Uzbekistan	[1158.18]
Côte d'Ivoire	[620.07]	Jordan	1245.83	Peru	[809.21]	Venezuela	[737.26]
Croatia	[387]	Kazakhstan	[1038.84]	Philippines	136.70	Viet Nam	559.87
Cuba	515.00	Kenya	[325.88]	Poland	969.12	Yemen	[327.79]
Czech Rep.	[1150.5]	Kuwait	[405.71]	Portugal	52.10	Zambia	[-13.87]
Dem. Rep. Congo	[155.57]	Kyrgyzstan	[745.88]	Romania	[657.24]	Zimbabwe	[914.33]
Denmark	382.92	Laos	20.88	Russia	39.14		
Dominican Rep.	[960.72]	Latvia	685.59	Rwanda	[218.1]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 14 **Code:** WQ_PH **Reference Year:** MRYA 1994-2003

Description: Phosphorus concentration

Units: Milligrams phosphorus per liter water

Source*: United Nations Environment Programme (UNEP), Organisation for Economic Co-operation and Development (OECD), European Environment Agency (EEA), plus country data.

Logic: A measure of eutrophication, which affects aquatic resources health. High levels correspond to high levels of eutrophication.

Methodology: For GEMS water data: for Phosphorus Concentration (PH), three codes were chosen: 15403, 15405 and 15406. Among them 15405 was used in the ESI 2002 report and 15406 was used only by New Zealand. The value for each country represents the average across all stations. 15403 values were used to fill in the blanks. For Japan, phosphorus concentration values for the 1997-1999 time period were available for both codes, but deviated substantially. Therefore, only data for code 15405 were used; the same as in the ESI 2002. The OECD data cover 1997 to 1999. The EEA data cover 2000-2002. For some countries, the original data contained a detection flag if the data fell below the detection limit, or the smallest concentration of a substance that can still be detected with at least 95% probability. The limit of determination was defined as the smallest concentration of a substance that can still be determined as being different from 0 with at least 95% probability. If the limit of detection flag was set, it can be assumed with a probability >=95% that the substance was not in the water. In order to do the calculations, those observations were set to 0. Two stations in Germany, stations NW08 and NW041, had abnormally large values for PH in 2002 indicating an error. These values were not included. GEMS data took precedence over OECD and EEA data.

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	0.16		0.67		0.01		
	0.12		0		0.55		
Albania	[0.14]	Ecuador	[0.12]	Lebanon	[0.25]	Saudi Arabia	[0.15]
Algeria	[0.31]	Egypt	[0.19]	Liberia	[0.18]	Senegal	[0.22]
Angola	[0.15]	El Salvador	[0.15]	Libya	[0.18]	Serbia and Mont.	[0.2]
Argentina	0.09	Estonia	0.00	Lithuania	0.08	Sierra Leone	[0.17]
Armenia	[0.06]	Ethiopia	[0.22]	Macedonia	0.02	Slovakia	0.19
Australia	[0.08]	Finland	0.01	Madagascar	[0.17]	Slovenia	0.09
Austria	0.08	France	0.17	Malawi	[0.19]	South Africa	[0.21]
Azerbaijan	[0.19]	Gabon	[0.07]	Malaysia	[0.09]	South Korea	0.13
Bangladesh	[0.29]	Gambia	[0.23]	Mali	0.15	Spain	0.23
Belarus	[0.12]	Georgia	[0.13]	Mauritania	[0.17]	Sri Lanka	[0.2]
Belgium	0.32	Germany	0.16	Mexico	0.10	Sudan	[0.18]
Benin	[0.17]	Ghana	[0.24]	Moldova	[0.14]	Sweden	0.11
Bhutan	[0.03]	Greece	0.39	Mongolia	[0.04]	Switzerland	0.07
Bolivia	[0.09]	Guatemala	[0.2]	Morocco	0.46	Syria	[0.28]
Bosnia and Herz.	0.10	Guinea	[0.22]	Mozambique	[0.14]	Taiwan	0.18
Botswana	[0.13]	Guinea-Bissau	[0.15]	Myanmar	[0.11]	Tajikistan	[0.11]
Brazil	[0.17]	Guyana	[0.02]	Namibia	[0.17]	Tanzania	[0.22]
Bulgaria	[0.28]	Haiti	[0.28]	Nepal	[0.19]	Thailand	[0.22]
Burkina Faso	[0.15]	Honduras	[0.21]	Netherlands	0.27	Togo	[0.26]
Burundi	[0.22]	Hungary	0.12	New Zealand	0.05	Trin. and Tob.	[0.17]
Cambodia	0.04	Iceland	[0.02]	Nicaragua	[0.06]	Tunisia	[0.16]
Cameroon	[0.05]	India	0.20	Niger	[0.12]	Turkey	0.29
Canada	0.01	Indonesia	0.57	Nigeria	[0.29]	Turkmenistan	[0.11]
Central Afr. Rep.	[0.11]	Iran	[0.28]	North Korea	[0.14]	Uganda	[0.22]
Chad	[0.14]	Iraq	[0.22]	Norway	0.01	Ukraine	[0.12]
Chile	[0.19]	Ireland	0.08	Oman	[0.08]	United Arab. Em.	[0.12]
China	0.28	Israel	[0.17]	P. N. Guinea	[0.16]	United Kingdom	0.09
Colombia	[0.1]	Italy	0.14	Pakistan	0.67	United States	0.13
Congo	[0.1]	Jamaica	[0.11]	Panama	[0.07]	Uruguay	[0.09]
Costa Rica	[0.13]	Japan	0.06	Paraguay	[0.21]	Uzbekistan	[0.2]
Côte d'Ivoire	[0.19]	Jordan	[0.19]	Peru	[0.14]	Venezuela	[0.21]
Croatia	[0.12]	Kazakhstan	[0.11]	Philippines	[0.26]	Viet Nam	0.12
Cuba	0.02	Kenya	[0.21]	Poland	0.24	Yemen	[0.19]
Czech Rep.	0.32	Kuwait	[0.23]	Portugal	[0.28]	Zambia	[0.17]
Dem. Rep. Congo	[0.17]	Kyrgyzstan	[0.13]	Romania	[0.16]	Zimbabwe	0.01
Denmark	0.14	Laos	0.12	Russia	0.01		
Dominican Rep.	[0.16]	Latvia	0.04	Rwanda	[0.16]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	15	Code:	WQ_SS	Reference Year:	MRYA 1994-2003
Description:	Suspended solids				
Units:	Milligrams suspended solids per liter water				
Source*:	United Nations Environment Programme (UNEP) plus country data.				
Logic:	A measure of water quality and turbidity.				
Methodology:	For GEMS water data: for Suspended Solids (SS), two codes are chosen: 10401 and 10408. A comparison of the values for the two codes yielded substantial differences. Therefore only code 10401, the same as in the ESI 2002 report, was used. To obtain data several methods were used: 10401:SUSPENDED SOLIDS, 105 DEG. Gravimetric method. If oil and grease are present, the sample is blended. If large particles, either floating or submerged, are present, they are excluded from the sample. The sample aliquot is passed through a pre-ignited and pre-weighed Whatman GF/C filter. The filter containing the residue is placed in a porcelain dish, oven-dried at 105 o C for 2.5 hours, cooled 15 minutes in a desiccator, and weighed to a constant weight. The method detection limit is 10 mg/L. 10408:SUSPENDED SOLIDS, 180 DEG. Gravimetric method. If oil and grease are present, the sample is blended. If large particles, either floating or submerged, are present, they are excluded from the sample. A sample aliquot is passed through a pre-ignited Whatman GF/C filter. The filter containing the residue is placed in a porcelain dish, oven-dried at 180 o C for 2.5 hours, cooled 15 minutes in a desiccator and weighed to a constant weight. The method detection limit is 10 mg/L.				
Mean	3.74	Max	7.97	2.5 Percentile	0.98
Median	3.92	Min	0.64	97.5 Percentile	6.33
Albania	..	Ecuador	..	Lebanon	..
Algeria	..	Egypt	..	Liberia	..
Angola	..	El Salvador	..	Libya	..
Argentina	4.35	Estonia	..	Lithuania	..
Armenia	..	Ethiopia	..	Macedonia	..
Australia	..	Finland	1.14	Madagascar	..
Austria	..	France	3.24	Malawi	..
Azerbaijan	..	Gabon	..	Malaysia	..
Bangladesh	4.08	Gambia	..	Mali	..
Belarus	..	Georgia	..	Mauritania	..
Belgium	3.42	Germany	..	Mexico	5.17
Benin	..	Ghana	4.55	Moldova	..
Bhutan	..	Greece	..	Mongolia	..
Bolivia	..	Guatemala	..	Morocco	5.31
Bosnia and Herz.	..	Guinea	..	Mozambique	..
Botswana	..	Guinea-Bissau	..	Myanmar	..
Brazil	..	Guyana	..	Namibia	..
Bulgaria	..	Haiti	..	Nepal	..
Burkina Faso	..	Honduras	..	Netherlands	3.26
Burundi	..	Hungary	..	New Zealand	..
Cambodia	4.03	Iceland	..	Nicaragua	..
Cameroon	..	India	1.83	Niger	..
Canada	0.64	Indonesia	5.37	Nigeria	..
Central Afr. Rep.	..	Iran	..	North Korea	..
Chad	..	Iraq	..	Norway	..
Chile	..	Ireland	..	Oman	..
China	7.97	Israel	..	P. N. Guinea	..
Colombia	..	Italy	..	Pakistan	5.54
Congo	..	Jamaica	..	Panama	..
Costa Rica	..	Japan	2.30	Paraguay	..
Côte d'Ivoire	..	Jordan	4.50	Peru	..
Croatia	..	Kazakhstan	..	Philippines	3.81
Cuba	..	Kenya	..	Poland	3.33
Czech Rep.	..	Kuwait	..	Portugal	..
Dem. Rep. Congo	..	Kyrgyzstan	..	Romania	..
Denmark	..	Laos	4.40	Russia	2.86
Dominican Rep.	..	Latvia	..	Rwanda	..
				Saudi Arabia	..
				Senegal	..
				Serbia and Mont.	..
				Sierra Leone	..
				Slovakia	3.18
				Slovenia	..
				South Africa	..
				South Korea	2.21
				Spain	..
				Sri Lanka	..
				Sudan	..
				Sweden	..
				Switzerland	4.06
				Syria	..
				Taiwan	5.25
				Tajikistan	..
				Tanzania	..
				Thailand	..
				Togo	..
				Trin. and Tob.	..
				Tunisia	..
				Turkey	2.10
				Turkmenistan	..
				Uganda	..
				Ukraine	..
				United Arab. Em.	..
				United Kingdom	2.26
				United States	..
				Uruguay	..
				Uzbekistan	..
				Venezuela	..
				Viet Nam	4.63
				Yemen	..
				Zambia	..
				Zimbabwe	..

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	16	Code:	WATAVL	Reference Year:	1961-1995 (long-term average)		
Description:	Freshwater availability per capita						
Units:	Thousand cubic meters per person						
Source*:	Center for Environmental System Research, Kassel University.						
Logic:	The per capita volume of available water resources for a country is an important indicator of environmental services and the ability to support the needs of the population.						
Methodology:	The total per capita water availability was measured as the sum of internal renewable water per capita (average annual surface runoff and groundwater recharge generated from endogenous precipitation, taking into account evaporation from lakes and wetlands) and per capita water inflow from other countries. These data were derived from the WaterGap 2.1 gridded hydrological model developed by the Center for Environmental Systems Research, Kassel University, Germany. A special run of the model was performed in order to derive country-level estimates of water availability in a country. It should be noted that the size of the grid cells (0.5 x 0.5 degree) does not accurately capture small countries. However, the fact that the model itself is based on over 30 years of global hydrological data means that the data are more comparable than similar country water resources estimates published elsewhere.						
Mean	26.99	Max	543.29	2.5 Percentile	0.56		
Median	7.51	Min	-0.01	97.5 Percentile	212.63		
Albania	7.13	Ecuador	29.52	Lebanon	0.88	Saudi Arabia	0.35
Algeria	0.76	Egypt	2.18	Liberia	75.03	Senegal	3.34
Angola	140.46	El Salvador	3.40	Libya	1.43	Serbia and Mont.	17.93
Argentina	27.27	Estonia	12.88	Lithuania	8.24	Sierra Leone	27.94
Armenia	1.45	Ethiopia	2.51	Macedonia	2.87	Slovakia	14.41
Australia	33.20	Finland	18.01	Madagascar	20.17	Slovenia	14.98
Austria	10.84	France	4.11	Malawi	6.57	South Africa	1.48
Azerbaijan	3.11	Gabon	192.75	Malaysia	20.24	South Korea	1.25
Bangladesh	9.65	Gambia	7.98	Mali	7.02	Spain	2.27
Belarus	4.81	Georgia	8.10	Mauritania	8.25	Sri Lanka	1.86
Belgium	1.87	Germany	2.53	Mexico	4.62	Sudan	6.44
Benin	7.71	Ghana	3.03	Moldova	5.77	Sweden	15.77
Bhutan	22.12	Greece	4.47	Mongolia	28.26	Switzerland	5.55
Bolivia	80.90	Guatemala	15.00	Morocco	0.68	Syria	2.50
Bosnia and Herz.	16.03	Guinea	19.29	Mozambique	18.20	Taiwan	1.74
Botswana	19.70	Guinea-Bissau	21.84	Myanmar	22.21	Tajikistan	11.03
Brazil	53.07	Guyana	299.98	Namibia	54.75	Tanzania	6.71
Bulgaria	23.09	Haiti	1.55	Nepal	6.63	Thailand	8.59
Burkina Faso	0.96	Honduras	18.71	Netherlands	5.98	Togo	3.80
Burundi	2.38	Hungary	11.61	New Zealand	79.88	Trin. and Tob.	1.91
Cambodia	45.74	Iceland	301.37	Nicaragua	32.07	Tunisia	0.66
Cameroon	19.80	India	1.94	Niger	8.15	Turkey	2.85
Canada	86.59	Indonesia	11.50	Nigeria	2.95	Turkmenistan	10.04
Central Afr. Rep.	57.73	Iran	1.49	North Korea	2.78	Uganda	3.88
Chad	8.07	Iraq	3.34	Norway	60.77	Ukraine	1.93
Chile	20.28	Ireland	13.72	Oman	1.35	United Arab. Em.	0.38
China	1.88	Israel	0.62	P. N. Guinea	151.70	United Kingdom	3.21
Colombia	90.58	Italy	2.14	Pakistan	1.01	United States	8.43
Congo	543.29	Jamaica	3.49	Panama	28.89	Uruguay	265.04
Costa Rica	23.17	Japan	2.62	Paraguay	110.27	Uzbekistan	2.60
Côte d'Ivoire	8.40	Jordan	0.37	Peru	65.42	Venezuela	60.50
Croatia	33.59	Kazakhstan	9.54	Philippines	3.94	Viet Nam	8.70
Cuba	2.28	Kenya	2.65	Poland	1.75	Yemen	30.36
Czech Rep.	2.00	Kuwait	-0.01	Portugal	5.05	Zambia	17.15
Dem. Rep. Congo	30.36	Kyrgyzstan	6.14	Romania	9.20	Zimbabwe	7.31
Denmark	2.78	Laos	74.99	Russia	24.65		
Dominican Rep.	2.23	Latvia	13.11	Rwanda	1.88		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 17 **Code:** GRDAVL **Reference Year:** 2003

Description: Internal groundwater availability per capita

Units: Thousand cubic meters per capita

Source*: United Nations Food and Agricultural Organization (FAO).

Logic: Groundwater is an important part of the picture of a country's water resources. The more groundwater is available per capita, the higher the probability that a country can sustainably manage its groundwater resources, e.g. for agricultural production.

Methodology: The groundwater data are divided by population data and expressed in thousand cubic meters per capita.

	Mean		4.24	Max	110.27	2.5 Percentile	0.04
	Median		0.82	Min	0.00	97.5 Percentile	19.52
Albania	1.92	Ecuador	10.00	Lebanon	0.71	Saudi Arabia	0.09
Algeria	0.05	Egypt	0.02	Liberia	17.21	Senegal	0.70
Angola	5.42	El Salvador	0.92	Libya	0.09	Serbia and Mont.	..
Argentina	3.38	Estonia	2.97	Lithuania	0.35	Sierra Leone	9.67
Armenia	1.31	Ethiopia	0.55	Macedonia	..	Slovakia	0.32
Australia	3.58	Finland	0.42	Madagascar	3.14	Slovenia	6.76
Austria	0.74	France	1.67	Malawi	0.12	South Africa	0.10
Azerbaijan	0.78	Gabon	45.89	Malaysia	2.50	South Korea	..
Bangladesh	0.15	Gambia	0.32	Mali	1.49	Spain	0.70
Belarus	1.84	Georgia	0.01	Mauritania	0.10	Sri Lanka	0.40
Belgium	0.09	Germany	0.21	Mexico	1.31	Sudan	0.18
Benin	0.25	Ghana	2.14	Moldova	0.10	Sweden	2.22
Bhutan	..	Greece	0.94	Mongolia	2.42	Switzerland	0.34
Bolivia	14.83	Guatemala	2.66	Morocco	0.33	Syria	0.23
Bosnia and Herz.	..	Guinea	4.11	Mozambique	0.89	Taiwan	..
Botswana	1.01	Guinea-Bissau	9.10	Myanmar	3.11	Tajikistan	0.91
Brazil	10.46	Guyana	..	Namibia	1.10	Tanzania	0.83
Bulgaria	0.82	Haiti	0.27	Nepal	0.81	Thailand	0.66
Burkina Faso	..	Honduras	5.55	Netherlands	0.28	Togo	1.03
Burundi	0.34	Hungary	0.60	New Zealand	..	Trin. and Tob.	..
Cambodia	1.34	Iceland	82.19	Nicaragua	10.49	Tunisia	0.14
Cameroon	6.23	India	0.39	Niger	0.20	Turkey	0.97
Canada	11.60	Indonesia	2.08	Nigeria	0.63	Turkmenistan	0.06
Central Afr. Rep.	14.97	Iran	0.73	North Korea	0.57	Uganda	1.11
Chad	1.21	Iraq	0.05	Norway	20.92	Ukraine	0.42
Chile	8.76	Ireland	2.66	Oman	0.36	United Arab. Em.	0.03
China	0.64	Israel	0.07	P. N. Guinea	..	United Kingdom	0.16
Colombia	11.25	Italy	0.74	Pakistan	0.35	United States	4.43
Congo	110.27	Jamaica	1.47	Panama	6.62	Uruguay	6.77
Costa Rica	8.84	Japan	0.21	Paraguay	6.81	Uzbekistan	0.33
Côte d'Ivoire	2.23	Jordan	0.09	Peru	11.00	Venezuela	8.67
Croatia	2.48	Kazakhstan	0.41	Philippines	2.15	Viet Nam	0.59
Cuba	0.58	Kenya	0.09	Poland	0.33	Yemen	0.07
Czech Rep.	0.14	Kuwait	0.00	Portugal	0.38	Zambia	4.30
Dem. Rep. Congo	0.23	Kyrgyzstan	2.69	Romania	0.38	Zimbabwe	0.39
Denmark	0.80	Laos	6.55	Russia	5.47		
Dominican Rep.	1.33	Latvia	0.95	Rwanda	0.43		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 18 **Code:** COALKM **Reference Year:** 2001

Description: Coal consumption per populated land area

Units: Terajoules coal consumed per populated land area (at 5 or more persons per square km)

Source*: United States Energy Information Agency, plus country data.

Logic: Coal fired power plants emit higher SO2 levels and other air pollutants than natural gas or oil fired plants, and the energy produced is more carbon-intensive.

Methodology: The original data are in billion British Thermal Units (BTUs), which were converted to terajoules. The factor applied to convert 10⁹ BTUs to terajoules is 0.9478 (Source: Energy Information Administration). The Gridded Population of the World dataset (CIESIN) was used to calculate the total land area in each country inhabited with a population density of greater than 5 persons per km². The data set was then used as the denominator for the coal consumption data.

	Mean		Max		2.5 Percentile		0.00
	Median		Min		97.5 Percentile		16.56
Albania	0.01	Ecuador	0.00	Lebanon	0.51	Saudi Arabia	0.00
Algeria	0.05	Egypt	0.27	Liberia	0.00	Senegal	0.00
Angola	0.00	El Salvador	0.00	Libya	0.00	Serbia and Mont.	2.99
Argentina	0.02	Estonia	0.33	Lithuania	0.05	Sierra Leone	0.00
Armenia	0.00	Ethiopia	0.00	Macedonia	2.89	Slovakia	3.30
Australia	10.29	Finland	1.07	Madagascar	0.00	Slovenia	2.69
Austria	1.63	France	0.99	Malawi	0.01	South Africa	9.87
Azerbaijan	0.00	Gabon	0.00	Malaysia	0.32	South Korea	16.23
Bangladesh	0.07	Gambia	0.00	Mali	0.00	Spain	1.54
Belarus	0.00	Georgia	0.00	Mauritania	0.00	Sri Lanka	0.00
Belgium	11.12	Germany	8.38	Mexico	0.20	Sudan	0.00
Benin	0.00	Ghana	0.00	Moldova	0.10	Sweden	0.40
Bhutan	0.04	Greece	3.06	Mongolia	4.67	Switzerland	0.16
Bolivia	1.68	Guatemala	0.05	Morocco	0.28	Syria	0.00
Bosnia and Herz.	0.32	Guinea	0.00	Mozambique	0.00	Taiwan	26.95
Botswana	0.29	Guinea-Bissau	0.00	Myanmar	0.02	Tajikistan	0.02
Brazil	0.00	Guyana	0.00	Namibia	0.00	Tanzania	0.00
Bulgaria	3.01	Haiti	0.00	Nepal	0.08	Thailand	0.68
Burkina Faso	0.00	Honduras	0.03	Netherlands	11.72	Togo	0.00
Burundi	0.00	Hungary	1.52	New Zealand	0.52	Trin. and Tob.	0.00
Cambodia	0.00	Iceland	1.32	Nicaragua	0.00	Tunisia	0.03
Cameroon	0.00	India	2.00	Niger	0.01	Turkey	0.94
Canada	4.47	Indonesia	0.75	Nigeria	0.00	Turkmenistan	0.00
Central Afr. Rep.	0.00	Iran	0.04	North Korea	18.94	Uganda	0.00
Chad	0.00	Iraq	0.00	Norway	0.54	Ukraine	2.97
Chile	0.29	Ireland	1.14	Oman	0.00	United Arab. Em.	0.00
China	3.90	Israel	11.20	P. N. Guinea	0.00	United Kingdom	6.24
Colombia	0.20	Italy	1.71	Pakistan	0.12	United States	5.91
Congo	0.00	Jamaica	0.12	Panama	0.03	Uruguay	0.00
Costa Rica	0.00	Japan	9.62	Paraguay	0.00	Uzbekistan	0.17
Côte d'Ivoire	0.00	Jordan	0.00	Peru	0.05	Venezuela	0.00
Croatia	[0.18]	Kazakhstan	1.19	Philippines	0.66	Viet Nam	0.44
Cuba	0.01	Kenya	0.01	Poland	6.89	Yemen	0.00
Czech Rep.	8.71	Kuwait	0.00	Portugal	1.29	Zambia	0.01
Dem. Rep. Congo	0.00	Kyrgyzstan	0.13	Romania	1.21	Zimbabwe	0.32
Denmark	3.83	Laos	0.00	Russia	1.56		
Dominican Rep.	0.10	Latvia	[0.53]	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 19 **Code:** NOXKM **Reference Year:** MRYA 1990-2003

Description: Anthropogenic NOx emissions per populated land area

Units: Metric tons NOx emissions per populated land area (at 5 or more persons per square km)

Source*: United Nations Framework Convention on Climate Change (UNFCCC), Organization for Economic Cooperation and Development (OECD), and Intergovernmental Panel on Climate Change (IPCC), plus country data.

Logic: NOx emissions contribute to changes in ambient air quality and consequently impact human and ecosystem

Methodology: The data were merged as follows: UNFCCC data were available in Gigagrams for 1990, 1994, and 2000. The most recent year available was used for each country. The OECD data were available in thousand tonnes for 1980, 1985-2000 and the most recent year 1998-2000 was extracted. The OECD data were then used to fill gaps in the UNFCCC data. The resulting data set was transformed to metric tons per populated land area (km2).

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	3.32		97.38		0.02		
	0.56		0.00		17.46		
Albania	0.07	Ecuador	0.65	Lebanon	5.25	Saudi Arabia	0.20
Algeria	0.86	Egypt	2.18	Liberia	0.27	Senegal	0.05
Angola	0.33	El Salvador	1.67	Libya	6.34	Serbia and Mont.	[1.01]
Argentina	0.83	Estonia	1.01	Lithuania	0.18	Sierra Leone	0.48
Armenia	2.55	Ethiopia	0.17	Macedonia	0.15	Slovakia	2.08
Australia	14.28	Finland	1.56	Madagascar	0.11	Slovenia	3.23
Austria	2.46	France	3.26	Malawi	0.16	South Africa	0.64
Azerbaijan	1.32	Gabon	0.11	Malaysia	0.21	South Korea	8.60
Bangladesh	0.67	Gambia	[0.79]	Mali	[0.32]	Spain	3.36
Belarus	0.20	Georgia	0.31	Mauritania	0.20	Sri Lanka	0.91
Belgium	9.88	Germany	4.49	Mexico	0.78	Sudan	0.18
Benin	0.14	Ghana	0.29	Moldova	1.70	Sweden	1.16
Bhutan	0.02	Greece	2.52	Mongolia	0.31	Switzerland	2.56
Bolivia	0.37	Guatemala	0.44	Morocco	0.41	Syria	0.21
Bosnia and Herz.	0.16	Guinea	0.08	Mozambique	0.13	Taiwan	14.77
Botswana	2.65	Guinea-Bissau	0.13	Myanmar	0.19	Tajikistan	0.16
Brazil	0.34	Guyana	0.78	Namibia	1.84	Tanzania	0.19
Bulgaria	0.19	Haiti	0.30	Nepal	0.93	Thailand	0.56
Burkina Faso	0.03	Honduras	0.14	Netherlands	10.15	Togo	0.30
Burundi	0.23	Hungary	2.19	New Zealand	3.30	Trin. and Tob.	7.33
Cambodia	1.31	Iceland	8.76	Nicaragua	0.37	Tunisia	0.67
Cameroon	0.17	India	0.52	Niger	0.16	Turkey	0.33
Canada	0.08	Indonesia	0.81	Nigeria	0.24	Turkmenistan	0.26
Central Afr. Rep.	0.61	Iran	0.12	North Korea	1.18	Uganda	0.26
Chad	0.17	Iraq	0.31	Norway	1.94	Ukraine	0.36
Chile	0.67	Ireland	1.90	Oman	0.09	United Arab. Em.	4.99
China	0.75	Israel	0.76	P. N. Guinea	0.01	United Kingdom	6.39
Colombia	0.52	Italy	4.63	Pakistan	0.25	United States	7.13
Congo	0.22	Jamaica	2.80	Panama	0.28	Uruguay	0.22
Costa Rica	0.65	Japan	5.59	Paraguay	50.70	Uzbekistan	1.12
Côte d'Ivoire	0.52	Jordan	3.49	Peru	0.38	Venezuela	0.41
Croatia	0.18	Kazakhstan	0.29	Philippines	1.17	Viet Nam	0.56
Cuba	0.62	Kenya	0.22	Poland	2.69	Yemen	[0.76]
Czech Rep.	5.00	Kuwait	1.05	Portugal	4.47	Zambia	0.41
Dem. Rep. Congo	0.16	Kyrgyzstan	0.08	Romania	2.06	Zimbabwe	0.21
Denmark	4.71	Laos	0.07	Russia	0.67		
Dominican Rep.	0.06	Latvia	0.61	Rwanda	0.32		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 20 **Code:** SO2KM **Reference Year:** MRYA 1990-2003

Description: Anthropogenic SO2 emissions per populated land area

Units: Metric tons SO2 per populated land area (at 5 or more persons per square km)

Source*: United Nations Framework Convention on Climate Change (UNFCCC), Organization for Economic Cooperation and Development (OECD), and Intergovernmental Panel on Climate Change (IPCC), plus country data.

Logic: SO2 emissions contribute to changes in ambient air quality and consequently impact human and ecosystem

Methodology: The data were merged as follows: UNFCCC data were available in Gigagrams for 1990, 1994, and 2000. The most recent year available was used for each country. The OECD data were available in thousand tonnes for 1980, 1985-2000 and the most recent available year 1997-2000 was extracted. The OECD data were then used to fill gaps in the UNFCCC data. The resulting data set was transformed to metric tons per populated land area (km2).

Mean	56.18	Max	8281.06	2.5 Percentile	0.02		
Median	0.64	Min	0.00	97.5 Percentile	12.71		
Albania	0.60	Ecuador	0.35	Lebanon	8.07	Saudi Arabia	0.56
Algeria	0.12	Egypt	4.09	Liberia	0.11	Senegal	0.15
Angola	0.20	El Salvador	0.70	Libya	3.22	Serbia and Mont.	[2.72]
Argentina	0.02	Estonia	3.35	Lithuania	1.69	Sierra Leone	[0.21]
Armenia	2.29	Ethiopia	0.01	Macedonia	0.90	Slovakia	2.08
Australia	11.86	Finland	0.50	Madagascar	0.04	Slovenia	3.59
Austria	0.43	France	1.54	Malawi	0.05	South Africa	2.35
Azerbaijan	0.56	Gabon	0.11	Malaysia	1.60	South Korea	11.58
Bangladesh	0.69	Gambia	0.11	Mali	[0.05]	Spain	3.57
Belarus	0.95	Georgia	3.62	Mauritania	0.18	Sri Lanka	0.68
Belgium	5.14	Germany	2.23	Mexico	0.90	Sudan	0.11
Benin	21.39	Ghana	0.17	Moldova	3.11	Sweden	0.27
Bhutan	0.00	Greece	3.79	Mongolia	0.43	Switzerland	0.48
Bolivia	0.02	Guatemala	0.75	Morocco	0.80	Syria	0.71
Bosnia and Herz.	1.78	Guinea	0.07	Mozambique	0.13	Taiwan	6.29
Botswana	1.32	Guinea-Bissau	0.19	Myanmar	0.09	Tajikistan	2.61
Brazil	0.36	Guyana	[0.6]	Namibia	0.87	Tanzania	0.10
Bulgaria	4.61	Haiti	0.34	Nepal	0.05	Thailand	1.07
Burkina Faso	0.08	Honduras	0.15	Netherlands	2.19	Togo	0.07
Burundi	0.13	Hungary	5.31	New Zealand	0.97	Trin. and Tob.	20.99
Cambodia	0.18	Iceland	3.85	Nicaragua	0.05	Tunisia	0.71
Cameroon	0.08	India	1.15	Niger	0.09	Turkey	2.99
Canada	7.52	Indonesia	0.36	Nigeria	0.19	Turkmenistan	0.07
Central Afr. Rep.	0.29	Iran	0.49	North Korea	7.64	Uganda	0.16
Chad	0.10	Iraq	0.58	Norway	0.23	Ukraine	2.06
Chile	6.70	Ireland	1.99	Oman	0.11	United Arab. Em.	1.52
China	2.68	Israel	3.31	P. N. Guinea	0.04	United Kingdom	4.04
Colombia	0.32	Italy	2.56	Pakistan	0.30	United States	4.68
Congo	0.14	Jamaica	8.95	Panama	0.03	Uruguay	0.19
Costa Rica	0.38	Japan	2.26	Paraguay	0.00	Uzbekistan	1.27
Côte d'Ivoire	0.20	Jordan	2.71	Peru	0.25	Venezuela	0.59
Croatia	1.87	Kazakhstan	0.58	Philippines	1.56	Viet Nam	0.26
Cuba	3.74	Kenya	0.16	Poland	4.85	Yemen	[0.22]
Czech Rep.	3.33	Kuwait	7.12	Portugal	3.84	Zambia	2.10
Dem. Rep. Congo	0.00	Kyrgyzstan	0.27	Romania	5.14	Zimbabwe	0.33
Denmark	0.64	Laos	0.11	Russia	2.08		
Dominican Rep.	0.64	Latvia	0.30	Rwanda	0.49		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 21 **Code:** VOCKM **Reference Year:** MRYA 1990-2003

Description: Anthropogenic VOC emissions per populated land area

Units: Metric tons per populated land area (at 5 or more persons per square km)

Source*: United Nations Framework Convention on Climate Change (UNFCCC), Organization for Economic Cooperation and Development (OECD), and Intergovernmental Panel on Climate Change (IPCC), plus country data.

Logic: VOC emissions contribute to changes in ambient air quality and consequently impact human and ecosystem

Methodology: The data were merged as follows: UNFCCC data were available for NMVOC (non-methane volatile organic compounds) emissions in Gigagrams for 1990, 1994, and 2000. The most recent year available was used for each country. The OECD data were available for VOC emissions in thousand tonnes for 1980, 1985-2000 and the most recent available year 1998-2000 was extracted. The OECD data were then used to fill gaps in the UNFCCC data. The resulting data set was transformed to metric tons per populated land area (km²).

Mean	5.00	Max	131.09	2.5 Percentile	0.08		
Median	1.65	Min	0.01	97.5 Percentile	26.15		
Albania	0.57	Ecuador	0.84	Lebanon	35.09	Saudi Arabia	4.10
Algeria	0.86	Egypt	7.94	Liberia	1.65	Senegal	1.20
Angola	1.94	El Salvador	0.60	Libya	18.90	Serbia and Mont.	[1.36]
Argentina	0.51	Estonia	0.60	Lithuania	1.42	Sierra Leone	1.39
Armenia	1.64	Ethiopia	0.40	Macedonia	1.30	Slovakia	1.80
Australia	12.79	Finland	1.07	Madagascar	0.71	Slovenia	1.87
Austria	2.31	France	4.64	Malawi	1.46	South Africa	1.62
Azerbaijan	3.28	Gabon	0.96	Malaysia	1.87	South Korea	1.54
Bangladesh	5.22	Gambia	[1.07]	Mali	[0.8]	Spain	5.93
Belarus	1.24	Georgia	0.67	Mauritania	1.02	Sri Lanka	2.10
Belgium	6.30	Germany	4.50	Mexico	0.61	Sudan	1.70
Benin	1.08	Ghana	2.21	Moldova	1.88	Sweden	1.96
Bhutan	0.05	Greece	2.40	Mongolia	0.58	Switzerland	4.01
Bolivia	0.20	Guatemala	1.07	Morocco	0.52	Syria	1.97
Bosnia and Herz.	1.52	Guinea	0.71	Mozambique	0.93	Taiwan	25.68
Botswana	13.59	Guinea-Bissau	0.83	Myanmar	1.07	Tajikistan	0.79
Brazil	2.02	Guyana	1.06	Namibia	9.40	Tanzania	1.57
Bulgaria	1.16	Haiti	1.79	Nepal	2.07	Thailand	4.93
Burkina Faso	0.02	Honduras	1.31	Netherlands	6.77	Togo	0.56
Burundi	2.29	Hungary	1.87	New Zealand	3.30	Trin. and Tob.	17.43
Cambodia	2.73	Iceland	2.80	Nicaragua	0.41	Tunisia	1.01
Cameroon	1.26	India	3.19	Niger	1.01	Turkey	1.26
Canada	7.46	Indonesia	1.65	Nigeria	3.80	Turkmenistan	0.15
Central Afr. Rep.	3.29	Iran	0.98	North Korea	1.91	Uganda	2.46
Chad	0.96	Iraq	2.88	Norway	3.16	Ukraine	2.04
Chile	1.04	Ireland	1.48	Oman	1.45	United Arab. Em.	10.55
China	2.08	Israel	2.34	P. N. Guinea	0.08	United Kingdom	4.81
Colombia	0.76	Italy	5.10	Pakistan	1.53	United States	5.19
Congo	0.24	Jamaica	2.98	Panama	0.10	Uruguay	0.26
Costa Rica	0.65	Japan	5.10	Paraguay	0.01	Uzbekistan	0.28
Côte d'Ivoire	0.05	Jordan	1.42	Peru	0.54	Venezuela	3.88
Croatia	1.50	Kazakhstan	0.46	Philippines	1.05	Viet Nam	2.21
Cuba	0.33	Kenya	2.32	Poland	1.92	Yemen	[1.76]
Czech Rep.	3.08	Kuwait	7.08	Portugal	5.62	Zambia	2.55
Dem. Rep. Congo	0.09	Kyrgyzstan	0.77	Romania	1.76	Zimbabwe	1.19
Denmark	3.06	Laos	1.03	Russia	1.23		
Dominican Rep.	0.45	Latvia	1.79	Rwanda	5.13		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 22 **Code:** CARSKM **Reference Year:** MRYA 1995-2004

Description: Vehicles in use per populated land area

Units: Number of vehicles per populated land area (at 5 or more persons per square km)

Source*: United Nations Statistics Division (UNSD) plus country data.

Logic: This is a proxy measure of air pollution from the transportation sector, which is a large sector in terms of energy use and experiences the highest growth rates.

Methodology: The Gridded Population of the World dataset (CIESIN) was used to calculate the total land area in each country inhabited with a population density of greater than 5 persons per square km. This data set was then used as the denominator for the vehicles data, which includes registered cars, trucks and buses but not motorcycles.

	Mean	86.22	Max	3838.0	2.5 Percentile	0.06	
	Median	8.49	Min	0.01	97.5 Percentile	453.95	
Albania	7.22	Ecuador	3.74	Lebanon	139.11	Saudi Arabia	4.61
Algeria	8.50	Egypt	22.07	Liberia	0.37	Senegal	0.86
Angola	0.41	El Salvador	19.65	Libya	11.74	Serbia and Mont.	[8.35]
Argentina	7.15	Estonia	13.20	Lithuania	21.37	Sierra Leone	0.47
Armenia	[2.75]	Ethiopia	0.11	Macedonia	13.89	Slovakia	29.36
Australia	59.91	Finland	16.23	Madagascar	0.15	Slovenia	47.65
Austria	65.12	France	73.41	Malawi	0.43	South Africa	18.65
Azerbaijan	5.49	Gabon	0.70	Malaysia	1.83	South Korea	112.42
Bangladesh	1.55	Gambia	0.88	Mali	0.11	Spain	53.31
Belarus	7.08	Georgia	4.53	Mauritania	0.74	Sri Lanka	8.69
Belgium	172.76	Germany	132.41	Mexico	12.18	Sudan	0.07
Benin	0.12	Ghana	0.91	Moldova	7.70	Sweden	20.81
Bhutan	[0.22]	Greece	35.64	Mongolia	[1.55]	Switzerland	104.08
Bolivia	1.61	Guatemala	6.75	Morocco	4.41	Syria	2.85
Bosnia and Herz.	[5.09]	Guinea	0.15	Mozambique	0.23	Taiwan	161.78
Botswana	1.35	Guinea-Bissau	[0.38]	Myanmar	0.46	Tajikistan	1.46
Brazil	4.32	Guyana	0.59	Namibia	[2.74]	Tanzania	0.16
Bulgaria	21.60	Haiti	5.76	Nepal	1.81	Thailand	13.50
Burkina Faso	0.17	Honduras	0.81	Netherlands	166.94	Togo	0.94
Burundi	0.64	Hungary	31.10	New Zealand	40.56	Trin. and Tob.	56.11
Cambodia	0.09	Iceland	63.08	Nicaragua	1.92	Tunisia	7.62
Cameroon	0.41	India	4.08	Niger	0.23	Turkey	8.02
Canada	48.97	Indonesia	5.01	Nigeria	0.07	Turkmenistan	[5.11]
Central Afr. Rep.	0.05	Iran	0.94	North Korea	[3.93]	Uganda	0.72
Chad	0.05	Iraq	2.36	Norway	20.33	Ukraine	9.03
Chile	6.89	Ireland	25.48	Oman	8.47	United Arab. Em.	8.64
China	2.08	Israel	83.32	P. N. Guinea	0.38	United Kingdom	112.89
Colombia	2.46	Italy	144.98	Pakistan	2.31	United States	65.42
Congo	0.61	Jamaica	17.81	Panama	5.17	Uruguay	4.07
Costa Rica	10.18	Japan	197.11	Paraguay	[5.74]	Uzbekistan	[4.41]
Côte d'Ivoire	0.53	Jordan	16.23	Peru	2.47	Venezuela	5.75
Croatia	25.62	Kazakhstan	2.20	Philippines	14.61	Viet Nam	0.21
Cuba	0.09	Kenya	1.81	Poland	40.35	Yemen	3.22
Czech Rep.	49.18	Kuwait	43.08	Portugal	79.22	Zambia	0.01
Dem. Rep. Congo	0.11	Kyrgyzstan	1.23	Romania	15.91	Zimbabwe	3.15
Denmark	52.46	Laos	[0.25]	Russia	7.84		
Dominican Rep.	17.58	Latvia	11.53	Rwanda	1.11		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 23 **Code:** FOREST **Reference Year:** 1990 to 2000

Description: Annual average forest cover change rate from 1990 to 2000

Units: Average annual change rate in forest cover from 1990 to 2000

Source*: United Nations Food and Agriculture Organization (FAO).

Logic: When forests are lost or severely degraded, their capacity to function as regulators for the environment is also lost, increasing flood and erosion hazards, reducing soil fertility, and contributing to the loss of plant and animal life. As a result, the sustainable provision of goods and services from forests is jeopardized.

Methodology: For area statistics, FRA 2000 generated information at three scales - country (based on surveys of national inventory and mapping reports), region (FRA 2000 remote sensing survey) and world (FRA 2000 global mapping). For the estimates of area and area change, only country- and regional-level information was used, as the global forest map did not provide sufficient precision.

	Mean		Max		2.5 Percentile		97.5 Percentile
	-0.11	Median	0	Min	-9		-4.33
Albania	-0.80	Ecuador	-1.20	Lebanon	-0.40	Saudi Arabia	0.00
Algeria	1.30	Egypt	3.30	Liberia	-2.00	Senegal	-0.70
Angola	-0.20	El Salvador	-4.60	Libya	1.40	Serbia and Mont.	-0.10
Argentina	-0.80	Estonia	0.60	Lithuania	0.20	Sierra Leone	-2.90
Armenia	1.30	Ethiopia	-0.80	Macedonia	0.00	Slovakia	0.90
Australia	-0.18	Finland	[1.27]	Madagascar	-0.90	Slovenia	0.20
Austria	0.20	France	0.40	Malawi	-2.40	South Africa	-0.10
Azerbaijan	1.30	Gabon	[0.6]	Malaysia	-1.20	South Korea	-0.10
Bangladesh	1.30	Gambia	1.00	Mali	-0.70	Spain	0.60
Belarus	3.20	Georgia	0.00	Mauritania	-2.70	Sri Lanka	-1.60
Belgium	-0.20	Germany	0.00	Mexico	-1.10	Sudan	-1.40
Benin	-2.30	Ghana	-1.70	Moldova	0.20	Sweden	[0.6]
Bhutan	0.00	Greece	0.90	Mongolia	-0.50	Switzerland	0.40
Bolivia	-0.30	Guatemala	-1.70	Morocco	[0.04]	Syria	0.00
Bosnia and Herz.	0.00	Guinea	-0.50	Mozambique	-0.20	Taiwan	[0.53]
Botswana	-0.90	Guinea-Bissau	-0.90	Myanmar	-1.40	Tajikistan	0.50
Brazil	-0.40	Guyana	-0.30	Namibia	-0.90	Tanzania	-0.20
Bulgaria	0.60	Haiti	-5.70	Nepal	-1.80	Thailand	-0.70
Burkina Faso	-0.20	Honduras	-1.00	Netherlands	0.30	Togo	-3.40
Burundi	-9.00	Hungary	0.40	New Zealand	0.50	Trin. and Tob.	-0.80
Cambodia	-0.60	Iceland	2.20	Nicaragua	-3.00	Tunisia	0.20
Cameroon	-0.90	India	0.10	Niger	-3.70	Turkey	0.20
Canada	0.00	Indonesia	-1.20	Nigeria	-2.60	Turkmenistan	0.00
Central Afr. Rep.	-0.10	Iran	0.00	North Korea	0.00	Uganda	-2.00
Chad	-0.60	Iraq	0.00	Norway	0.40	Ukraine	0.30
Chile	-0.10	Ireland	3.00	Oman	5.30	United Arab. Em.	2.80
China	1.20	Israel	4.90	P. N. Guinea	-0.40	United Kingdom	0.60
Colombia	-0.40	Italy	0.30	Pakistan	-1.50	United States	0.20
Congo	-0.10	Jamaica	-1.50	Panama	-1.60	Uruguay	5.00
Costa Rica	-0.80	Japan	[0.72]	Paraguay	-0.50	Uzbekistan	0.20
Côte d'Ivoire	-3.10	Jordan	0.00	Peru	-0.40	Venezuela	-0.40
Croatia	0.10	Kazakhstan	2.20	Philippines	-1.40	Viet Nam	0.50
Cuba	1.30	Kenya	-0.50	Poland	0.20	Yemen	-1.90
Czech Rep.	[-0.13]	Kuwait	3.50	Portugal	1.70	Zambia	-2.40
Dem. Rep. Congo	-0.40	Kyrgyzstan	2.60	Romania	0.20	Zimbabwe	-1.50
Denmark	0.20	Laos	-0.40	Russia	[1.28]		
Dominican Rep.	0.00	Latvia	0.40	Rwanda	-3.90		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 24 **Code:** ACEXC **Reference Year:** 1990

Description: Acidification exceedance from anthropogenic sulfur deposition

Units: Percentage of total land area at risk of acidification exceedance

Source*: Stockholm Environment Institute at York.

Logic: Exceedance of critical SO₂ loading represents an indicator for ecosystems under stress due to acidification from anthropogenic sulfur deposition. Since it takes into account both the deposition and the ability of the ecosystem to respond to stress, it is a good indicator of the ecosystems' sustainability.

Methodology: From a map of acidification exceedance, the area of terrestrial ecosystems at risk were summed within each country and then the percentage of a country at risk of exceedance was calculated.

	Mean		4.6	Max	97.48	2.5 Percentile	0
	Median		0	Min	0	97.5 Percentile	53.52
Albania	2.54	Ecuador	0.00	Lebanon	0.00	Saudi Arabia	0.00
Algeria	0.00	Egypt	0.00	Liberia	0.00	Senegal	0.00
Angola	1.83	El Salvador	0.00	Libya	0.00	Serbia and Mont.	0.00
Argentina	0.00	Estonia	0.00	Lithuania	0.00	Sierra Leone	0.00
Armenia	0.00	Ethiopia	0.00	Macedonia	97.48	Slovakia	27.23
Australia	0.00	Finland	1.19	Madagascar	0.00	Slovenia	40.11
Austria	50.81	France	18.84	Malawi	0.00	South Africa	0.00
Azerbaijan	0.00	Gabon	0.00	Malaysia	0.00	South Korea	58.90
Bangladesh	0.00	Gambia	0.00	Mali	0.00	Spain	3.65
Belarus	4.91	Georgia	0.00	Mauritania	0.00	Sri Lanka	0.00
Belgium	70.83	Germany	51.88	Mexico	0.68	Sudan	0.00
Benin	0.00	Ghana	0.00	Moldova	0.00	Sweden	34.37
Bhutan	0.00	Greece	2.77	Mongolia	0.00	Switzerland	36.90
Bolivia	0.00	Guatemala	0.00	Morocco	0.00	Syria	0.00
Bosnia and Herz.	34.07	Guinea	0.00	Mozambique	0.00	Taiwan	0.00
Botswana	0.00	Guinea-Bissau	0.00	Myanmar	0.77	Tajikistan	0.00
Brazil	0.00	Guyana	0.00	Namibia	0.00	Tanzania	0.00
Bulgaria	14.10	Haiti	0.00	Nepal	0.00	Thailand	0.27
Burkina Faso	0.00	Honduras	0.00	Netherlands	43.81	Togo	0.00
Burundi	0.00	Hungary	4.93	New Zealand	0.00	Trin. and Tob.	0.00
Cambodia	0.00	Iceland	0.00	Nicaragua	0.00	Tunisia	0.00
Cameroon	0.00	India	0.00	Niger	0.00	Turkey	0.02
Canada	5.39	Indonesia	8.15	Nigeria	0.00	Turkmenistan	0.00
Central Afr. Rep.	0.00	Iran	0.00	North Korea	2.43	Uganda	4.27
Chad	0.00	Iraq	0.00	Norway	15.96	Ukraine	0.00
Chile	0.00	Ireland	54.16	Oman	0.00	United Arab. Em.	0.00
China	15.66	Israel	0.00	P. N. Guinea	0.00	United Kingdom	45.75
Colombia	0.00	Italy	17.94	Pakistan	0.00	United States	13.74
Congo	0.43	Jamaica	0.00	Panama	0.00	Uruguay	0.00
Costa Rica	0.00	Japan	10.99	Paraguay	0.00	Uzbekistan	0.00
Côte d'Ivoire	0.00	Jordan	0.00	Peru	0.00	Venezuela	0.00
Croatia	4.69	Kazakhstan	0.00	Philippines	0.00	Viet Nam	32.17
Cuba	0.00	Kenya	0.00	Poland	53.45	Yemen	0.00
Czech Rep.	89.22	Kuwait	0.00	Portugal	3.24	Zambia	5.13
Dem. Rep. Congo	0.00	Kyrgyzstan	0.00	Romania	19.27	Zimbabwe	0.00
Denmark	54.88	Laos	29.22	Russia	0.33		
Dominican Rep.	0.00	Latvia	1.95	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 25 **Code:** GR2050 **Reference Year:** 2004

Description: Percentage change in projected population 2004-2050

Units: Percentage change in projected population 2004-2050

Source*: Population Reference Bureau (PRB).

Logic: The projected change in population between 2004 and 2050 provides an indication of the trajectory of population change, which has an impact on a country's per capita natural resource availability and environmental conditions. Projections can be made with a fair degree of accuracy because of the influence of a country's current age structure and fertility on likely future growth.

Methodology: The projected population in 2050 was divided by the population in 2004 to calculate a percentage change in the population between the two dates.

Mean	58.58	Max	327	2.5 Percentile	-27.53		
Median	42	Min	-43	97.5 Percentile	225.3		
Albania	15.00	Ecuador	54.00	Lebanon	53.00	Saudi Arabia	120.00
Algeria	37.00	Egypt	74.00	Liberia	182.00	Senegal	126.00
Angola	206.00	El Salvador	48.00	Libya	92.00	Serbia and Mont.	-4.00
Argentina	40.00	Estonia	-23.00	Lithuania	-9.00	Sierra Leone	100.00
Armenia	-24.00	Ethiopia	139.00	Macedonia	3.00	Slovakia	-13.00
Australia	31.00	Finland	-8.00	Madagascar	274.00	Slovenia	-15.00
Austria	1.00	France	7.00	Malawi	296.00	South Africa	-11.00
Azerbaijan	40.00	Gabon	84.00	Malaysia	83.00	South Korea	-8.00
Bangladesh	98.00	Gambia	169.00	Mali	243.00	Spain	-3.00
Belarus	-13.00	Georgia	-32.00	Mauritania	152.00	Sri Lanka	10.00
Belgium	5.00	Germany	-9.00	Mexico	41.00	Sudan	115.00
Benin	148.00	Ghana	85.00	Moldova	-28.00	Sweden	18.00
Bhutan	113.00	Greece	-12.00	Mongolia	72.00	Switzerland	-3.00
Bolivia	75.00	Guatemala	115.00	Morocco	47.00	Syria	95.00
Bosnia and Herz.	-15.00	Guinea	231.00	Mozambique	63.00	Taiwan	-3.00
Botswana	-43.00	Guinea-Bissau	207.00	Myanmar	29.00	Tajikistan	52.00
Brazil	24.00	Guyana	-34.00	Namibia	35.00	Tanzania	105.00
Bulgaria	-38.00	Haiti	97.00	Nepal	105.00	Thailand	15.00
Burkina Faso	191.00	Honduras	109.00	Netherlands	8.00	Togo	74.00
Burundi	147.00	Hungary	-25.00	New Zealand	26.00	Trin. and Tob.	-7.00
Cambodia	104.00	Iceland	22.00	Nicaragua	93.00	Tunisia	22.00
Cameroon	92.00	India	50.00	Niger	327.00	Turkey	37.00
Canada	16.00	Indonesia	41.00	Nigeria	124.00	Turkmenistan	53.00
Central Afr. Rep.	65.00	Iran	43.00	North Korea	10.00	Uganda	217.00
Chad	206.00	Iraq	124.00	Norway	22.00	Ukraine	-19.00
Chile	39.00	Ireland	16.00	Oman	93.00	United Arab. Em.	35.00
China	11.00	Israel	56.00	P. N. Guinea	90.00	United Kingdom	10.00
Colombia	48.00	Italy	-10.00	Pakistan	85.00	United States	43.00
Congo	179.00	Jamaica	39.00	Panama	58.00	Uruguay	24.00
Costa Rica	49.00	Japan	-21.00	Paraguay	101.00	Uzbekistan	84.00
Côte d'Ivoire	63.00	Jordan	80.00	Peru	55.00	Venezuela	59.00
Croatia	-14.00	Kazakhstan	-1.00	Philippines	76.00	Viet Nam	41.00
Cuba	-2.00	Kenya	54.00	Poland	-15.00	Yemen	255.00
Czech Rep.	-10.00	Kuwait	182.00	Portugal	-11.00	Zambia	70.00
Dem. Rep. Congo	211.00	Kyrgyzstan	62.00	Romania	-27.00	Zimbabwe	15.00
Denmark	-3.00	Laos	98.00	Russia	-17.00		
Dominican Rep.	52.00	Latvia	-24.00	Rwanda	104.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	26	Code:	TFR	Reference Year:	2004		
Description:	Total Fertility Rate						
Units:	Average number of births per woman based on current age-specific fertility rates						
Source*:	Population Reference Bureau (PRB).						
Logic:	Fertility contributes significantly to population growth, and thus to pressures on natural resources.						
Methodology:	The average number of children a woman will have, assuming that current age-specific birth rates remain constant throughout her childbearing years (usually considered to be ages 15 to 49).						
Mean	3.19	Max	8	2.5 Percentile			1.18
Median	2.65	Min	0	97.5 Percentile			6.88
Albania	2.10	Ecuador	3.00	Lebanon	3.20	Saudi Arabia	4.81
Algeria	2.50	Egypt	3.19	Liberia	6.80	Senegal	5.12
Angola	6.80	El Salvador	2.97	Libya	3.57	Serbia and Mont.	1.71
Argentina	2.44	Estonia	1.41	Lithuania	1.27	Sierra Leone	6.50
Armenia	1.21	Ethiopia	5.90	Macedonia	1.73	Slovakia	1.21
Australia	1.73	Finland	1.75	Madagascar	5.77	Slovenia	1.20
Austria	1.36	France	1.89	Malawi	6.60	South Africa	2.76
Azerbaijan	1.84	Gabon	4.30	Malaysia	3.29	South Korea	1.17
Bangladesh	3.31	Gambia	5.61	Mali	7.00	Spain	1.26
Belarus	1.23	Georgia	1.42	Mauritania	5.90	Sri Lanka	1.97
Belgium	1.62	Germany	1.30	Mexico	2.80	Sudan	5.35
Benin	5.60	Ghana	4.45	Moldova	1.21	Sweden	1.73
Bhutan	4.70	Greece	1.34	Mongolia	2.66	Switzerland	1.37
Bolivia	3.85	Guatemala	4.38	Morocco	2.47	Syria	3.80
Bosnia and Herz.	1.23	Guinea	6.01	Mozambique	5.50	Taiwan	1.22
Botswana	3.46	Guinea-Bissau	7.10	Myanmar	3.08	Tajikistan	3.06
Brazil	2.18	Guyana	2.38	Namibia	4.20	Tanzania	5.30
Bulgaria	1.23	Haiti	4.70	Nepal	4.10	Thailand	1.70
Burkina Faso	6.24	Honduras	4.10	Netherlands	1.78	Togo	5.50
Burundi	6.16	Hungary	1.27	New Zealand	1.96	Trin. and Tob.	1.63
Cambodia	4.50	Iceland	1.99	Nicaragua	3.75	Tunisia	2.00
Cameroon	4.88	India	3.06	Niger	8.00	Turkey	2.46
Canada	1.50	Indonesia	2.57	Nigeria	5.70	Turkmenistan	2.89
Central Afr. Rep.	4.86	Iran	2.50	North Korea	2.04	Uganda	6.90
Chad	6.60	Iraq	5.01	Norway	1.80	Ukraine	1.17
Chile	2.35	Ireland	1.98	Oman	4.10	United Arab. Em.	2.54
China	1.70	Israel	2.93	P. N. Guinea	4.14	United Kingdom	1.71
Colombia	2.58	Italy	1.29	Pakistan	4.77	United States	2.02
Congo	6.29	Jamaica	2.42	Panama	2.70	Uruguay	2.21
Costa Rica	2.10	Japan	1.28	Paraguay	3.84	Uzbekistan	2.92
Côte d'Ivoire	5.20	Jordan	3.67	Peru	2.80	Venezuela	2.83
Croatia	1.30	Kazakhstan	2.03	Philippines	3.54	Viet Nam	2.10
Cuba	1.63	Kenya	5.00	Poland	1.25	Yemen	7.00
Czech Rep.	1.18	Kuwait	4.04	Portugal	1.44	Zambia	5.64
Dem. Rep. Congo	6.84	Kyrgyzstan	2.59	Romania	1.23	Zimbabwe	3.96
Denmark	1.76	Laos	4.88	Russia	1.39		
Dominican Rep.	3.00	Latvia	1.30	Rwanda	5.80		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 27 **Code:** EFPC **Reference Year:** MRYA 1999-2000

Description: Ecological Footprint per capita

Units: Hectares of biologically productive land required per capita

Source*: Redefining Progress, plus country data.

Logic: The ecological footprint is a measure of the biologically productive land that is required to sustain a country's population at current consumption levels. Countries whose footprints exceed their own arable land area are consuming at levels that are unsustainable in the long term.

Methodology: The data reflect information from the Ecological Footprint of Nations 2004. The reference year is 2000. For Niger, Somalia, Togo, Afghanistan, Uzbekistan, and Yemen, the 1999 data from the Living Planet Report 2002 were

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	2.55		9.57		0.62		
	1.73		0.5		8.15		
Albania	1.25	Ecuador	1.77	Lebanon	2.37	Saudi Arabia	4.05
Algeria	1.67	Egypt	1.16	Liberia	0.85	Senegal	1.23
Angola	0.76	El Salvador	1.72	Libya	3.21	Serbia and Mont.	[2]
Argentina	3.18	Estonia	5.37	Lithuania	3.87	Sierra Leone	0.88
Armenia	0.75	Ethiopia	0.67	Macedonia	2.69	Slovakia	3.27
Australia	7.09	Finland	7.00	Madagascar	0.97	Slovenia	3.52
Austria	4.87	France	5.74	Malawi	0.64	South Africa	3.52
Azerbaijan	1.91	Gabon	1.87	Malaysia	2.99	South Korea	2.43
Bangladesh	0.50	Gambia	1.01	Mali	1.16	Spain	4.90
Belarus	3.17	Georgia	0.85	Mauritania	2.36	Sri Lanka	0.88
Belgium	5.11	Germany	4.26	Mexico	2.59	Sudan	1.20
Benin	0.92	Ghana	1.23	Moldova	1.13	Sweden	7.95
Bhutan	[1.85]	Greece	4.78	Mongolia	5.68	Switzerland	5.26
Bolivia	1.67	Guatemala	1.30	Morocco	0.92	Syria	1.74
Bosnia and Herz.	1.49	Guinea	1.22	Mozambique	0.56	Taiwan	4.67
Botswana	2.70	Guinea-Bissau	1.05	Myanmar	0.76	Tajikistan	0.65
Brazil	2.39	Guyana	[2.52]	Namibia	2.52	Tanzania	0.89
Bulgaria	2.65	Haiti	0.62	Nepal	0.57	Thailand	1.41
Burkina Faso	1.19	Honduras	1.54	Netherlands	3.81	Togo	0.86
Burundi	0.63	Hungary	3.26	New Zealand	8.13	Trin. and Tob.	1.73
Cambodia	1.03	Iceland	[6.65]	Nicaragua	1.57	Tunisia	1.51
Cameroon	1.24	India	0.76	Niger	1.15	Turkey	2.20
Canada	8.56	Indonesia	0.98	Nigeria	1.10	Turkmenistan	2.60
Central Afr. Rep.	1.48	Iran	1.85	North Korea	4.07	Uganda	1.29
Chad	1.31	Iraq	[2.19]	Norway	8.17	Ukraine	3.53
Chile	3.04	Ireland	4.97	Oman	[4.27]	United Arab. Em.	8.97
China	1.36	Israel	3.97	P. N. Guinea	1.25	United Kingdom	4.72
Colombia	1.51	Italy	3.26	Pakistan	0.67	United States	9.57
Congo	0.80	Jamaica	2.15	Panama	1.89	Uruguay	3.32
Costa Rica	1.91	Japan	3.91	Paraguay	2.29	Uzbekistan	1.91
Côte d'Ivoire	1.60	Jordan	1.39	Peru	1.26	Venezuela	2.42
Croatia	2.76	Kazakhstan	3.75	Philippines	1.11	Viet Nam	0.76
Cuba	1.53	Kenya	1.08	Poland	3.40	Yemen	0.71
Czech Rep.	4.24	Kuwait	8.01	Portugal	5.34	Zambia	1.02
Dem. Rep. Congo	0.62	Kyrgyzstan	1.10	Romania	2.46	Zimbabwe	1.05
Denmark	5.32	Laos	1.09	Russia	4.28		
Dominican Rep.	1.69	Latvia	4.40	Rwanda	0.78		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 28 **Code:** RECYCLE **Reference Year:** MRYA 1996-2003

Description: Waste recycling rates

Units: Percentage of solid waste recycled for 1998 for selected cities in each country for non-OECD countries and the percentage of glass, paper and cardboard recycled for OECD countries

Source*: Organisation for Economic Co-operation and Development (OECD) and United Nations Human Settlement Programme (UNHABITAT), plus country data.

Logic: Waste recycling reduces the impact on the environment by using resources more efficiently and by reducing the stream of waste for landfills and incineration.

Methodology: If both recycling rates were available for an OECD country, the maximum of the recycling rates for glass and "paper and cardboard" was used. If neither value was available, it was classified as missing. The solid waste recycling data refer to municipal waste, waste handled by the scrapping industry and other waste from economic activities. Material that is collected for recycling by private sources is included. Internal recycling, i.e. within industrial establishments, is excluded. Recycling is defined as any reuse of material in a production process that diverts it from the waste stream, except reuse as fuel. Reprocessing as the same type of product, and for different purpose, are both included. "Recycling rates" are the ratios of the quantity collected for recycling to the apparent consumption (economic notion of domestic production of the respective material + imports - exports). Definitions may vary from one country to another.

Mean	20.12	Max	91	2.5 Percentile	0		
Median	8	Min	0	97.5 Percentile	86.45		
Albania	0.00	Ecuador	20.00	Lebanon	6.00	Saudi Arabia	..
Algeria	..	Egypt	0.00	Liberia	0.00	Senegal	0.00
Angola	..	El Salvador	0.00	Libya	20.00	Serbia and Mont.	0.70
Argentina	0.30	Estonia	0.00	Lithuania	..	Sierra Leone	..
Armenia	0.00	Ethiopia	0.00	Macedonia	..	Slovakia	40.00
Australia	47.00	Finland	89.00	Madagascar	..	Slovenia	8.00
Austria	84.00	France	55.00	Malawi	..	South Africa	0.00
Azerbaijan	..	Gabon	0.00	Malaysia	10.00	South Korea	67.00
Bangladesh	35.00	Gambia	0.00	Mali	0.00	Spain	54.00
Belarus	0.00	Georgia	..	Mauritania	1.00	Sri Lanka	0.00
Belgium	87.00	Germany	83.00	Mexico	13.00	Sudan	..
Benin	25.00	Ghana	0.00	Moldova	..	Sweden	86.00
Bhutan	..	Greece	35.00	Mongolia	0.00	Switzerland	91.00
Bolivia	2.00	Guatemala	5.00	Morocco	0.00	Syria	21.00
Bosnia and Herz.	..	Guinea	5.00	Mozambique	0.00	Taiwan	14.60
Botswana	1.00	Guinea-Bissau	..	Myanmar	14.00	Tajikistan	..
Brazil	22.00	Guyana	..	Namibia	4.50	Tanzania	..
Bulgaria	22.80	Haiti	..	Nepal	15.90	Thailand	0.00
Burkina Faso	12.00	Honduras	..	Netherlands	78.00	Togo	0.00
Burundi	0.00	Hungary	38.00	New Zealand	65.00	Trin. and Tob.	..
Cambodia	15.00	Iceland	..	Nicaragua	..	Tunisia	5.00
Cameroon	8.00	India	14.50	Niger	..	Turkey	40.00
Canada	54.00	Indonesia	30.00	Nigeria	..	Turkmenistan	..
Central Afr. Rep.	0.00	Iran	..	North Korea	..	Uganda	2.50
Chad	0.00	Iraq	..	Norway	85.00	Ukraine	..
Chile	8.00	Ireland	35.00	Oman	..	United Arab. Em.	..
China	..	Israel	..	P. N. Guinea	..	United Kingdom	41.00
Colombia	11.50	Italy	40.00	Pakistan	12.00	United States	42.00
Congo	26.20	Jamaica	..	Panama	0.00	Uruguay	0.00
Costa Rica	..	Japan	78.00	Paraguay	4.00	Uzbekistan	..
Côte d'Ivoire	3.00	Jordan	0.00	Peru	7.00	Venezuela	..
Croatia	13.00	Kazakhstan	..	Philippines	0.00	Viet Nam	15.00
Cuba	0.00	Kenya	1.00	Poland	17.20	Yemen	5.00
Czech Rep.	42.00	Kuwait	0.00	Portugal	40.00	Zambia	..
Dem. Rep. Congo	4.90	Kyrgyzstan	0.00	Romania	..	Zimbabwe	16.00
Denmark	65.00	Laos	..	Russia	13.90		
Dominican Rep.	..	Latvia	0.00	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #: 29 **Code:** HAZWST **Reference Year:** MRYA 1992-2001

Description: Generation of hazardous waste

Units: Metric tons of hazardous waste to be managed in the country

Source*: United Nations Environment Program, plus country data.

Logic: Most countries in the world are confronting real difficulties in safely disposing of their hazardous wastes. The more hazardous waste generated, the less likely that a long-term sustainable solution can be found for their proper disposal.

Methodology: The data from the Basel Convention on the amounts of hazardous waste to be managed in the country (thousand tonnes) have been extended by OECD data for the following countries: USA, Japan, and New Zealand. The methodologies underlying both data sources may not be fully comparable although both source refer to "amounts to be managed in the country" (a comparison of OECD data and Basel Convention data for countries reporting to both sources indicates that substantial differences can exist). The objective lies therefore in increasing geographical coverage rather than complete comparability of the data. All Basel data refer to the year 2000, the additional 5 OECD values refer to years between 1992 and 1999. Also note a potential rounding bias due to the fact that the OECD data are reported in thousand metric tons while the Basel data are in metric tons.

	Mean		Max		2.5 Percentile		67
	Median		Min		97.5 Percentile		14849000
	2244961		36312000				
	325439		24				
Albania	253	Ecuador	85859	Lebanon	50000	Saudi Arabia	23000
Algeria	58	Egypt	170000	Liberia	..	Senegal	..
Angola	..	El Salvador	..	Libya	..	Serbia and Mont.	..
Argentina	..	Estonia	7540480	Lithuania	11138	Sierra Leone	..
Armenia	429854	Ethiopia	..	Macedonia	15000	Slovakia	16600
Australia	648785	Finland	1203000	Madagascar	..	Slovenia	66779
Austria	969000	France	9000000	Malawi	64055	South Africa	..
Azerbaijan	..	Gabon	..	Malaysia	42019	South Korea	28202
Bangladesh	..	Gambia	200000	Mali	..	Spain	32228
Belarus	1387551	Georgia	92800	Mauritania	..	Sri Lanka	40617
Belgium	2016123	Germany	15532000	Mexico	20742	Sudan	..
Benin	428040	Ghana	..	Moldova	11879	Sweden	80130
Bhutan	..	Greece	287000	Mongolia	44500	Switzerland	10870
Bolivia	..	Guatemala	..	Morocco	98700	Syria	53010
Bosnia and Herz.	..	Guinea	..	Mozambique	..	Taiwan	67390
Botswana	8848	Guinea-Bissau	..	Myanmar	..	Tajikistan	..
Brazil	..	Guyana	..	Namibia	..	Tanzania	..
Bulgaria	754703	Haiti	..	Nepal	575	Thailand	..
Burkina Faso	..	Honduras	..	Netherlands	28356	Togo	..
Burundi	..	Hungary	3413032	New Zealand	47900	Trin. and Tob.	24385
Cambodia	..	Iceland	13408	Nicaragua	..	Tunisia	71067
Cameroon	..	India	..	Niger	23782	Turkey	11660
Canada	5900000	Indonesia	17131	Nigeria	589	Turkmenistan	..
Central Afr. Rep.	..	Iran	167812	North Korea	..	Uganda	38.00
Chad	..	Iraq	..	Norway	63000	Ukraine	25445
Chile	..	Ireland	491669	Oman	24209	United Arab. Em.	22869
China	9520000	Israel	325439	P. N. Guinea	..	United Kingdom	55683
Colombia	..	Italy	4279233	Pakistan	16271	United States	36312
Congo	..	Jamaica	..	Panama	..	Uruguay	..
Costa Rica	..	Japan	2652000	Paraguay	..	Uzbekistan	28471
Côte d'Ivoire	..	Jordan	17390	Peru	..	Venezuela	..
Croatia	58285	Kazakhstan	..	Philippines	..	Viet Nam	10307
Cuba	941118	Kenya	..	Poland	10293	Yemen	42500
Czech Rep.	2785000	Kuwait	24534	Portugal	25846	Zambia	15810
Dem. Rep. Congo	..	Kyrgyzstan	6779859	Romania	79216	Zimbabwe	..
Denmark	374303	Laos	..	Russia	12800		
Dominican Rep.	..	Latvia	92800	Rwanda	..		

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #: 30 **Code:** BODWAT **Reference Year:** BOD: MRYA 1990-2000; Population: 1995
Freshwater availability: long-term average 1961-1995

Description: Industrial organic water pollutant (BOD) emissions per available freshwater

Units: Metric tons of daily BOD emissions per cubic km of available freshwater

Source*: World Bank, plus country data.

Logic: Emissions of organic pollutants from industrial activities degrade water quality by contributing to the eutrophication of water bodies. Given these considerations, the biochemical oxygen demand (BOD) emissions have been normalized per amount of freshwater available (internal water availability + inflows from other countries).

Methodology: Emissions of organic water pollutants were measured by biochemical oxygen demand, which is the amount of oxygen that bacteria in the water will consume in breaking down waste. This is a standard water-treatment test for the presence of organic pollutants. The data from the World Bank, which represent daily BOD emissions in kilograms, were normalized by water availability from the WaterGap version 2.1B model (Kassel University).

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	-2.51		38.58		0.00		
	0.62		-495.79		10.90		
Albania	0.29	Ecuador	0.10	Lebanon	4.23	Saudi Arabia	3.87
Algeria	2.14	Egypt	1.61	Liberia	[-1.91]	Senegal	0.24
Angola	0.00	El Salvador	1.18	Libya	[3.5]	Serbia and Mont.	0.54
Argentina	0.19	Estonia	[2.04]	Lithuania	1.19	Sierra Leone	0.03
Armenia	2.08	Ethiopia	0.15	Macedonia	4.16	Slovakia	0.75
Australia	0.16	Finland	0.68	Madagascar	[-1.77]	Slovenia	1.29
Austria	0.94	France	1.17	Malawi	0.20	South Africa	4.03
Azerbaijan	1.88	Gabon	0.01	Malaysia	0.38	South Korea	5.38
Bangladesh	0.24	Gambia	0.09	Mali	[-1.87]	Spain	4.21
Belarus	[1.18]	Georgia	[1.24]	Mauritania	[-1.06]	Sri Lanka	2.59
Belgium	5.40	Germany	3.83	Mexico	0.70	Sudan	[-0.84]
Benin	[-0.21]	Ghana	0.27	Moldova	1.37	Sweden	0.75
Bhutan	[-0.3]	Greece	1.22	Mongolia	0.12	Switzerland	3.16
Bolivia	0.02	Guatemala	0.13	Morocco	4.94	Syria	0.42
Bosnia and Herz.	0.16	Guinea	[-1.02]	Mozambique	0.04	Taiwan	38.58
Botswana	0.16	Guinea-Bissau	[-1.37]	Myanmar	0.00	Tajikistan	[-0.7]
Brazil	0.07	Guyana	[-1.67]	Namibia	0.08	Tanzania	0.18
Bulgaria	0.56	Haiti	[1.47]	Nepal	0.20	Thailand	0.71
Burkina Faso	0.27	Honduras	0.32	Netherlands	1.34	Togo	[0.16]
Burundi	0.11	Hungary	1.28	New Zealand	0.16	Trin. and Tob.	4.90
Cambodia	0.02	Iceland	0.08	Nicaragua	[-3.11]	Tunisia	7.78
Cameroon	0.04	India	0.88	Niger	[0.03]	Turkey	0.97
Canada	0.12	Indonesia	0.34	Nigeria	0.25	Turkmenistan	[0.97]
Central Afr. Rep.	0.00	Iran	1.16	North Korea	[5.02]	Uganda	[0.7]
Chad	[2.17]	Iraq	0.28	Norway	0.21	Ukraine	5.03
Chile	0.25	Ireland	0.99	Oman	2.01	United Arab. Em.	[4.95]
China	2.74	Israel	15.63	P. N. Guinea	[-2.66]	United Kingdom	3.04
Colombia	0.03	Italy	4.04	Pakistan	0.82	United States	0.88
Congo	[-3.42]	Jamaica	2.02	Panama	0.15	Uruguay	0.02
Costa Rica	0.41	Japan	4.06	Paraguay	0.01	Uzbekistan	[3.55]
Côte d'Ivoire	0.11	Jordan	10.43	Peru	0.03	Venezuela	0.07
Croatia	0.31	Kazakhstan	[1.59]	Philippines	0.75	Viet Nam	[0.77]
Cuba	[1.52]	Kenya	0.75	Poland	5.76	Yemen	0.02
Czech Rep.	12.50	Kuwait	-495.79	Portugal	2.41	Zambia	0.08
Dem. Rep. Congo	[-2.57]	Kyrgyzstan	0.73	Romania	1.60	Zimbabwe	0.32
Denmark	5.74	Laos	[-1.47]	Russia	0.41		
Dominican Rep.	[1.87]	Latvia	0.76	Rwanda	[0.86]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 31 **Code:** FERTHA **Reference Year:** MRYA 2001-2003

Description: Fertilizer consumption per hectare of arable land

Units: 100 grams fertilizer per hectare of arable land

Source*: World Bank, plus country data.

Logic: Excessive use of fertilizers from agricultural activities has a negative impact on soil and water, altering chemistry and levels of nutrients and leading to eutrophication of water bodies.

Methodology: Fertilizer consumption (100 grams per hectare of arable land) measures the quantity of plant nutrients used per unit of arable land. Fertilizer products cover nitrogenous, potash, and phosphate fertilizers (including ground rock phosphate). The time reference for fertilizer consumption is the crop year (July through June). Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Original source: Food and Agriculture Organization, Production Yearbook and data files.

	Mean		Max		2.5 Percentile		0.00
	Median		Min		97.5 Percentile		6324.85
Albania	323.53	Ecuador	1423.46	Lebanon	3210.7	Saudi Arabia	1066.0
Algeria	137.38	Egypt	4574.16	Liberia	0.00	Senegal	162.20
Angola	0.00	El Salvador	1108.70	Libya	308.54	Serbia and Mont.	[834.0
Argentina	255.11	Estonia	622.68	Lithuania	552.90	Sierra Leone	6.00
Armenia	101.01	Ethiopia	125.95	Macedonia	535.34	Slovakia	865.46
Australia	489.62	Finland	1355.55	Madagascar	22.97	Slovenia	4188.8
Austria	1355.25	France	2264.87	Malawi	103.44	South Africa	500.92
Azerbaijan	70.00	Gabon	9.23	Malaysia	6281.7	South Korea	4225.8
Bangladesh	1675.70	Gambia	32.00	Mali	90.13	Spain	1676.9
Belarus	1272.22	Georgia	528.30	Mauritania	40.98	Sri Lanka	2616.5
Belgium	2070.00	Germany	2211.39	Mexico	753.91	Sudan	48.67
Benin	155.50	Ghana	27.57	Moldova	28.02	Sweden	1065.3
Bhutan	0.00	Greece	1544.12	Mongolia	26.69	Switzerland	2219.1
Bolivia	41.79	Guatemala	1345.18	Morocco	411.66	Syria	599.98
Bosnia and Herz.	472.46	Guinea	35.96	Mozambique	62.25	Taiwan	1525.6
Botswana	124.32	Guinea-Bissau	80.00	Myanmar	164.36	Tajikistan	130.11
Brazil	1150.60	Guyana	270.83	Namibia	3.68	Tanzania	56.25
Bulgaria	354.05	Haiti	178.51	Nepal	226.71	Thailand	1144.6
Burkina Faso	82.32	Honduras	1418.54	Netherlands	4519.3	Togo	76.49
Burundi	38.89	Hungary	700.39	New Zealand	5927.8	Trin. and Tob.	1448.6
Cambodia	0.00	Iceland	30285.71	Nicaragua	117.39	Tunisia	391.85
Cameroon	88.09	India	1073.24	Niger	11.10	Turkey	700.97
Canada	521.77	Indonesia	1231.02	Nigeria	77.54	Turkmenistan	668.57
Central Afr. Rep.	3.11	Iran	925.22	North Korea	1148.0	Uganda	11.37
Chad	48.61	Iraq	576.35	Norway	2170.4	Ukraine	145.56
Chile	2426.84	Ireland	4949.84	Oman	1576.5	United Arab. Em.	3640.0
China	2463.03	Israel	2633.14	P. N. Guinea	561.90	United Kingdom	3377.5
Colombia	2545.31	Italy	2057.02	Pakistan	1360.4	United States	1119.4
Congo	285.71	Jamaica	672.41	Panama	532.85	Uruguay	919.89
Costa Rica	5686.67	Japan	3046.12	Paraguay	221.19	Uzbekistan	1545.8
Côte d'Ivoire	201.61	Jordan	942.62	Peru	812.70	Venezuela	1154.7
Croatia	1474.98	Kazakhstan	23.40	Philippines	1382.9	Viet Nam	3075.6
Cuba	553.17	Kenya	314.44	Poland	1114.2	Yemen	111.19
Czech Rep.	1283.22	Kuwait	804.62	Portugal	1145.7	Zambia	69.20
Dem. Rep. Congo	[20.83]	Kyrgyzstan	50.00	Romania	348.30	Zimbabwe	472.67
Denmark	1383.07	Laos	140.06	Russia	129.40		
Dominican Rep.	895.29	Latvia	347.89	Rwanda	3.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 32 **Code:** PESTHA **Reference Year:** MRYA 1990-2003

Description: Pesticide consumption per hectare of arable land

Units: Kilograms pesticide consumption per hectares of arable land

Source*: United Nations Food and Agricultural Organization (FAO), plus country data.

Logic: Excessive use of pesticides in agricultural activities has negative impacts on soil, water, humans and wildlife.

Methodology: Pesticide use intensity refers to the amount of pesticide used per hectare of arable and permanent cropland. To calculate this figure, total pesticide consumption in agriculture is divided by the total area of arable and permanent cropland. Pesticide consumption is measured in metric tons of active ingredients. Pesticides are organized into eight categories, the sum of which is used to determine total pesticide consumption. The eight categories are: insecticides, mineral oils, herbicides, fungicides and bactericides, seed treatment - fungicides, seed treatment - insecticides, plant growth regulators and rodenticides. Arable and permanent cropland is comprised of both arable and permanent land in a given country for each year. Arable land is land under temporary crops (double-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens, and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for "Arable land" are not meant to indicate the amount of land that is potentially cultivable. Permanent Crops is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee and rubber; this category includes land under flowering shrubs, fruit trees, nut trees and vines, but excludes land under trees grown for wood or timber.

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	3.12		47.33		0.10		
	1.10		0.10		19.85		
Albania	0.18	Ecuador	2.50	Lebanon	5.60	Saudi Arabia	0.70
Algeria	[0.31]	Egypt	1.40	Liberia	[0.09]	Senegal	0.10
Angola	0.10	El Salvador	4.90	Libya	[0.32]	Serbia and Mont.	0.80
Argentina	1.90	Estonia	0.50	Lithuania	0.20	Sierra Leone	[0.07]
Armenia	0.10	Ethiopia	0.10	Macedonia	0.80	Slovakia	2.49
Australia	2.50	Finland	0.60	Madagascar	[0.18]	Slovenia	7.40
Austria	2.42	France	4.50	Malawi	0.30	South Africa	1.70
Azerbaijan	[0.34]	Gabon	[0.27]	Malaysia	1.50	South Korea	12.80
Bangladesh	0.40	Gambia	0.10	Mali	0.10	Spain	2.00
Belarus	[0.74]	Georgia	[0.87]	Mauritania	[0.08]	Sri Lanka	0.90
Belgium	5.90	Germany	2.30	Mexico	[1.9]	Sudan	[0.14]
Benin	[0.12]	Ghana	0.10	Moldova	1.10	Sweden	0.70
Bhutan	0.10	Greece	2.80	Mongolia	[0.31]	Switzerland	3.60
Bolivia	1.30	Guatemala	0.80	Morocco	1.00	Syria	0.60
Bosnia and Herz.	[0.46]	Guinea	0.10	Mozambique	[0.26]	Taiwan	47.33
Botswana	[0.4]	Guinea-Bissau	0.10	Myanmar	[0.23]	Tajikistan	0.80
Brazil	1.20	Guyana	[0.28]	Namibia	0.10	Tanzania	0.10
Bulgaria	0.90	Haiti	[0.31]	Nepal	[0.44]	Thailand	1.10
Burkina Faso	0.20	Honduras	2.50	Netherlands	8.00	Togo	0.10
Burundi	0.10	Hungary	1.10	New Zealand	1.00	Trin. and Tob.	7.30
Cambodia	[0.15]	Iceland	0.90	Nicaragua	2.40	Tunisia	0.20
Cameroon	0.10	India	0.30	Niger	[0.08]	Turkey	1.00
Canada	0.60	Indonesia	0.10	Nigeria	[0.06]	Turkmenistan	6.40
Central Afr. Rep.	[0.06]	Iran	0.30	North Korea	[1.01]	Uganda	[0.17]
Chad	[0.06]	Iraq	0.10	Norway	0.60	Ukraine	1.90
Chile	6.70	Ireland	2.00	Oman	1.20	United Arab. Em.	0.13
China	[0.77]	Israel	5.70	P. N. Guinea	0.10	United Kingdom	5.80
Colombia	16.70	Italy	1.16	Pakistan	0.50	United States	2.30
Congo	0.10	Jamaica	5.80	Panama	4.70	Uruguay	3.30
Costa Rica	20.40	Japan	[4.31]	Paraguay	3.40	Uzbekistan	[0.75]
Côte d'Ivoire	[0.27]	Jordan	1.40	Peru	1.20	Venezuela	1.20
Croatia	2.20	Kazakhstan	0.30	Philippines	[1.95]	Viet Nam	2.30
Cuba	[1.06]	Kenya	0.30	Poland	0.78	Yemen	0.80
Czech Rep.	1.40	Kuwait	4.60	Portugal	5.50	Zambia	0.30
Dem. Rep. Congo	[0.16]	Kyrgyzstan	1.80	Romania	0.80	Zimbabwe	0.90
Denmark	1.40	Laos	0.10	Russia	0.20		
Dominican Rep.	4.50	Latvia	0.20	Rwanda	0.10		

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #: 33 **Code:** WATSTR **Reference Year:** 1961-1995
(long-term average)

Description: Percentage of country under severe water stress

Units: Percentage of national territory in which water consumption exceeds 40 percent of available water

Source*: Center for Environmental Systems Research, University of Kassel.

Logic: The regional distribution of water availability relative to population and consumption needs is as important as its overall water availability. This variable captures the percent of the territory that is under water stress, which will affect the availability of water for environmental services and human well-being.

Methodology: These data are derived from the WaterGap 2.1 gridded hydrological model developed by the Center for Environmental Systems Research, University of Kassel, Germany. The modelers derived gridcell by gridcell estimates of where water consumption exceeded 40 percent of the water available in that particular grid cell. These were then converted to land area equivalents, and the percent of the territory under severe water stress was calculated.

Mean	25.18	Max	100	2.5 Percentile	0		
Median	5.13	Min	0	97.5 Percentile	97.67		
Albania	23.09	Ecuador	9.83	Lebanon	84.91	Saudi Arabia	90.73
Algeria	67.94	Egypt	88.68	Liberia	0.00	Senegal	17.73
Angola	0.00	El Salvador	0.00	Libya	83.69	Serbia and Mont.	20.29
Argentina	19.64	Estonia	2.74	Lithuania	0.28	Sierra Leone	0.00
Armenia	87.14	Ethiopia	26.29	Madagascar	0.00	Slovakia	0.00
Australia	8.27	Finland	2.14	Mali	0.43	Slovenia	0.00
Austria	0.00	France	19.47	Malawi	0.00	South Africa	68.44
Azerbaijan	96.27	Gabon	0.00	Malaysia	3.05	South Korea	9.34
Bangladesh	22.88	Gambia	0.67	Mali	11.87	Spain	87.82
Belarus	0.00	Georgia	50.72	Mauritania	5.15	Sri Lanka	32.93
Belgium	93.54	Germany	1.79	Mexico	44.64	Sudan	31.13
Benin	0.00	Ghana	0.00	Moldova	8.02	Sweden	1.73
Bhutan	0.00	Greece	56.85	Mongolia	2.86	Switzerland	0.00
Bolivia	13.77	Guatemala	0.14	Morocco	82.26	Syria	99.58
Bosnia and Herz.	0.00	Guinea	0.00	Mozambique	12.23	Taiwan	6.80
Botswana	14.51	Guinea-Bissau	0.00	Myanmar	0.00	Tajikistan	94.82
Brazil	0.28	Guyana	0.00	Namibia	17.15	Tanzania	0.03
Bulgaria	55.24	Haiti	9.47	Nepal	97.47	Thailand	0.64
Burkina Faso	0.00	Honduras	0.00	Netherlands	43.19	Togo	0.00
Burundi	0.00	Hungary	0.00	New Zealand	0.44	Trin. and Tob.	99.85
Cambodia	0.00	Iceland	0.24	Nicaragua	0.69	Tunisia	92.04
Cameroon	0.00	India	80.37	Niger	1.21	Turkey	64.36
Canada	0.87	Indonesia	1.02	Nigeria	0.00	Turkmenistan	93.87
Central Afr. Rep.	0.00	Iran	87.30	North Korea	3.51	Uganda	0.00
Chad	1.95	Iraq	86.21	Norway	0.66	Ukraine	16.88
Chile	52.44	Ireland	0.00	Oman	49.91	United Arab. Em.	92.72
China	40.67	Israel	97.62	P. N. Guinea	0.00	United Kingdom	20.87
Colombia	0.44	Italy	32.10	Pakistan	76.37	United States	30.66
Congo	0.00	Jamaica	5.11	Panama	0.00	Uruguay	0.00
Costa Rica	0.00	Japan	13.87	Paraguay	0.00	Uzbekistan	86.67
Côte d'Ivoire	0.00	Jordan	81.20	Peru	20.09	Venezuela	4.90
Croatia	1.45	Kazakhstan	57.14	Philippines	15.20	Viet Nam	10.65
Cuba	28.55	Kenya	1.09	Poland	0.98	Yemen	64.31
Czech Rep.	0.00	Kuwait	100.00	Portugal	63.22	Zambia	0.00
Dem. Rep. Congo	0.00	Kyrgyzstan	93.62	Romania	1.92	Zimbabwe	16.23
Denmark	11.54	Laos	0.00	Russia	2.91		
Dominican Rep.	13.44	Latvia	0.30	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 34 **Code:** OVRFSH **Reference Year:** Average for 1993-1998
Description: Productivity overfishing
Units: Score between 1 and 7 with high scores corresponding to high degrees of overfishing
Source*: South Pacific Applied Geoscience Commission (SOPAC).
Logic: Fish stocks are an important component of marine ecosystems. Overfishing puts pressure on ecosystems and threatens biodiversity.
Methodology: This measure is drawn from the EVI prepared by SOPAC in partnership with UNEP and other support. The indicator's cut-off values are based on the ratio of fisheries productivity to fish catch, or specifically the ratio of tonnes of carbon per square kilometer of exclusive economic zone per year to tonnes of fish catch per square kilometer of shelf per year. The score ranges represent the following: 1=(\geq 3.2millions], 2=(3.2-1.2 millions], 3=(1.2 millions - 442 thousand], 4=(442-163 thousand], 5=(163-60 thousand], 6=(60-22 thousand], 7=(\leq 22

Mean	3.89	Max	7	2.5 Percentile	1		
Median	4	Min	1	97.5 Percentile	7		
Albania	3.00	Ecuador	6.00	Lebanon	4.00	Saudi Arabia	3.00
Algeria	5.00	Egypt	6.00	Liberia	3.00	Senegal	6.00
Angola	3.00	El Salvador	4.00	Libya	3.00	Serbia and Mont.	..
Argentina	4.00	Estonia	4.00	Lithuania	5.00	Sierra Leone	4.00
Armenia	..	Ethiopia	..	Macedonia	..	Slovakia	..
Australia	2.00	Finland	4.00	Madagascar	4.00	Slovenia	7.00
Austria	..	France	5.00	Malawi	..	South Africa	5.00
Azerbaijan	..	Gabon	3.00	Malaysia	5.00	South Korea	6.00
Bangladesh	6.00	Gambia	5.00	Mali	..	Spain	6.00
Belarus	..	Georgia	3.00	Mauritania	3.00	Sri Lanka	6.00
Belgium	5.00	Germany	5.00	Mexico	5.00	Sudan	4.00
Benin	6.00	Ghana	6.00	Moldova	..	Sweden	4.00
Bhutan	..	Greece	5.00	Mongolia	..	Switzerland	..
Bolivia	..	Guatemala	4.00	Morocco	6.00	Syria	6.00
Bosnia and Herz.	..	Guinea	4.00	Mozambique	3.00	Taiwan	..
Botswana	..	Guinea-Bissau	2.00	Myanmar	5.00	Tajikistan	..
Brazil	4.00	Guyana	4.00	Namibia	4.00	Tanzania	6.00
Bulgaria	4.00	Haiti	3.00	Nepal	..	Thailand	7.00
Burkina Faso	..	Honduras	3.00	Netherlands	5.00	Togo	6.00
Burundi	..	Hungary	..	New Zealand	5.00	Trin. and Tob.	3.00
Cambodia	5.00	Iceland	7.00	Nicaragua	3.00	Tunisia	4.00
Cameroon	5.00	India	6.00	Niger	..	Turkey	6.00
Canada	3.00	Indonesia	4.00	Nigeria	6.00	Turkmenistan	..
Central Afr. Rep.	..	Iran	4.00	North Korea	6.00	Uganda	..
Chad	..	Iraq	7.00	Norway	7.00	Ukraine	5.00
Chile	7.00	Ireland	5.00	Oman	3.00	United Arab. Em.	5.00
China	7.00	Israel	6.00	P. N. Guinea	2.00	United Kingdom	4.00
Colombia	4.00	Italy	5.00	Pakistan	5.00	United States	6.00
Congo	4.00	Jamaica	3.00	Panama	5.00	Uruguay	4.00
Costa Rica	4.00	Japan	7.00	Paraguay	..	Uzbekistan	..
Côte d'Ivoire	5.00	Jordan	5.00	Peru	7.00	Venezuela	5.00
Croatia	4.00	Kazakhstan	..	Philippines	6.00	Viet Nam	5.00
Cuba	4.00	Kenya	6.00	Poland	6.00	Yemen	3.00
Czech Rep.	..	Kuwait	3.00	Portugal	6.00	Zambia	..
Dem. Rep. Congo	6.00	Kyrgyzstan	..	Romania	4.00	Zimbabwe	..
Denmark	6.00	Laos	..	Russia	4.00		
Dominican Rep.	4.00	Latvia	5.00	Rwanda	..		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 35 **Code:** FORCERT **Reference Year:** Certifications: 2004
Total forest area: 2000

Description: Percentage of total forest area that is certified for sustainable management

Units: Percentage of total forest area that is FSC or PEFC certified

Source*: The Forest Stewardship Council, and Pan-European Forest Certification Council.

Logic: This variable measures the extent to which a country seeks sustainable forestry practices.

Methodology: The forest area certified by either the Forest Stewardship Council (FSC) or the Pan-European Forest Certification Council (PEFC) is divided by the year 2000 total forest area. To avoid double counting, if a country has forest areas under both programs, the maximum is selected. If no data are available for FSC or PEFC certified forest area, the value is set to 0. Also, ratios exceeding 100% are set to 100. This is the case for Croatia, Liechtenstein, Finland, and Norway.

Mean	4.92	Max	100.00	2.5 Percentile	0.00		
Median	0.00	Min	0.00	97.5 Percentile	67.01		
Albania	0.00	Ecuador	0.20	Lebanon	0.00	Saudi Arabia	0.00
Algeria	0.00	Egypt	0.00	Liberia	0.00	Senegal	0.00
Angola	0.00	El Salvador	0.00	Libya	0.00	Serbia and Mont.	0.00
Argentina	0.38	Estonia	51.63	Lithuania	40.29	Sierra Leone	0.00
Armenia	0.00	Ethiopia	0.00	Macedonia	0.00	Slovakia	2.01
Australia	0.71	Finland	100.00	Madagascar	0.00	Slovenia	0.00
Austria	10.14	France	22.55	Malawi	0.00	South Africa	18.17
Azerbaijan	0.00	Gabon	0.00	Malaysia	0.40	South Korea	0.00
Bangladesh	0.00	Gambia	0.00	Mali	0.00	Spain	2.20
Belarus	1.13	Georgia	0.00	Mauritania	0.00	Sri Lanka	0.84
Belgium	31.67	Germany	64.47	Mexico	1.16	Sudan	0.00
Benin	0.00	Ghana	0.00	Moldova	0.00	Sweden	37.11
Bhutan	0.00	Greece	0.00	Mongolia	0.00	Switzerland	25.28
Bolivia	2.78	Guatemala	17.08	Morocco	0.00	Syria	0.00
Bosnia and Herz.	0.00	Guinea	0.00	Mozambique	0.00	Taiwan	0.00
Botswana	0.00	Guinea-Bissau	0.00	Myanmar	0.00	Tajikistan	0.00
Brazil	0.52	Guyana	0.00	Namibia	1.03	Tanzania	0.00
Bulgaria	0.00	Haiti	0.00	Nepal	0.00	Thailand	0.01
Burkina Faso	0.00	Honduras	0.69	Netherlands	29.50	Togo	0.00
Burundi	0.00	Hungary	10.25	New Zealand	7.93	Trin. and Tob.	0.00
Cambodia	0.00	Iceland	0.00	Nicaragua	0.51	Tunisia	0.00
Cameroon	0.00	India	0.00	Niger	0.00	Turkey	0.00
Canada	1.72	Indonesia	0.09	Nigeria	0.00	Turkmenistan	0.00
Central Afr. Rep.	0.00	Iran	0.00	North Korea	0.00	Uganda	0.84
Chad	0.00	Iraq	0.00	Norway	100.00	Ukraine	2.12
Chile	6.35	Ireland	66.46	Oman	0.00	United Arab. Em.	0.00
China	0.00	Israel	0.00	P. N. Guinea	0.00	United Kingdom	43.29
Colombia	0.12	Italy	0.70	Pakistan	0.00	United States	2.33
Congo	0.00	Jamaica	0.00	Panama	0.38	Uruguay	5.81
Costa Rica	2.77	Japan	0.81	Paraguay	0.01	Uzbekistan	0.00
Côte d'Ivoire	0.00	Jordan	0.00	Peru	0.00	Venezuela	0.28
Croatia	100.00	Kazakhstan	0.00	Philippines	0.26	Viet Nam	0.00
Cuba	0.00	Kenya	0.00	Poland	68.45	Yemen	0.00
Czech Rep.	73.58	Kuwait	0.00	Portugal	0.00	Zambia	0.00
Dem. Rep. Congo	0.00	Kyrgyzstan	0.00	Romania	0.49	Zimbabwe	0.67
Denmark	2.69	Laos	0.00	Russia	0.25		
Dominican Rep.	0.00	Latvia	57.68	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 36 **Code:** WEFSUB **Reference Year:** 2003/4

Description: World Economic Forum Survey on subsidies

Units: Survey Responses Ranging from 1 (strongly disagree) to 7 (strongly agree)

Source*: World Economic Forum (WEF).

Logic: Subsidies encourage wasteful consumption of energy and materials.

Methodology: Response to the statement "No government subsidies for energy or materials usage are present."

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	4.18		5.8		2.73		
	4.15		2.48		5.65		
Albania	[3.89]	Ecuador	2.82	Lebanon	[4.12]	Saudi Arabia	[3.53]
Algeria	3.50	Egypt	3.87	Liberia	[3.13]	Senegal	3.79
Angola	2.69	El Salvador	4.40	Libya	[3.66]	Serbia and Mont.	3.24
Argentina	4.15	Estonia	4.77	Lithuania	4.42	Sierra Leone	[3.16]
Armenia	[3.79]	Ethiopia	3.64	Macedonia	3.35	Slovakia	4.58
Australia	4.83	Finland	5.51	Madagascar	3.74	Slovenia	4.67
Austria	4.85	France	5.17	Malawi	4.33	South Africa	4.24
Azerbaijan	[3.39]	Gabon	[3.87]	Malaysia	4.62	South Korea	[4.7]
Bangladesh	3.38	Gambia	4.03	Mali	3.33	Spain	4.45
Belarus	[3.54]	Georgia	[3.66]	Mauritania	[3.79]	Sri Lanka	3.83
Belgium	5.23	Germany	4.87	Mexico	4.06	Sudan	[3.23]
Benin	[3.92]	Ghana	4.10	Moldova	[3.55]	Sweden	5.56
Bhutan	[3.63]	Greece	[4.45]	Mongolia	[3.51]	Switzerland	5.49
Bolivia	3.35	Guatemala	3.98	Morocco	3.88	Syria	[3.49]
Bosnia and Herz.	[4.02]	Guinea	[3.66]	Mozambique	3.68	Taiwan	4.91
Botswana	4.46	Guinea-Bissau	[3.57]	Myanmar	[3.67]	Tajikistan	[3.63]
Brazil	4.60	Guyana	[3.75]	Namibia	4.46	Tanzania	3.97
Bulgaria	3.43	Haiti	2.78	Nepal	[3.5]	Thailand	4.04
Burkina Faso	[3.48]	Honduras	2.97	Netherlands	5.56	Togo	[3.31]
Burundi	[3.31]	Hungary	4.40	New Zealand	5.08	Trin. and Tob.	4.55
Cambodia	[3.76]	Iceland	5.68	Nicaragua	3.02	Tunisia	[4.53]
Cameroon	4.45	India	3.65	Niger	[3.47]	Turkey	4.00
Canada	4.94	Indonesia	3.54	Nigeria	3.05	Turkmenistan	[3.22]
Central Afr. Rep.	[3.4]	Iran	[3.42]	North Korea	[3.47]	Uganda	3.59
Chad	2.60	Iraq	[3.27]	Norway	5.15	Ukraine	3.36
Chile	5.05	Ireland	4.26	Oman	[4.19]	United Arab. Em.	[4.27]
China	4.08	Israel	4.67	P. N. Guinea	[3.44]	United Kingdom	5.18
Colombia	4.11	Italy	4.81	Pakistan	3.64	United States	5.02
Congo	[3.55]	Jamaica	4.53	Panama	3.81	Uruguay	4.65
Costa Rica	4.27	Japan	4.93	Paraguay	3.70	Uzbekistan	[3.5]
Côte d'Ivoire	[3.56]	Jordan	4.90	Peru	4.06	Venezuela	2.48
Croatia	3.71	Kazakhstan	[3.61]	Philippines	3.49	Viet Nam	4.36
Cuba	[4.04]	Kenya	3.80	Poland	4.07	Yemen	[3.48]
Czech Rep.	4.40	Kuwait	[4.32]	Portugal	4.48	Zambia	4.25
Dem. Rep. Congo	[2.92]	Kyrgyzstan	[3.61]	Romania	3.35	Zimbabwe	2.86
Denmark	5.61	Laos	[3.39]	Russia	3.24		
Dominican Rep.	2.94	Latvia	4.63	Rwanda	[3.6]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 37 **Code:** IRRSAL **Reference Year:** Arable land: 2000,
Salinized area: MRYA 1990-1999

Description: Salinized area due to irrigation as percentage of total arable land

Units: Percentage of total arable land salinized due to irrigation

Source*: United Nations Food and Agricultural Organization (FAO).

Logic: Soil salinization is a form of land degradation. The transport of salts to the land's surface due to irrigation renders the land unfit for production, and is therefore unsustainable in the long term.

Methodology: The area of land salinized due to irrigation is divided by the total arable land area for each country (benchmarked to 2000).

	Mean	3.54	Max	44.36	2.5 Percentile	0	
	Median	0	Min	0	97.5 Percentile	34.6	
Albania	0.00	Ecuador	..	Lebanon	..	Saudi Arabia	..
Algeria	..	Egypt	36.77	Liberia	..	Senegal	..
Angola	..	El Salvador	0.00	Libya	..	Serbia and Mont.	..
Argentina	1.68	Estonia	0.00	Lithuania	0.00	Sierra Leone	..
Armenia	6.02	Ethiopia	..	Macedonia	..	Slovakia	..
Australia	..	Finland	0.00	Madagascar	..	Slovenia	0.00
Austria	0.00	France	..	Malawi	..	South Africa	..
Azerbaijan	9.20	Gabon	..	Malaysia	..	South Korea	..
Bangladesh	1.18	Gambia	..	Mali	..	Spain	..
Belarus	0.00	Georgia	..	Mauritania	..	Sri Lanka	..
Belgium	0.00	Germany	0.00	Mexico	1.41	Sudan	..
Benin	0.00	Ghana	0.00	Moldova	..	Sweden	..
Bhutan	0.00	Greece	..	Mongolia	..	Switzerland	..
Bolivia	0.70	Guatemala	0.26	Morocco	..	Syria	1.12
Bosnia and Herz.	0.00	Guinea	..	Mozambique	..	Taiwan	..
Botswana	..	Guinea-Bissau	..	Myanmar	..	Tajikistan	10.87
Brazil	0.02	Guyana	..	Namibia	..	Tanzania	..
Bulgaria	0.00	Haiti	..	Nepal	0.00	Thailand	..
Burkina Faso	..	Honduras	..	Netherlands	0.00	Togo	..
Burundi	0.00	Hungary	..	New Zealand	..	Trin. and Tob.	..
Cambodia	..	Iceland	..	Nicaragua	0.00	Tunisia	..
Cameroon	..	India	..	Niger	..	Turkey	..
Canada	..	Indonesia	9.82	Nigeria	0.00	Turkmenistan	34.06
Central Afr. Rep.	..	Iran	12.86	North Korea	0.00	Uganda	0.00
Chad	..	Iraq	..	Norway	0.00	Ukraine	..
Chile	1.46	Ireland	0.00	Oman	..	United Arab. Em.	..
China	..	Israel	..	P. N. Guinea	..	United Kingdom	0.00
Colombia	..	Italy	..	Pakistan	..	United States	..
Congo	0.00	Jamaica	0.00	Panama	0.00	Uruguay	..
Costa Rica	0.00	Japan	0.00	Paraguay	..	Uzbekistan	44.36
Côte d'Ivoire	0.00	Jordan	0.57	Peru	7.00	Venezuela	..
Croatia	0.00	Kazakhstan	1.12	Philippines	0.00	Viet Nam	..
Cuba	21.80	Kenya	..	Poland	0.00	Yemen	..
Czech Rep.	..	Kuwait	34.00	Portugal	0.00	Zambia	0.00
Dem. Rep. Congo	..	Kyrgyzstan	4.18	Romania	..	Zimbabwe	..
Denmark	0.00	Laos	0.00	Russia	..		
Dominican Rep.	0.00	Latvia	0.00	Rwanda	..		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	38	Code:	AGSUB	Reference Year:	PSE and AMS: MRYA 1997-2001, EU15: 2001, Agricultural GDP: MRYA 1992-2001
Description:	Agricultural subsidies				
Units:	Scale from 1 (lowest) to 8 (highest), with 0 being missing data				
Source*:	Organisation for Economic Co-operation and Development (OECD), World Trade Organization, and European Commission's Directorate General Agriculture.				
Logic:	Agricultural subsidies reduce environmental sustainability primarily by creating price distortions, promoting the production of input intensive crops, wasteful use of natural resource inputs, use of marginal and fragile lands, and rent-seeking behavior.				
Methodology:	OECD data for producer support estimates (PSE), WTO data for aggregate measure of support (AMS). For China and India the data were taken from their notifications to the WTO. WTO data were converted from national currencies to US dollars using annual average exchange rates for 1999: ECU to USD using historic weighted 12 month average (http://www.x-rates.com/d/USD/EUR/hist1999.html), all other currencies were converted using annual average exchange rates (World Bank WDI 2004). OECD data for the EU15 refer to total PSE for the 15 members. A breakdown by member state was calculated as follows: The total PSE for EU15 was multiplied by each country's fraction of total EU15 agricultural production. OECD countries (John Finn, WTO) provided updated PSE data as percentage of total agricultural GDP replaced older OECD data. Final data were classified into 8 groups as follows: [0-10%)=1; [10-20%)=2; [20-30%)=3, [30-40%)=4, [40-50%)=5, [50-60%)=6, [60-70%)=7, [>70%)=8. All other countries with no information are classified as 0.				

Mean	0.67	Max	8	2.5 Percentile	0		
Median	0	Min	0	97.5 Percentile	7		
Albania	0.00	Ecuador	0.00	Lebanon	0.00	Saudi Arabia	0.00
Algeria	0.00	Egypt	0.00	Liberia	0.00	Senegal	0.00
Angola	0.00	El Salvador	0.00	Libya	0.00	Serbia and Mont.	0.00
Argentina	1.00	Estonia	0.00	Lithuania	0.00	Sierra Leone	0.00
Armenia	0.00	Ethiopia	0.00	Macedonia	0.00	Slovakia	2.00
Australia	1.00	Finland	4.00	Madagascar	0.00	Slovenia	1.00
Austria	5.00	France	6.00	Malawi	0.00	South Africa	1.00
Azerbaijan	0.00	Gabon	0.00	Malaysia	0.00	South Korea	7.00
Bangladesh	0.00	Gambia	0.00	Mali	0.00	Spain	7.00
Belarus	0.00	Georgia	0.00	Mauritania	0.00	Sri Lanka	0.00
Belgium	8.00	Germany	3.00	Mexico	3.00	Sudan	0.00
Benin	0.00	Ghana	0.00	Moldova	0.00	Sweden	4.00
Bhutan	0.00	Greece	5.00	Mongolia	0.00	Switzerland	8.00
Bolivia	0.00	Guatemala	0.00	Morocco	1.00	Syria	0.00
Bosnia and Herz.	0.00	Guinea	0.00	Mozambique	0.00	Taiwan	0.00
Botswana	0.00	Guinea-Bissau	0.00	Myanmar	0.00	Tajikistan	0.00
Brazil	1.00	Guyana	0.00	Namibia	0.00	Tanzania	0.00
Bulgaria	1.00	Haiti	0.00	Nepal	0.00	Thailand	1.00
Burkina Faso	0.00	Honduras	0.00	Netherlands	7.00	Togo	0.00
Burundi	0.00	Hungary	6.00	New Zealand	1.00	Trin. and Tob.	0.00
Cambodia	0.00	Iceland	7.00	Nicaragua	0.00	Tunisia	1.00
Cameroon	0.00	India	1.00	Niger	0.00	Turkey	1.00
Canada	2.00	Indonesia	0.00	Nigeria	0.00	Turkmenistan	0.00
Central Afr. Rep.	0.00	Iran	0.00	North Korea	0.00	Uganda	0.00
Chad	0.00	Iraq	0.00	Norway	7.00	Ukraine	0.00
Chile	0.00	Ireland	6.00	Oman	0.00	United Arab. Em.	0.00
China	1.00	Israel	..	P. N. Guinea	0.00	United Kingdom	6.00
Colombia	1.00	Italy	5.00	Pakistan	0.00	United States	3.00
Congo	0.00	Jamaica	0.00	Panama	0.00	Uruguay	0.00
Costa Rica	1.00	Japan	6.00	Paraguay	0.00	Uzbekistan	0.00
Côte d'Ivoire	0.00	Jordan	0.00	Peru	0.00	Venezuela	1.00
Croatia	0.00	Kazakhstan	0.00	Philippines	0.00	Viet Nam	0.00
Cuba	0.00	Kenya	0.00	Poland	2.00	Yemen	0.00
Czech Rep.	3.00	Kuwait	0.00	Portugal	6.00	Zambia	0.00
Dem. Rep. Congo	0.00	Kyrgyzstan	0.00	Romania	0.00	Zimbabwe	0.00
Denmark	7.00	Laos	0.00	Russia	0.00		
Dominican Rep.	0.00	Latvia	0.00	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 39 **Code:** DISINT **Reference Year:** MRYA 1995-2002

Description: Death rate from intestinal infectious diseases

Units: Deaths per 100,000 population

Source*: World Health Organization (WHO).

Logic: Indicator of the degree to which the population is affected by poor sanitation and water quality, which are related to environmental conditions.

Methodology: Standardized, age-specific death rate from intestinal infectious diseases. Results calculated as follows: For ICD-9, the codes extracted are B01 and CH01 (which cover B01-B07 in ICD-9) for Armenia, Belarus, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and the former USSR (for some years), and C004-C006 for China (which cover 001-005, 008, and 009 in the detailed ICD-9). For ICD-10 the codes extracted are A00, A03-A09, and A010. The data were extracted by age group and aggregated by sex. They were then combined with annual population data by age group prepared by CIESIN for the year 2000. The data were then standardized for differences in the national age distributions using Canada's population structure in 2000 as it offers a relatively stable and suitable reference distribution.

	Mean		9.86	Max	104.52	2.5 Percentile	0.03
	Median		1.2	Min	0.01	97.5 Percentile	94.58
Albania	1.44	Ecuador	21.32	Lebanon	[7.38]	Saudi Arabia	[4.55]
Algeria	[19.32]	Egypt	94.58	Liberia	[33.64]	Senegal	[13.67]
Angola	[49.88]	El Salvador	36.89	Libya	[5.65]	Serbia and Mont.	[3.94]
Argentina	2.04	Estonia	0.77	Lithuania	0.03	Sierra Leone	[22.08]
Armenia	2.14	Ethiopia	[36.31]	Macedonia	3.48	Slovakia	0.09
Australia	0.07	Finland	0.46	Madagascar	[14.19]	Slovenia	0.57
Austria	0.14	France	1.08	Malawi	[41.52]	South Africa	[3.1]
Azerbaijan	9.64	Gabon	[17.35]	Malaysia	2.39	South Korea	1.20
Bangladesh	[8.22]	Gambia	[22.46]	Mali	[24.03]	Spain	0.48
Belarus	0.71	Georgia	1.06	Mauritania	[17.08]	Sri Lanka	[8.33]
Belgium	0.96	Germany	0.20	Mexico	15.91	Sudan	[29.76]
Benin	[8.67]	Ghana	[13.53]	Moldova	0.94	Sweden	0.08
Bhutan	[23.41]	Greece	0.02	Mongolia	[13.58]	Switzerland	[0.69]
Bolivia	[33.61]	Guatemala	[27.11]	Morocco	[8.24]	Syria	[6.39]
Bosnia and Herz.	[4.05]	Guinea	[24.02]	Mozambique	[50.26]	Taiwan	[3.85]
Botswana	[6.73]	Guinea-Bissau	[18.82]	Myanmar	[3.83]	Tajikistan	85.90
Brazil	12.85	Guyana	97.25	Namibia	[6.95]	Tanzania	[26.42]
Bulgaria	0.76	Haiti	[21.1]	Nepal	[10.24]	Thailand	[5.3]
Burkina Faso	[15.01]	Honduras	[18.84]	Netherlands	0.07	Togo	[22.65]
Burundi	[48.95]	Hungary	0.13	New Zealand	0.10	Trin. and Tob.	2.93
Cambodia	[13.85]	Iceland	0.80	Nicaragua	37.72	Tunisia	[3.78]
Cameroon	[16.01]	India	[4.27]	Niger	[33.44]	Turkey	[0.69]
Canada	0.04	Indonesia	[9.85]	Nigeria	[17.58]	Turkmenistan	104.52
Central Afr. Rep.	[25.11]	Iran	[9.65]	North Korea	[6.09]	Uganda	[15.39]
Chad	[27.58]	Iraq	[20.06]	Norway	0.59	Ukraine	0.80
Chile	3.23	Ireland	0.27	Oman	[13.9]	United Arab. Em.	[1.46]
China	0.19	Israel	1.41	P. N. Guinea	[17.81]	United Kingdom	0.82
Colombia	13.69	Italy	0.08	Pakistan	[16.66]	United States	0.03
Congo	[53.79]	Jamaica	[3.61]	Panama	[11.38]	Uruguay	2.87
Costa Rica	7.26	Japan	0.67	Paraguay	31.35	Uzbekistan	9.20
Côte d'Ivoire	[13.97]	Jordan	[5.76]	Peru	12.66	Venezuela	29.54
Croatia	0.23	Kazakhstan	3.35	Philippines	49.15	Viet Nam	[8.37]
Cuba	3.03	Kenya	[16.41]	Poland	0.12	Yemen	[40.28]
Czech Rep.	0.01	Kuwait	2.10	Portugal	0.14	Zambia	[16.94]
Dem. Rep. Congo	[63.52]	Kyrgyzstan	15.91	Romania	1.21	Zimbabwe	[22.66]
Denmark	0.94	Laos	[24.7]	Russia	1.60		
Dominican Rep.	23.29	Latvia	0.40	Rwanda	[23.09]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 40 **Code:** DISRES **Reference Year:** MRYA 1995-2002

Description: Child death rate from respiratory diseases

Units: Deaths per 100,000 population aged 0-14

Source*: World Health Organization (WHO).

Logic: Indicator of the degree to which children are impacted by poor air quality.

Methodology: The final results were calculated as follows: For ICD-9, the codes extracted are B31, B320, B321, CH08 (which covers B31 and B32 in ICD-9), S310 (which covers B310-B312, B320 in ICD-9) for Armenia, Belarus, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and the former USSR (for some years), and C052 and C053 for China (which cover 460-519 and 480-486 in the detailed ICD-9). For ICD-10 the codes extracted are J03, J04, J06, J311, J312, J32, J33, J342, J35, J20, J21, J12-J16, and J18. The data were extracted by age group (0-14 years) and aggregated by sex. They were then combined with annual population data by age group prepared by CIESIN for the year 2000.

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	11.54		291.49		0.00		
	0.58		0.00		117.64		
Albania	12.85	Ecuador	0.02	Lebanon	[18.21]	Saudi Arabia	[53.62]
Algeria	[29.02]	Egypt	49.62	Liberia	[32.58]	Senegal	[13.86]
Angola	[29.49]	El Salvador	13.52	Libya	[32.05]	Serbia and Mont.	[2.67]
Argentina	0.00	Estonia	1.42	Lithuania	0.00	Sierra Leone	[31.72]
Armenia	12.41	Ethiopia	[19.51]	Macedonia	3.33	Slovakia	0.00
Australia	2.91	Finland	0.00	Madagascar	[15.18]	Slovenia	0.44
Austria	0.00	France	0.40	Malawi	[27.38]	South Africa	14.64
Azerbaijan	118.38	Gabon	[12.01]	Malaysia	2.45	South Korea	0.72
Bangladesh	[8.33]	Gambia	[26.76]	Mali	[31.33]	Spain	0.00
Belarus	5.30	Georgia	8.67	Mauritania	[69.79]	Sri Lanka	0.00
Belgium	0.38	Germany	0.00	Mexico	0.02	Sudan	[17.04]
Benin	[14.75]	Ghana	[6.02]	Moldova	8.60	Sweden	0.00
Bhutan	[17.86]	Greece	1.05	Mongolia	[34.9]	Switzerland	[1.15]
Bolivia	[6.8]	Guatemala	[3.33]	Morocco	[10.65]	Syria	[26.58]
Bosnia and Herz.	[7.17]	Guinea	[17.82]	Mozambique	[15.54]	Taiwan	[7.54]
Botswana	[5.02]	Guinea-Bissau	[21.13]	Myanmar	[9.12]	Tajikistan	88.69
Brazil	0.01	Guyana	12.55	Namibia	[3.43]	Tanzania	[10.9]
Bulgaria	9.61	Haiti	[23.11]	Nepal	[6.9]	Thailand	[0.36]
Burkina Faso	[22.41]	Honduras	[3.84]	Netherlands	0.03	Togo	[17.04]
Burundi	[17.56]	Hungary	0.00	New Zealand	0.26	Trin. and Tob.	2.77
Cambodia	[5.69]	Iceland	0.00	Nicaragua	0.04	Tunisia	[19.03]
Cameroon	[3.57]	India	[7.86]	Niger	[35.21]	Turkey	[5.28]
Canada	0.00	Indonesia	[2.6]	Nigeria	[21.8]	Turkmenistan	291.49
Central Afr. Rep.	[26.88]	Iran	[14.9]	North Korea	[55.62]	Uganda	[17.7]
Chad	[37.16]	Iraq	[44.87]	Norway	0.00	Ukraine	7.86
Chile	0.02	Ireland	0.89	Oman	[38.84]	United Arab. Em.	[11.9]
China	2.00	Israel	0.00	P. N. Guinea	[7.93]	United Kingdom	1.27
Colombia	0.01	Italy	0.38	Pakistan	[26.74]	United States	0.01
Congo	[18.37]	Jamaica	[1.3]	Panama	[0.21]	Uruguay	0.00
Costa Rica	4.87	Japan	0.00	Paraguay	0.04	Uzbekistan	142.34
Côte d'Ivoire	[12.76]	Jordan	[13.57]	Peru	0.01	Venezuela	0.01
Croatia	0.00	Kazakhstan	22.40	Philippines	26.84	Viet Nam	[7.31]
Cuba	0.00	Kenya	[14.28]	Poland	0.01	Yemen	[39.72]
Czech Rep.	0.00	Kuwait	[36.68]	Portugal	1.02	Zambia	[18.22]
Dem. Rep. Congo	[25.3]	Kyrgyzstan	[38.93]	Romania	0.00	Zimbabwe	[22.25]
Denmark	0.08	Laos	[8.63]	Russia	18.77		
Dominican Rep.	7.93	Latvia	0.84	Rwanda	[13.94]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 41 **Code:** U5MORT **Reference Year:** MRYA 2002-2004

Description: Children under five mortality rate per 1,000 live births

Units: Children under five mortality rate per 1,000 live births

Source*: United Nations Statistics Division (UNSD).

Logic: Under-5 mortality rate is a measure of the vulnerability of the most vulnerable population group.

Methodology: Deaths between birth and age five divided by live births (in thousands).

Mean	62.25	Max	284	2.5 Percentile	4.4		
Median	29.5	Min	3	97.5 Percentile	226.25		
Albania	30.00	Ecuador	29.00	Lebanon	32.00	Saudi Arabia	28.00
Algeria	49.00	Egypt	39.00	Liberia	235.00	Senegal	138.00
Angola	260.00	El Salvador	39.00	Libya	19.00	Serbia and Mont.	19.00
Argentina	19.00	Estonia	12.00	Lithuania	10.40	Sierra Leone	284.00
Armenia	35.00	Ethiopia	171.00	Macedonia	26.00	Slovakia	9.00
Australia	5.00	Finland	5.00	Madagascar	135.00	Slovenia	5.00
Austria	4.46	France	6.00	Malawi	182.00	South Africa	65.00
Azerbaijan	105.00	Gabon	91.00	Malaysia	8.00	South Korea	5.00
Bangladesh	73.00	Gambia	126.00	Mali	222.00	Spain	6.00
Belarus	20.00	Georgia	29.00	Mauritania	183.00	Sri Lanka	19.00
Belgium	6.00	Germany	5.00	Mexico	29.00	Sudan	94.00
Benin	156.00	Ghana	97.00	Moldova	32.00	Sweden	3.00
Bhutan	94.00	Greece	5.00	Mongolia	71.00	Switzerland	6.00
Bolivia	71.00	Guatemala	49.00	Morocco	43.00	Syria	28.00
Bosnia and Herz.	18.00	Guinea	165.00	Mozambique	205.00	Taiwan	4.97
Botswana	110.00	Guinea-Bissau	211.00	Myanmar	108.00	Tajikistan	72.00
Brazil	37.00	Guyana	72.00	Namibia	67.00	Tanzania	165.00
Bulgaria	16.00	Haiti	123.00	Nepal	87.00	Thailand	28.00
Burkina Faso	207.00	Honduras	42.00	Netherlands	5.00	Togo	141.00
Burundi	190.00	Hungary	9.00	New Zealand	5.28	Trin. and Tob.	20.00
Cambodia	138.00	Iceland	4.00	Nicaragua	41.00	Tunisia	26.00
Cameroon	166.00	India	90.00	Niger	264.00	Turkey	41.00
Canada	7.00	Indonesia	43.00	Nigeria	201.00	Turkmenistan	98.00
Central Afr. Rep.	180.00	Iran	41.00	North Korea	55.00	Uganda	141.00
Chad	200.00	Iraq	125.00	Norway	4.00	Ukraine	20.00
Chile	12.00	Ireland	6.00	Oman	13.00	United Arab. Em.	9.78
China	38.00	Israel	6.00	P. N. Guinea	94.00	United Kingdom	7.00
Colombia	23.00	Italy	6.00	Pakistan	104.00	United States	8.00
Congo	108.00	Jamaica	20.00	Panama	25.00	Uruguay	15.00
Costa Rica	6.86	Japan	5.00	Paraguay	30.00	Uzbekistan	68.00
Côte d'Ivoire	191.00	Jordan	33.00	Peru	39.00	Venezuela	22.00
Croatia	8.00	Kazakhstan	76.00	Philippines	37.00	Viet Nam	26.00
Cuba	9.00	Kenya	122.00	Poland	7.50	Yemen	114.00
Czech Rep.	5.00	Kuwait	10.00	Portugal	6.00	Zambia	182.00
Dem. Rep. Congo	205.00	Kyrgyzstan	61.00	Romania	21.00	Zimbabwe	123.00
Denmark	4.00	Laos	100.00	Russia	21.00		
Dominican Rep.	38.00	Latvia	21.00	Rwanda	203.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 42 **Code:** UND_NO **Reference Year:** MRYA 1999-2001

Description: Percentage of undernourished in total population

Units: Percentage of undernourished in total population

Source*: United Nations Food and Agriculture Organization (FAO).

Logic: This indicator represents the population vulnerability to malnutrition, famine or diseases, in addition to showing the incapacity of an economy to supply an adequate amount of food and to manage food resources.

Methodology: The value of 1% was allocated to the following countries: Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Israel, Italy, Japan, South Korea, The Netherlands, Norway, New Zealand, Portugal, Sweden, and the United States of America. These countries are not covered in the FAO State of Food Insecurity in the World 2003 report but are considered to have a small proportion of undernourished people.

	Mean	16.93	Max	75	2.5 Percentile	0	
	Median	11	Min	0	97.5 Percentile	70	
Albania	4.00	Ecuador	4.00	Lebanon	3.00	Saudi Arabia	3.00
Algeria	6.00	Egypt	3.00	Liberia	42.00	Senegal	24.00
Angola	49.00	El Salvador	14.00	Libya	0.00	Serbia and Mont.	9.00
Argentina	0.00	Estonia	4.00	Lithuania	0.00	Sierra Leone	50.00
Armenia	51.00	Ethiopia	42.00	Macedonia	10.00	Slovakia	5.00
Australia	1.00	Finland	1.00	Madagascar	36.00	Slovenia	0.00
Austria	1.00	France	1.00	Malawi	33.00	South Africa	[14.7]
Azerbaijan	21.00	Gabon	7.00	Malaysia	0.00	South Korea	0.00
Bangladesh	32.00	Gambia	27.00	Mali	21.00	Spain	1.00
Belarus	3.00	Georgia	26.00	Mauritania	10.00	Sri Lanka	25.00
Belgium	1.00	Germany	1.00	Mexico	5.00	Sudan	25.00
Benin	16.00	Ghana	12.00	Moldova	12.00	Sweden	1.00
Bhutan	[32.42]	Greece	1.00	Mongolia	38.00	Switzerland	1.00
Bolivia	22.00	Guatemala	25.00	Morocco	7.00	Syria	4.00
Bosnia and Herz.	8.00	Guinea	28.00	Mozambique	53.00	Taiwan	[13.27]
Botswana	24.00	Guinea-Bissau	[31.93]	Myanmar	7.00	Tajikistan	71.00
Brazil	9.00	Guyana	14.00	Namibia	7.00	Tanzania	43.00
Bulgaria	16.00	Haiti	49.00	Nepal	17.00	Thailand	19.00
Burkina Faso	17.00	Honduras	20.00	Netherlands	1.00	Togo	25.00
Burundi	70.00	Hungary	0.00	New Zealand	1.00	Trin. and Tob.	12.00
Cambodia	38.00	Iceland	1.00	Nicaragua	29.00	Tunisia	0.00
Cameroon	27.00	India	21.00	Niger	34.00	Turkey	3.00
Canada	1.00	Indonesia	6.00	Nigeria	8.00	Turkmenistan	7.00
Central Afr. Rep.	44.00	Iran	5.00	North Korea	34.00	Uganda	19.00
Chad	34.00	Iraq	27.00	Norway	1.00	Ukraine	4.00
Chile	4.00	Ireland	1.00	Oman	[4.17]	United Arab. Em.	0.00
China	11.00	Israel	1.00	P. N. Guinea	27.00	United Kingdom	1.00
Colombia	13.00	Italy	1.00	Pakistan	19.00	United States	1.00
Congo	30.00	Jamaica	9.00	Panama	26.00	Uruguay	3.00
Costa Rica	6.00	Japan	1.00	Paraguay	13.00	Uzbekistan	26.00
Côte d'Ivoire	15.00	Jordan	6.00	Peru	11.00	Venezuela	18.00
Croatia	12.00	Kazakhstan	22.00	Philippines	22.00	Viet Nam	19.00
Cuba	11.00	Kenya	37.00	Poland	0.00	Yemen	33.00
Czech Rep.	0.00	Kuwait	4.00	Portugal	1.00	Zambia	50.00
Dem. Rep. Congo	75.00	Kyrgyzstan	7.00	Romania	0.00	Zimbabwe	39.00
Denmark	1.00	Laos	22.00	Russia	4.00		
Dominican Rep.	25.00	Latvia	6.00	Rwanda	41.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 43 **Code:** WATSUP **Reference Year:** MRYA 1991-2004

Description: Percentage of population with access to improved drinking water source

Units: Percentage of population with access to improved drinking water source

Source*: World Health Organization (WHO) and United Nations Children's Fund (UNICEF), plus country data.

Logic: The percentage of population with access to improved sources of drinking water supply is directly related to the capacity of a country to provide a healthy environment, reducing the risks associated with water-borne diseases and exposure to pollutants.

Methodology: Proportion of population with sustainable access to an improved water source, whole Area (UNICEF-WHO)

	Mean	81.42	Max	100	2.5 Percentile	36.25	
	Median	86	Min	13	97.5 Percentile	100	
Albania	97.00	Ecuador	86.00	Lebanon	100.00	Saudi Arabia	[87.55]
Algeria	87.00	Egypt	98.00	Liberia	62.00	Senegal	72.00
Angola	50.00	El Salvador	82.00	Libya	72.00	Serbia and Mont.	93.00
Argentina	[88.93]	Estonia	[101.83]	Lithuania	[98.01]	Sierra Leone	57.00
Armenia	92.00	Ethiopia	22.00	Macedonia	[86.05]	Slovakia	100.00
Australia	100.00	Finland	100.00	Madagascar	45.00	Slovenia	[103.1]
Austria	100.00	France	[101.75]	Malawi	67.00	South Africa	87.00
Azerbaijan	77.00	Gabon	87.00	Malaysia	95.00	South Korea	92.00
Bangladesh	75.00	Gambia	82.00	Mali	48.00	Spain	[99.85]
Belarus	100.00	Georgia	76.00	Mauritania	56.00	Sri Lanka	78.00
Belgium	96.45	Germany	100.00	Mexico	91.00	Sudan	69.00
Benin	68.00	Ghana	79.00	Moldova	92.00	Sweden	100.00
Bhutan	62.00	Greece	[102.16]	Mongolia	62.00	Switzerland	100.00
Bolivia	85.00	Guatemala	95.00	Morocco	80.00	Syria	79.00
Bosnia and Herz.	98.00	Guinea	51.00	Mozambique	42.00	Taiwan	100.00
Botswana	95.00	Guinea-Bissau	59.00	Myanmar	80.00	Tajikistan	58.00
Brazil	89.00	Guyana	83.00	Namibia	80.00	Tanzania	73.00
Bulgaria	100.00	Haiti	71.00	Nepal	84.00	Thailand	85.00
Burkina Faso	51.00	Honduras	90.00	Netherlands	100.00	Togo	51.00
Burundi	79.00	Hungary	99.00	New Zealand	[97.7]	Trin. and Tob.	91.00
Cambodia	34.00	Iceland	100.00	Nicaragua	81.00	Tunisia	82.00
Cameroon	63.00	India	86.00	Niger	46.00	Turkey	93.00
Canada	100.00	Indonesia	78.00	Nigeria	60.00	Turkmenistan	71.00
Central Afr. Rep.	75.00	Iran	93.00	North Korea	100.00	Uganda	56.00
Chad	34.00	Iraq	81.00	Norway	100.00	Ukraine	98.00
Chile	95.00	Ireland	100.00	Oman	79.00	United Arab. Em.	98.00
China	77.00	Israel	100.00	P. N. Guinea	39.00	United Kingdom	[100.1]
Colombia	92.00	Italy	94.10	Pakistan	90.00	United States	100.00
Congo	46.00	Jamaica	93.00	Panama	91.00	Uruguay	98.00
Costa Rica	97.00	Japan	100.00	Paraguay	83.00	Uzbekistan	89.00
Côte d'Ivoire	84.00	Jordan	91.00	Peru	81.00	Venezuela	83.00
Croatia	[95.48]	Kazakhstan	86.00	Philippines	85.00	Viet Nam	73.00
Cuba	91.00	Kenya	62.00	Poland	[102.2]	Yemen	69.00
Czech Rep.	[96.86]	Kuwait	[98.75]	Portugal	[98.51]	Zambia	55.00
Dem. Rep. Congo	46.00	Kyrgyzstan	76.00	Romania	57.00	Zimbabwe	83.00
Denmark	100.00	Laos	43.00	Russia	96.00		
Dominican Rep.	93.00	Latvia	[98.73]	Rwanda	73.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 44 **Code:** DISCAS **Reference Year:** 1980-2000

Description: Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts

Units: Average number of deaths per million inhabitants

Source*: United Nations Development Programme (UNDP) Bureau for Crisis Prevention and Recovery.

Logic: Vulnerability to natural disasters is a function of the exposure to hazards (how often and how severe they are), the sensitivity to such hazards (how big the linkages are to social systems), and the resilience within a society to hazard impacts. By averaging deaths from environmentally-related natural disasters, this measure provides a useful summary of overall human vulnerability to environmental change.

Methodology: The UNDP compiled these measures by aggregating and normalizing information from the OFDA/CRED International Disasters Data Base, Center for Research on the Epidemiology of Disasters.

	Mean		Max		2.5 Percentile		0.00
	Median		Min		97.5 Percentile		289.10
Albania	0.22	Ecuador	2.92	Lebanon	0.00	Saudi Arabia	0.00
Algeria	0.50	Egypt	0.48	Liberia	0.19	Senegal	0.00
Angola	0.11	El Salvador	8.82	Libya	0.00	Serbia and Mont.	0.38
Argentina	0.34	Estonia	0.00	Lithuania	0.00	Sierra Leone	0.14
Armenia	0.05	Ethiopia	286.74	Macedonia	0.00	Slovakia	0.49
Australia	0.52	Finland	0.00	Madagascar	4.65	Slovenia	0.00
Austria	0.12	France	0.09	Malawi	2.36	South Africa	1.38
Azerbaijan	0.10	Gabon	0.00	Malaysia	0.84	South Korea	2.86
Bangladesh	68.13	Gambia	2.09	Mali	0.18	Spain	0.21
Belarus	0.01	Georgia	0.90	Mauritania	57.86	Sri Lanka	1.62
Belgium	0.03	Germany	0.01	Mexico	2.34	Sudan	294.62
Benin	0.91	Ghana	0.60	Moldova	0.62	Sweden	0.00
Bhutan	5.44	Greece	0.11	Mongolia	0.00	Switzerland	0.01
Bolivia	2.27	Guatemala	5.71	Morocco	1.40	Syria	0.00
Bosnia and Herz.	0.00	Guinea	0.10	Mozambique	361.13	Taiwan	..
Botswana	1.07	Guinea-Bissau	0.00	Myanmar	0.20	Tajikistan	0.00
Brazil	0.68	Guyana	0.00	Namibia	0.00	Tanzania	0.77
Bulgaria	0.00	Haiti	13.35	Nepal	10.92	Thailand	1.91
Burkina Faso	0.23	Honduras	145.74	Netherlands	0.00	Togo	0.04
Burundi	0.15	Hungary	0.04	New Zealand	0.22	Trin. and Tob.	0.19
Cambodia	4.08	Iceland	0.00	Nicaragua	3739.6	Tunisia	1.13
Cameroon	0.13	India	2.81	Niger	0.47	Turkey	0.36
Canada	0.05	Indonesia	1.01	Nigeria	0.12	Turkmenistan	0.00
Central Afr. Rep.	0.09	Iran	2.20	North Korea	580.78	Uganda	0.65
Chad	28.50	Iraq	0.00	Norway	0.01	Ukraine	0.06
Chile	1.21	Ireland	0.04	Oman	0.00	United Arab. Em.	0.00
China	1.83	Israel	0.09	P. N. Guinea	2.40	United Kingdom	0.01
Colombia	1.39	Italy	0.24	Pakistan	2.28	United States	0.95
Congo	0.03	Jamaica	2.79	Panama	0.32	Uruguay	0.00
Costa Rica	1.73	Japan	0.57	Paraguay	0.85	Uzbekistan	0.00
Côte d'Ivoire	0.10	Jordan	0.26	Peru	4.56	Venezuela	68.56
Croatia	0.00	Kazakhstan	0.03	Philippines	15.58	Viet Nam	8.38
Cuba	0.47	Kenya	0.66	Poland	0.08	Yemen	3.65
Czech Rep.	0.13	Kuwait	0.06	Portugal	0.34	Zambia	0.00
Dem. Rep. Congo	0.07	Kyrgyzstan	0.02	Romania	0.41	Zimbabwe	0.41
Denmark	0.00	Laos	1.35	Russia	0.06		
Dominican Rep.	3.10	Latvia	0.00	Rwanda	0.34		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 45 **Code:** DISEXP **Reference Year:** 2005

Description: Environmental Hazard Exposure Index

Units: An index of population-weighted exposure to high levels of environmentally-related natural hazards.

Source*: The World Bank.

Logic: Vulnerability to natural disasters is a function of the exposure to hazards (how often and how severe they are), the sensitivity to such hazards (how big the linkages are to social systems), and the resilience within a society to hazard impacts. This measure provides a useful proxy of the exposure term.

Methodology: To calculate the environmental hazard exposure index, data from Dilley et al. were used. Data on exposure to landslides, droughts, cyclones and floods were put into a consistent GIS database. The world's land area was classified into degrees of exposure to these four hazards. Those grid cells falling into the highest three deciles of exposure were flagged. The number of high-exposure hazards was summed for each grid cell. The values range from 0-4. The resulting gridded data set was then overlaid with a gridded population data set for the year 2000. Each person was assigned a score equal to the number of high-exposure hazards identified in that grid cell. We calculated the sum of personal exposure scores, and divided by the total population, by country. The theoretically possible range was 0-4. The actual index ranged from 0 to 2.04.

	Mean		Max		2.5 Percentile		97.5 Percentile
	0.59	Median	0.51	Min	0	2.04	0
Albania	0.04	Ecuador	1.76	Lebanon	1.02	Saudi Arabia	0.00
Algeria	0.20	Egypt	..	Liberia	..	Senegal	..
Angola	0.55	El Salvador	1.23	Libya	0.33	Serbia and Mont.	0.16
Argentina	0.59	Estonia	..	Lithuania	..	Sierra Leone	0.38
Armenia	0.16	Ethiopia	0.11	Macedonia	0.34	Slovakia	0.31
Australia	0.28	Finland	0.00	Madagascar	0.99	Slovenia	0.00
Austria	0.11	France	0.24	Malawi	0.08	South Africa	0.48
Azerbaijan	0.16	Gabon	..	Malaysia	0.72	South Korea	1.45
Bangladesh	1.31	Gambia	..	Mali	0.00	Spain	0.42
Belarus	0.01	Georgia	0.13	Mauritania	0.00	Sri Lanka	0.74
Belgium	..	Germany	0.42	Mexico	0.69	Sudan	0.34
Benin	0.12	Ghana	0.21	Moldova	..	Sweden	..
Bhutan	0.85	Greece	0.20	Mongolia	0.03	Switzerland	0.83
Bolivia	0.46	Guatemala	2.04	Morocco	0.54	Syria	0.49
Bosnia and Herz.	0.02	Guinea	0.19	Mozambique	0.66	Taiwan	1.97
Botswana	0.26	Guinea-Bissau	..	Myanmar	0.90	Tajikistan	0.38
Brazil	0.64	Guyana	..	Namibia	0.34	Tanzania	0.14
Bulgaria	0.00	Haiti	0.96	Nepal	0.99	Thailand	0.94
Burkina Faso	0.03	Honduras	1.00	Netherlands	..	Togo	0.06
Burundi	0.34	Hungary	0.13	New Zealand	0.36	Trin. and Tob.	0.00
Cambodia	0.91	Iceland	0.07	Nicaragua	1.08	Tunisia	..
Cameroon	0.01	India	0.79	Niger	0.33	Turkey	0.21
Canada	0.02	Indonesia	0.68	Nigeria	0.28	Turkmenistan	0.12
Central Afr. Rep.	0.01	Iran	0.74	North Korea	0.58	Uganda	0.65
Chad	0.14	Iraq	0.47	Norway	..	Ukraine	0.05
Chile	1.43	Ireland	..	Oman	0.01	United Arab. Em.	0.39
China	0.72	Israel	0.35	P. N. Guinea	0.30	United Kingdom	0.77
Colombia	1.01	Italy	0.31	Pakistan	0.92	United States	0.56
Congo	0.00	Jamaica	1.01	Panama	0.22	Uruguay	0.14
Costa Rica	1.03	Japan	1.30	Paraguay	0.60	Uzbekistan	0.04
Côte d'Ivoire	..	Jordan	0.95	Peru	0.54	Venezuela	0.48
Croatia	0.00	Kazakhstan	0.13	Philippines	1.63	Viet Nam	1.41
Cuba	0.44	Kenya	0.86	Poland	0.18	Yemen	0.55
Czech Rep.	0.03	Kuwait	0.18	Portugal	0.43	Zambia	0.34
Dem. Rep. Congo	0.12	Kyrgyzstan	0.06	Romania	0.36	Zimbabwe	0.76
Denmark	..	Laos	0.79	Russia	0.09		
Dominican Rep.	0.86	Latvia	..	Rwanda	0.97		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 46 **Code:** GASPR **Reference Year:** 2002

Description: Ratio of gasoline price to world average

Units: Ratio of gasoline price to world average price

Source*: World Bank.

Logic: Unsubsidized gasoline prices are an indicator that appropriate price signals are being sent and that environmental externalities have been internalized. High taxes on gasoline act as an incentive for public transportation use and development of alternative fuels.

Methodology: Pump price for super gasoline (US dollars per liter): Fuel prices refer to the pump prices of the most widely sold grade of gasoline expressed in US dollars. The ratio of the gas price to the world average in the same time period was used to normalize the data.

Mean	1	Max	2.41	2.5 Percentile	0.18		
Median	0.95	Min	0.03	97.5 Percentile	1.84		
Albania	1.31	Ecuador	0.90	Lebanon	1.07	Saudi Arabia	0.39
Algeria	0.36	Egypt	0.31	Liberia	[1.02]	Senegal	1.23
Angola	0.31	El Salvador	0.75	Libya	0.16	Serbia and Mont.	1.21
Argentina	1.03	Estonia	0.95	Lithuania	1.13	Sierra Leone	0.84
Armenia	0.69	Ethiopia	0.85	Macedonia	1.39	Slovakia	1.21
Australia	0.82	Finland	1.84	Madagascar	1.77	Slovenia	1.25
Austria	1.38	France	1.72	Malawi	1.08	South Africa	0.70
Azerbaijan	0.61	Gabon	1.13	Malaysia	0.57	South Korea	1.79
Bangladesh	0.85	Gambia	0.75	Mali	1.13	Spain	1.36
Belarus	0.82	Georgia	0.79	Mauritania	1.03	Sri Lanka	0.89
Belgium	1.70	Germany	1.69	Mexico	1.02	Sudan	0.49
Benin	0.89	Ghana	0.46	Moldova	0.74	Sweden	1.74
Bhutan	0.95	Greece	1.28	Mongolia	0.62	Switzerland	1.46
Bolivia	1.13	Guatemala	0.79	Morocco	1.43	Syria	0.87
Bosnia and Herz.	1.21	Guinea	1.08	Mozambique	0.75	Taiwan	1.00
Botswana	0.67	Guinea-Bissau	[1.05]	Myanmar	0.59	Tajikistan	0.59
Brazil	0.90	Guyana	0.51	Namibia	0.74	Tanzania	1.10
Bulgaria	1.11	Haiti	0.89	Nepal	1.08	Thailand	0.59
Burkina Faso	1.36	Honduras	1.03	Netherlands	1.84	Togo	0.92
Burundi	0.95	Hungary	1.54	New Zealand	0.90	Trin. and Tob.	0.66
Cambodia	1.03	Iceland	1.90	Nicaragua	0.89	Tunisia	0.48
Cameroon	1.11	India	1.08	Niger	1.26	Turkey	1.67
Canada	0.84	Indonesia	0.44	Nigeria	0.33	Turkmenistan	0.03
Central Afr. Rep.	1.64	Iran	0.11	North Korea	0.90	Uganda	1.36
Chad	1.30	Iraq	0.03	Norway	2.02	Ukraine	0.77
Chile	0.95	Ireland	1.48	Oman	0.51	United Arab. Em.	0.48
China	0.69	Israel	1.48	P. N. Guinea	0.87	United Kingdom	1.93
Colombia	0.72	Italy	1.72	Pakistan	0.85	United States	0.66
Congo	1.13	Jamaica	0.85	Panama	0.84	Uruguay	0.75
Costa Rica	1.05	Japan	1.49	Paraguay	0.92	Uzbekistan	0.62
Côte d'Ivoire	1.39	Jordan	0.85	Peru	1.21	Venezuela	0.08
Croatia	1.46	Kazakhstan	0.57	Philippines	0.57	Viet Nam	0.56
Cuba	1.48	Kenya	1.15	Poland	1.36	Yemen	0.34
Czech Rep.	1.33	Kuwait	0.33	Portugal	1.59	Zambia	1.18
Dem. Rep. Congo	1.15	Kyrgyzstan	0.64	Romania	1.05	Zimbabwe	[0.73]
Denmark	1.79	Laos	0.59	Russia	0.57		
Dominican Rep.	0.80	Latvia	1.15	Rwanda	1.38		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 47 **Code:** GRAFT **Reference Year:** 2002

Description: Corruption measure

Units: Standardized scale (z-score); with high scores corresponding to effective control of corruption

Source*: World Bank.

Logic: Corruption contributes to lax enforcement of environmental regulations and an ability on the part of producers and consumers to evade responsibility for the environmental harms they cause.

Methodology: Multi-pronged, experiential surveys of households, firms and public officials were used to measure social and economic costs of corruption. The quality of public service delivery, business, environmental, and public sector vulnerability were also examined, and the indicators on institutions, expenditure flows, and procurement were then added to yield the standardized score.

	Mean		Max		2.5 Percentile		-1.35
	Median		Min		97.5 Percentile		2.2
Albania	-0.85	Ecuador	-1.02	Lebanon	-0.34	Saudi Arabia	0.57
Algeria	-0.70	Egypt	-0.29	Liberia	-0.98	Senegal	-0.17
Angola	-1.12	El Salvador	-0.54	Libya	-0.82	Serbia and Mont.	-0.80
Argentina	-0.77	Estonia	0.66	Lithuania	0.25	Sierra Leone	-0.82
Armenia	-0.72	Ethiopia	-0.35	Macedonia	-0.73	Slovakia	0.28
Australia	1.91	Finland	2.39	Madagascar	0.14	Slovenia	0.89
Austria	1.85	France	1.45	Malawi	-0.91	South Africa	0.36
Azerbaijan	-1.07	Gabon	-0.55	Malaysia	0.38	South Korea	0.33
Bangladesh	-1.12	Gambia	-0.83	Mali	-0.32	Spain	1.46
Belarus	-0.78	Georgia	-1.03	Mauritania	0.23	Sri Lanka	-0.14
Belgium	1.57	Germany	1.82	Mexico	-0.19	Sudan	-1.09
Benin	-0.61	Ghana	-0.40	Moldova	-0.89	Sweden	2.25
Bhutan	0.91	Greece	0.58	Mongolia	-0.14	Switzerland	2.17
Bolivia	-0.82	Guatemala	-0.71	Morocco	-0.04	Syria	-0.29
Bosnia and Herz.	-0.60	Guinea	-0.58	Mozambique	-1.01	Taiwan	0.81
Botswana	0.76	Guinea-Bissau	-0.61	Myanmar	-1.37	Tajikistan	-1.07
Brazil	-0.05	Guyana	-0.50	Namibia	0.21	Tanzania	-1.00
Bulgaria	-0.17	Haiti	-1.70	Nepal	-0.30	Thailand	-0.15
Burkina Faso	-0.04	Honduras	-0.78	Netherlands	2.15	Togo	-0.68
Burundi	-1.02	Hungary	0.60	New Zealand	2.28	Trin. and Tob.	-0.04
Cambodia	-0.90	Iceland	2.19	Nicaragua	-0.44	Tunisia	0.35
Cameroon	-1.10	India	-0.25	Niger	-1.10	Turkey	-0.38
Canada	2.03	Indonesia	-1.16	Nigeria	-1.35	Turkmenistan	-1.21
Central Afr. Rep.	-1.02	Iran	-0.38	North Korea	-1.18	Uganda	-0.92
Chad	-1.02	Iraq	-1.43	Norway	2.00	Ukraine	-0.96
Chile	1.55	Ireland	1.67	Oman	1.03	United Arab. Em.	1.19
China	-0.41	Israel	1.08	P. N. Guinea	-0.90	United Kingdom	1.97
Colombia	-0.47	Italy	0.80	Pakistan	-0.73	United States	1.77
Congo	-0.94	Jamaica	-0.46	Panama	-0.24	Uruguay	0.79
Costa Rica	0.88	Japan	1.20	Paraguay	-1.22	Uzbekistan	-1.03
Côte d'Ivoire	-0.86	Jordan	0.00	Peru	-0.20	Venezuela	-0.94
Croatia	0.23	Kazakhstan	-1.05	Philippines	-0.52	Viet Nam	-0.68
Cuba	-0.13	Kenya	-1.05	Poland	0.39	Yemen	-0.69
Czech Rep.	0.38	Kuwait	1.06	Portugal	1.33	Zambia	-0.97
Dem. Rep. Congo	-1.42	Kyrgyzstan	-0.84	Romania	-0.34	Zimbabwe	-1.17
Denmark	2.26	Laos	-1.25	Russia	-0.90		
Dominican Rep.	-0.39	Latvia	0.09	Rwanda	-0.58		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 48 **Code:** GOVEFF **Reference Year:** 2002

Description: Government effectiveness

Units: Standardized score (z-score), with high values corresponding to high levels of effectiveness.

Source*: World Bank.

Logic: Governmental effectiveness is defined in this data set as "quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies." It is relevant for environmental sustainability because basic governmental competence enhances a society's ability to monitor and respond to environmental

Methodology: The World Bank aggregates 25 sources of information on governmental effectiveness to produce comparable indicators.

Mean	0	Max	2.26	2.5 Percentile	-1.54		
Median	-0.2	Min	-1.97	97.5 Percentile	2.01		
Albania	-0.47	Ecuador	-0.96	Lebanon	-0.41	Saudi Arabia	-0.05
Algeria	-0.59	Egypt	-0.32	Liberia	-1.51	Senegal	-0.18
Angola	-1.16	El Salvador	-0.53	Libya	-0.87	Serbia and Mont.	-0.73
Argentina	-0.49	Estonia	0.78	Lithuania	0.61	Sierra Leone	-1.54
Armenia	-0.42	Ethiopia	-0.89	Macedonia	-0.39	Slovakia	0.40
Australia	1.84	Finland	2.01	Madagascar	-0.38	Slovenia	0.82
Austria	1.79	France	1.67	Malawi	-0.68	South Africa	0.52
Azerbaijan	-0.96	Gabon	-0.45	Malaysia	0.92	South Korea	0.84
Bangladesh	-0.53	Gambia	-0.81	Mali	-0.84	Spain	1.53
Belarus	-1.03	Georgia	-0.77	Mauritania	-0.16	Sri Lanka	0.03
Belgium	1.85	Germany	1.76	Mexico	0.15	Sudan	-1.11
Benin	-0.62	Ghana	0.01	Moldova	-0.63	Sweden	1.84
Bhutan	0.93	Greece	0.79	Mongolia	-0.18	Switzerland	2.26
Bolivia	-0.53	Guatemala	-0.61	Morocco	0.07	Syria	-0.57
Bosnia and Herz.	-0.90	Guinea	-0.78	Mozambique	-0.41	Taiwan	1.00
Botswana	0.87	Guinea-Bissau	-1.35	Myanmar	-1.29	Tajikistan	-1.23
Brazil	-0.22	Guyana	-0.32	Namibia	0.18	Tanzania	-0.51
Bulgaria	-0.06	Haiti	-1.56	Nepal	-0.51	Thailand	0.28
Burkina Faso	-0.69	Honduras	-0.73	Netherlands	2.14	Togo	-1.17
Burundi	-1.46	Hungary	0.78	New Zealand	1.97	Trin. and Tob.	0.47
Cambodia	-0.56	Iceland	1.98	Nicaragua	-0.87	Tunisia	0.65
Cameroon	-0.62	India	-0.13	Niger	-0.79	Turkey	-0.20
Canada	1.88	Indonesia	-0.56	Nigeria	-1.12	Turkmenistan	-1.47
Central Afr. Rep.	-1.43	Iran	-0.46	North Korea	-1.78	Uganda	-0.41
Chad	-0.75	Iraq	-1.64	Norway	1.84	Ukraine	-0.74
Chile	1.19	Ireland	1.62	Oman	0.69	United Arab. Em.	0.83
China	0.18	Israel	1.02	P. N. Guinea	-0.78	United Kingdom	2.03
Colombia	-0.39	Italy	0.91	Pakistan	-0.50	United States	1.70
Congo	-1.25	Jamaica	-0.07	Panama	-0.14	Uruguay	0.51
Costa Rica	0.37	Japan	1.07	Paraguay	-1.29	Uzbekistan	-1.10
Côte d'Ivoire	-0.89	Jordan	0.36	Peru	-0.47	Venezuela	-1.14
Croatia	0.19	Kazakhstan	-0.80	Philippines	-0.06	Viet Nam	-0.27
Cuba	-0.26	Kenya	-0.85	Poland	0.61	Yemen	-0.87
Czech Rep.	0.70	Kuwait	0.16	Portugal	1.03	Zambia	-0.93
Dem. Rep. Congo	-1.60	Kyrgyzstan	-0.81	Romania	-0.33	Zimbabwe	-0.80
Denmark	1.99	Laos	-0.80	Russia	-0.40		
Dominican Rep.	-0.41	Latvia	0.67	Rwanda	-0.82		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 49 **Code:** PRAREA **Reference Year:** 2003

Description: Percentage of total land area under protected status

Units: Percentage of total land area under protected status

Source*: United Nations Environment Program - World Conservation Monitoring Centre (UNEP-WCMC), plus country data.

Logic: The percentage of land area dedicated to protected areas represents an investment by the country in biodiversity conservation.

Methodology: Marine protected areas were subtracted from the total area of protected areas in order to limit the focus to land-based ecosystem protection.

Mean	10.91	Max	72.3	2.5 Percentile	0		
Median	7.1	Min	0	97.5 Percentile	41.76		
Albania	2.60	Ecuador	26.00	Lebanon	0.70	Saudi Arabia	41.80
Algeria	5.10	Egypt	5.70	Liberia	15.80	Senegal	11.00
Angola	10.00	El Salvador	2.00	Libya	0.10	Serbia and Mont.	3.70
Argentina	6.30	Estonia	19.60	Lithuania	9.10	Sierra Leone	4.50
Armenia	10.00	Ethiopia	16.40	Macedonia	7.90	Slovakia	22.50
Australia	7.50	Finland	8.90	Madagascar	3.10	Slovenia	7.40
Austria	36.40	France	11.30	Malawi	16.30	South Africa	6.20
Azerbaijan	4.60	Gabon	3.40	Malaysia	30.60	South Korea	3.60
Bangladesh	0.50	Gambia	3.20	Mali	3.70	Spain	9.20
Belarus	6.40	Georgia	4.30	Mauritania	0.20	Sri Lanka	26.50
Belgium	13.73	Germany	31.70	Mexico	5.00	Sudan	4.90
Benin	22.70	Ghana	15.40	Moldova	1.40	Sweden	7.20
Bhutan	30.20	Greece	3.20	Mongolia	14.00	Switzerland	28.80
Bolivia	19.40	Guatemala	25.30	Morocco	1.20	Syria	1.90
Bosnia and Herz.	0.20	Guinea	4.30	Mozambique	5.70	Taiwan	8.30
Botswana	30.20	Guinea-Bissau	[12.63]	Myanmar	5.40	Tajikistan	18.30
Brazil	18.00	Guyana	2.30	Namibia	5.60	Tanzania	39.60
Bulgaria	10.10	Haiti	0.30	Nepal	18.10	Thailand	15.70
Burkina Faso	15.40	Honduras	20.80	Netherlands	26.20	Togo	11.30
Burundi	5.40	Hungary	8.90	New Zealand	24.40	Trin. and Tob.	4.70
Cambodia	23.70	Iceland	4.70	Nicaragua	21.80	Tunisia	1.50
Cameroon	8.00	India	5.20	Niger	8.20	Turkey	2.60
Canada	6.30	Indonesia	12.50	Nigeria	6.00	Turkmenistan	4.20
Central Afr. Rep.	16.60	Iran	6.50	North Korea	2.60	Uganda	26.40
Chad	9.40	Iraq	0.00	Norway	6.20	Ukraine	3.30
Chile	3.60	Ireland	1.30	Oman	9.60	United Arab. Em.	7.38
China	7.80	Israel	19.10	P. N. Guinea	1.60	United Kingdom	10.50
Colombia	72.30	Italy	11.20	Pakistan	9.20	United States	15.80
Congo	15.80	Jamaica	15.90	Panama	19.50	Uruguay	0.40
Costa Rica	25.60	Japan	14.00	Paraguay	4.10	Uzbekistan	4.60
Côte d'Ivoire	16.90	Jordan	10.90	Peru	16.70	Venezuela	70.30
Croatia	6.90	Kazakhstan	2.90	Philippines	7.80	Viet Nam	4.20
Cuba	1.60	Kenya	12.30	Poland	23.50	Yemen	[6.04]
Czech Rep.	16.00	Kuwait	0.00	Portugal	5.10	Zambia	41.40
Dem. Rep. Congo	8.30	Kyrgyzstan	3.60	Romania	2.50	Zimbabwe	14.70
Denmark	25.60	Laos	18.80	Russia	7.60		
Dominican Rep.	24.50	Latvia	15.10	Rwanda	7.70		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 50 **Code:** WEFGOV **Reference Year:** 2003/4

Description: World Economic Forum Survey on environmental governance

Units: Principal components of several survey questions

Source*: World Economic Forum (WEF).

Logic: Effective governance is vital for environmental sustainability.

Methodology: This represents principal components of survey questions addressing several aspects of environmental governance: air pollution regulations, chemical waste regulations, clarity and stability of regulations, flexibility of regulations, environmental regulatory innovation, leadership in environmental policy, consistency of regulation enforcement, environmental regulatory stringency, toxic waste disposal regulations, and water pollution regulations (questions Q1101-Q1111)

	Mean		Max		2.5 Percentile		97.5 Percentile
	Median		Min				
Albania	[29.19]	Ecuador	24.10	Lebanon	[37.65]	Saudi Arabia	[36.72]
Algeria	29.16	Egypt	34.33	Liberia	[22.48]	Senegal	31.37
Angola	17.74	El Salvador	31.07	Libya	[30.66]	Serbia and Mont.	28.87
Argentina	32.26	Estonia	44.57	Lithuania	40.96	Sierra Leone	[20.11]
Armenia	[33.51]	Ethiopia	24.21	Macedonia	26.16	Slovakia	46.05
Australia	52.95	Finland	59.50	Madagascar	28.59	Slovenia	45.91
Austria	53.45	France	52.65	Malawi	33.61	South Africa	42.02
Azerbaijan	[30.74]	Gabon	[28.43]	Malaysia	44.01	South Korea	43.08
Bangladesh	26.98	Gambia	38.82	Mali	26.58	Spain	44.11
Belarus	[31.55]	Georgia	[27.7]	Mauritania	[29.48]	Sri Lanka	29.98
Belgium	51.93	Germany	59.74	Mexico	37.56	Sudan	[24.03]
Benin	[33.1]	Ghana	35.20	Moldova	[28.8]	Sweden	59.56
Bhutan	[28.88]	Greece	39.66	Mongolia	[30.55]	Switzerland	59.14
Bolivia	23.73	Guatemala	24.44	Morocco	30.73	Syria	[27.35]
Bosnia and Herz.	[28.78]	Guinea	[25.2]	Mozambique	25.27	Taiwan	48.58
Botswana	35.83	Guinea-Bissau	[25.91]	Myanmar	[29.07]	Tajikistan	[22.22]
Brazil	41.48	Guyana	[34.06]	Namibia	37.35	Tanzania	33.65
Bulgaria	27.83	Haiti	15.30	Nepal	[29.07]	Thailand	38.59
Burkina Faso	[29.75]	Honduras	26.38	Netherlands	56.96	Togo	[24.2]
Burundi	[25.17]	Hungary	41.18	New Zealand	53.36	Trin. and Tob.	28.63
Cambodia	[30.31]	Iceland	55.00	Nicaragua	24.08	Tunisia	47.33
Cameroon	30.72	India	34.13	Niger	[26.96]	Turkey	32.08
Canada	47.65	Indonesia	34.58	Nigeria	25.61	Turkmenistan	[22.25]
Central Afr. Rep.	[27.93]	Iran	[29.47]	North Korea	[24.87]	Uganda	30.96
Chad	22.41	Iraq	[21.09]	Norway	55.84	Ukraine	32.52
Chile	42.26	Ireland	41.98	Oman	[36.57]	United Arab. Em.	[42.84]
China	35.39	Israel	41.67	P. N. Guinea	[25.46]	United Kingdom	52.95
Colombia	36.10	Italy	46.02	Pakistan	28.50	United States	51.17
Congo	[24.27]	Jamaica	32.88	Panama	30.82	Uruguay	35.71
Costa Rica	39.14	Japan	51.21	Paraguay	23.27	Uzbekistan	[28.9]
Côte d'Ivoire	[24.35]	Jordan	41.21	Peru	28.25	Venezuela	25.60
Croatia	35.81	Kazakhstan	[28.22]	Philippines	28.66	Viet Nam	31.09
Cuba	[31.51]	Kenya	27.79	Poland	38.51	Yemen	[22.77]
Czech Rep.	44.45	Kuwait	[36.48]	Portugal	43.30	Zambia	35.32
Dem. Rep. Congo	[18.68]	Kyrgyzstan	[24.79]	Romania	29.09	Zimbabwe	27.62
Denmark	59.16	Laos	[26.71]	Russia	31.35		
Dominican Rep.	30.07	Latvia	42.34	Rwanda	[24.73]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 51 Code: LAW Reference Year: 2002

Description: Rule of law

Units: Standardized score (z-score), where high values correspond to high degrees of rule of law.

Source*: World Bank.

Logic: The rule of law is important in terms of establishing the "rules of the game" for the civil society, the private sector, and government; for ensuring that violations of environmental regulations are enforced; and for promoting stable expectations that facilitate long-range planning.

Methodology: The indicators measuring rule of law are defined as the extent to which agents have confidence in and abide by the rules of society. They are: perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.

	Mean	0	Max	2.03	2.5 Percentile	-1.61	
	Median	-0.27	Min	-2.05	97.5 Percentile	1.96	
Albania	-0.92	Ecuador	-0.60	Lebanon	-0.27	Saudi Arabia	0.44
Algeria	-0.54	Egypt	0.09	Liberia	-1.42	Senegal	-0.20
Angola	-1.56	El Salvador	-0.46	Libya	-0.91	Serbia and Mont.	-0.95
Argentina	-0.73	Estonia	0.80	Lithuania	0.48	Sierra Leone	-1.25
Armenia	-0.44	Ethiopia	-0.44	Macedonia	-0.41	Slovakia	0.40
Australia	1.85	Finland	1.99	Madagascar	-0.19	Slovenia	1.09
Austria	1.91	France	1.33	Malawi	-0.34	South Africa	0.19
Azerbaijan	-0.79	Gabon	-0.27	Malaysia	0.58	South Korea	0.88
Bangladesh	-0.78	Gambia	-0.50	Mali	-0.54	Spain	1.15
Belarus	-1.12	Georgia	-1.17	Mauritania	-0.33	Sri Lanka	0.23
Belgium	1.45	Germany	1.73	Mexico	-0.22	Sudan	-1.36
Benin	-0.42	Ghana	-0.15	Moldova	-0.49	Sweden	1.92
Bhutan	0.10	Greece	0.79	Mongolia	0.36	Switzerland	2.03
Bolivia	-0.60	Guatemala	-0.84	Morocco	0.11	Syria	-0.41
Bosnia and Herz.	-0.88	Guinea	-0.75	Mozambique	-0.65	Taiwan	0.95
Botswana	0.72	Guinea-Bissau	-1.00	Myanmar	-1.62	Tajikistan	-1.27
Brazil	-0.30	Guyana	-0.43	Namibia	0.45	Tanzania	-0.49
Bulgaria	0.05	Haiti	-1.76	Nepal	-0.50	Thailand	0.30
Burkina Faso	-0.55	Honduras	-0.79	Netherlands	1.83	Togo	-0.67
Burundi	-1.49	Hungary	0.90	New Zealand	1.91	Trin. and Tob.	0.34
Cambodia	-0.86	Iceland	2.00	Nicaragua	-0.63	Tunisia	0.27
Cameroon	-1.28	India	0.07	Niger	-0.78	Turkey	0.00
Canada	1.79	Indonesia	-0.80	Nigeria	-1.35	Turkmenistan	-1.16
Central Afr. Rep.	-0.88	Iran	-0.58	North Korea	-1.00	Uganda	-0.84
Chad	-0.93	Iraq	-1.70	Norway	1.96	Ukraine	-0.79
Chile	1.30	Ireland	1.72	Oman	0.83	United Arab. Em.	0.95
China	-0.22	Israel	0.97	P. N. Guinea	-0.82	United Kingdom	1.81
Colombia	-0.75	Italy	0.82	Pakistan	-0.70	United States	1.70
Congo	-1.22	Jamaica	-0.38	Panama	0.00	Uruguay	0.56
Costa Rica	0.67	Japan	1.41	Paraguay	-1.12	Uzbekistan	-1.16
Côte d'Ivoire	-1.21	Jordan	0.33	Peru	-0.44	Venezuela	-1.04
Croatia	0.11	Kazakhstan	-0.90	Philippines	-0.50	Viet Nam	-0.39
Cuba	-0.94	Kenya	-1.04	Poland	0.65	Yemen	-1.23
Czech Rep.	0.74	Kuwait	0.81	Portugal	1.30	Zambia	-0.52
Dem. Rep. Congo	-1.79	Kyrgyzstan	-0.83	Romania	-0.12	Zimbabwe	-1.33
Denmark	1.97	Laos	-1.05	Russia	-0.78		
Dominican Rep.	-0.43	Latvia	0.46	Rwanda	-1.01		

* Full source information for this variable can be found at the end of Appendix C. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 52 **Code:** AGENDA21 **Reference Year:** 2001

Description: Local Agenda 21 initiatives per million people

Units: Number of Local Agenda 21 initiatives per million people

Source*: International Council for Local Environmental Initiatives (ICLEI).

Logic: Local Agenda 21 (LA21) is an international sustainability planning process that provides an opportunity for local governments to work with their communities to create a sustainable future. The number of Local Agenda 21 initiatives in a country measures the degree to which civil society is engaged in environmental governance.

Methodology: For each country, the number of existing Local Agenda 21 initiatives was counted and divided by the total country population.

	Mean		Max		2.5 Percentile		0.02
	Median		Min		97.5 Percentile		59.20
Albania	2.22	Ecuador	1.01	Lebanon	1.35	Saudi Arabia	0.18
Algeria	0.10	Egypt	0.11	Liberia	..	Senegal	0.30
Angola	..	El Salvador	..	Libya	0.37	Serbia and Mont.	2.45
Argentina	0.03	Estonia	21.35	Lithuania	4.04	Sierra Leone	..
Armenia	..	Ethiopia	..	Macedonia	..	Slovakia	5.58
Australia	8.95	Finland	58.28	Madagascar	0.30	Slovenia	1.53
Austria	7.95	France	1.16	Malawi	0.37	South Africa	0.44
Azerbaijan	..	Gabon	0.76	Malaysia	0.37	South Korea	3.61
Bangladesh	0.01	Gambia	..	Mali	0.18	Spain	8.77
Belarus	..	Georgia	..	Mauritania	0.36	Sri Lanka	1.27
Belgium	10.26	Germany	24.75	Mexico	0.02	Sudan	0.03
Benin	0.15	Ghana	0.15	Moldova	..	Sweden	32.38
Bhutan	..	Greece	3.67	Mongolia	8.98	Switzerland	11.39
Bolivia	0.11	Guatemala	..	Morocco	0.17	Syria	0.12
Bosnia and Herz.	0.24	Guinea	..	Mozambique	0.11	Taiwan	..
Botswana	..	Guinea-Bissau	..	Myanmar	..	Tajikistan	..
Brazil	0.21	Guyana	1.31	Namibia	2.52	Tanzania	0.37
Bulgaria	2.76	Haiti	..	Nepal	0.17	Thailand	0.34
Burkina Faso	..	Honduras	0.88	Netherlands	6.19	Togo	0.42
Burundi	0.28	Hungary	0.89	New Zealand	9.39	Trin. and Tob.	0.77
Cambodia	..	Iceland	130.28	Nicaragua	0.94	Tunisia	0.10
Cameroon	0.06	India	0.01	Niger	..	Turkey	0.72
Canada	0.45	Indonesia	0.04	Nigeria	0.04	Turkmenistan	..
Central Afr. Rep.	..	Iran	0.03	North Korea	..	Uganda	0.20
Chad	..	Iraq	..	Norway	62.36	Ukraine	0.18
Chile	0.96	Ireland	7.40	Oman	0.39	United Arab. Em.	0.62
China	0.02	Israel	0.46	P. N. Guinea	..	United Kingdom	7.18
Colombia	0.14	Italy	7.44	Pakistan	0.01	United States	0.30
Congo	..	Jamaica	1.91	Panama	..	Uruguay	..
Costa Rica	1.01	Japan	0.87	Paraguay	..	Uzbekistan	..
Côte d'Ivoire	..	Jordan	0.77	Peru	0.64	Venezuela	0.12
Croatia	4.48	Kazakhstan	..	Philippines	0.35	Viet Nam	0.25
Cuba	0.18	Kenya	0.35	Poland	1.81	Yemen	0.11
Czech Rep.	4.11	Kuwait	0.43	Portugal	2.65	Zambia	0.39
Dem. Rep. Congo	0.04	Kyrgyzstan	..	Romania	0.54	Zimbabwe	3.00
Denmark	40.19	Laos	..	Russia	0.20		
Dominican Rep.	..	Latvia	2.14	Rwanda	0.12		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 53 **Code:** CIVLIB **Reference Year:** 2003

Description: Civil and Political Liberties

Units: Average of political and civil liberties indices, each ranging from 1 (high levels of liberties) to 7 (low levels of liberties)

Source*: Freedom House.

Logic: In countries that guarantee freedom of expression, rights to organize, rule of law, economic rights, and multi-party elections, there is more likely to be a vigorous public debate about values and issues relevant to environmental quality, and legal safeguards that encourage innovation.

Methodology: Each country and territory was awarded from 0 to 4 raw points for each of 10 questions grouped into three subcategories in a political rights checklist, and for each of 15 questions grouped into four subcategories in a civil liberties checklist. The total raw points in each checklist correspond to two final numerical ratings of 1 to 7. These two ratings are then averaged to determine a status category of Free, Partly Free, or Not Free.

Mean	3.35	Max	7	2.5 Percentile	1		
Median	3	Min	1	97.5 Percentile	7		
Albania	3.00	Ecuador	3.00	Lebanon	5.50	Saudi Arabia	7.00
Algeria	5.50	Egypt	6.00	Liberia	6.00	Senegal	2.50
Angola	5.50	El Salvador	2.50	Libya	7.00	Serbia and Mont.	2.50
Argentina	3.00	Estonia	1.50	Lithuania	1.50	Sierra Leone	4.00
Armenia	4.00	Ethiopia	5.00	Macedonia	3.00	Slovakia	1.50
Australia	1.00	Finland	1.00	Madagascar	3.50	Slovenia	1.00
Austria	1.00	France	1.00	Malawi	4.00	South Africa	1.50
Azerbaijan	5.50	Gabon	4.50	Malaysia	5.00	South Korea	2.00
Bangladesh	4.00	Gambia	4.00	Mali	2.50	Spain	1.00
Belarus	6.00	Georgia	4.00	Mauritania	5.00	Sri Lanka	3.50
Belgium	1.00	Germany	1.00	Mexico	2.00	Sudan	7.00
Benin	2.50	Ghana	2.50	Moldova	3.50	Sweden	1.00
Bhutan	5.50	Greece	1.50	Mongolia	2.00	Switzerland	1.00
Bolivia	2.50	Guatemala	4.00	Morocco	5.00	Syria	7.00
Bosnia and Herz.	4.00	Guinea	5.50	Mozambique	3.50	Taiwan	2.00
Botswana	2.00	Guinea-Bissau	4.50	Myanmar	7.00	Tajikistan	5.50
Brazil	2.50	Guyana	2.00	Namibia	2.50	Tanzania	3.50
Bulgaria	1.50	Haiti	6.00	Nepal	4.00	Thailand	2.50
Burkina Faso	4.00	Honduras	3.00	Netherlands	1.00	Togo	5.50
Burundi	5.50	Hungary	1.50	New Zealand	1.00	Trin. and Tob.	3.00
Cambodia	5.50	Iceland	1.00	Nicaragua	3.00	Tunisia	5.50
Cameroon	6.00	India	2.50	Niger	4.00	Turkey	3.50
Canada	1.00	Indonesia	3.50	Nigeria	4.50	Turkmenistan	7.00
Central Afr. Rep.	5.00	Iran	6.00	North Korea	7.00	Uganda	5.00
Chad	5.50	Iraq	7.00	Norway	1.00	Ukraine	4.00
Chile	1.50	Ireland	1.00	Oman	5.50	United Arab. Em.	5.50
China	6.50	Israel	2.00	P. N. Guinea	2.50	United Kingdom	1.00
Colombia	4.00	Italy	1.00	Pakistan	5.50	United States	1.00
Congo	5.00	Jamaica	2.50	Panama	1.50	Uruguay	1.00
Costa Rica	1.50	Japan	1.50	Paraguay	3.50	Uzbekistan	6.50
Côte d'Ivoire	4.50	Jordan	5.50	Peru	2.50	Venezuela	3.50
Croatia	2.00	Kazakhstan	5.50	Philippines	2.50	Viet Nam	6.50
Cuba	7.00	Kenya	4.00	Poland	1.50	Yemen	5.50
Czech Rep.	1.50	Kuwait	4.50	Portugal	1.00	Zambia	4.00
Dem. Rep. Congo	..	Kyrgyzstan	5.50	Romania	2.00	Zimbabwe	6.00
Denmark	1.00	Laos	6.50	Russia	5.00		
Dominican Rep.	2.00	Latvia	1.50	Rwanda	6.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	54	Code:	CSDMIS	Reference Year:	2002		
Description:	Percentage of variables missing from the CGSDI "Rio to Joburg Dashboard"						
Units:	Percentage of variables missing						
Source*:	Consultative Group on Sustainable Development Indicators (CGSDI).						
Logic:	The greater the number of missing variables, the poorer the data availability in that country. Environmental monitoring and data systems are vital for tracking progress towards environmental sustainability.						
Methodology:	The CGSDI (Consultative Group on Sustainable Development Indicators) published the "From Rio to Johannesburg" Dashboard. The index contains 60 indicators for more than 200 countries and is a tool for the assessment of the 10 years since the Rio Summit. The percentage of variables in the list of the CGSDI for which data are available for each country is calculated. Indicators evaluated: Population, CO2 Fuel emissions, Other GHG, Urban air pollution (TSP), Arable and permanent crop Land area, Fertilizer consumption, Use of pesticides, Forest area, Population in coastal area, Withdrawal of ground and surface water, BOD in water bodies, Protected areas, Population living below poverty line (1ppp\$/day), Gini coefficient, Unemployment total, Female/Male manufacturing wages, Prevalence of child malnutrition, Child mortality rate, Life expectancy at birth, Access to adequate sanitation, Access to safe water, WHO Index of overall health system attainment, Immunization, DPT or measles, Contraceptive prevalence, Persistence to Grade 5, Total adult literacy rate, Floor area in main city, Number of homicides, Population growth rate, percent population in urban areas, Income per capita, Investment, Current account balance, Value of external debt present, Aid given or received, Intensity of metals & minerals use, Commercial energy use, Renewable energy resources, Energy intensity of GDP, Municipal waste generated, Hazardous waste generated, Nuclear waste generated, Waste recycling paper or glass, Internet hosts, Telephone mainlines, Research and development expenditure. Not calculated for Taiwan.						
Mean	28.68	Max	80.43	2.5 Percentile	6.52		
Median	26.09	Min	2.17	97.5 Percentile	69.57		
Albania	34.78	Ecuador	13.04	Lebanon	34.78	Saudi Arabia	39.13
Algeria	21.74	Egypt	15.22	Liberia	58.70	Senegal	19.57
Angola	32.61	El Salvador	17.39	Libya	43.48	Serbia and Mont.	..
Argentina	26.09	Estonia	28.26	Lithuania	23.91	Sierra Leone	..
Armenia	34.78	Ethiopia	23.91	Macedonia	43.48	Slovakia	17.39
Australia	8.70	Finland	4.35	Madagascar	23.91	Slovenia	30.43
Austria	8.70	France	8.70	Malawi	34.78	South Africa	17.39
Azerbaijan	34.78	Gabon	32.61	Malaysia	23.91	South Korea	8.70
Bangladesh	15.22	Gambia	..	Mali	32.61	Spain	13.04
Belarus	32.61	Georgia	41.30	Mauritania	..	Sri Lanka	17.39
Belgium	15.22	Germany	10.87	Mexico	13.04	Sudan	26.09
Benin	32.61	Ghana	19.57	Moldova	23.91	Sweden	6.52
Bhutan	..	Greece	15.22	Mongolia	..	Switzerland	10.87
Bolivia	19.57	Guatemala	19.57	Morocco	19.57	Syria	26.09
Bosnia and Herz.	58.70	Guinea	34.78	Mozambique	23.91	Taiwan	..
Botswana	30.43	Guinea-Bissau	..	Myanmar	36.96	Tajikistan	43.48
Brazil	15.22	Guyana	..	Namibia	36.96	Tanzania	23.91
Bulgaria	15.22	Haiti	28.26	Nepal	23.91	Thailand	17.39
Burkina Faso	32.61	Honduras	21.74	Netherlands	2.17	Togo	32.61
Burundi	..	Hungary	2.17	New Zealand	13.04	Trin. and Tob.	23.91
Cameroon	28.26	India	15.22	Niger	34.78	Turkey	10.87
Canada	6.52	Indonesia	15.22	Nigeria	21.74	Turkmenistan	47.83
Central Afr. Rep.	30.43	Iran	21.74	North Korea	56.52	Uganda	28.26
Chad	41.30	Iraq	43.48	Norway	10.87	Ukraine	23.91
Chile	17.39	Ireland	15.22	Oman	32.61	United Arab. Em.	47.83
China	15.22	Israel	34.78	P. N. Guinea	34.78	United Kingdom	6.52
Colombia	15.22	Italy	13.04	Pakistan	19.57	United States	8.70
Congo	32.61	Jamaica	21.74	Panama	23.91	Uruguay	23.91
Costa Rica	15.22	Japan	10.87	Paraguay	17.39	Uzbekistan	30.43
Côte d'Ivoire	28.26	Jordan	15.22	Peru	23.91	Venezuela	21.74
Croatia	28.26	Kazakhstan	26.09	Philippines	13.04	Viet Nam	30.43
Cuba	34.78	Kenya	21.74	Poland	15.22	Yemen	28.26
Czech Rep.	13.04	Kuwait	36.96	Portugal	15.22	Zambia	19.57
Dem. Rep. Congo	32.61	Kyrgyzstan	30.43	Romania	..	Zimbabwe	17.39
Denmark	6.52	Laos	32.61	Russia	15.22		
Dominican Rep.	28.26	Latvia	26.09	Rwanda	30.43		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 55 **Code:** IUCN **Reference Year:** IUCN memberships: 2004, Population: 2003

Description: IUCN member organizations per million population

Units: Number of member organizations per million population

Source*: IUCN-The World Conservation Union.

Logic: IUCN is the oldest international environmental membership organization, currently with more than 1000 members (governmental and NGO) worldwide, including the most significant environmental NGOs in each

Methodology: The number of IUCN member organizations is divided by the country's population (in millions). Countries for which no data on IUCN memberships is available are counted as having no memberships.

	Mean		Max		2.5 Percentile		0.00
	Median		Min		97.5 Percentile		11.14
Albania	0.00	Ecuador	1.56	Lebanon	1.35	Saudi Arabia	0.14
Algeria	0.10	Egypt	0.06	Liberia	0.00	Senegal	0.60
Angola	0.23	El Salvador	1.25	Libya	0.18	Serbia and Mont.	0.25
Argentina	0.47	Estonia	1.47	Lithuania	0.58	Sierra Leone	0.19
Armenia	0.00	Ethiopia	0.01	Macedonia	0.00	Slovakia	0.93
Australia	1.63	Finland	0.96	Madagascar	0.06	Slovenia	0.51
Austria	0.75	France	0.66	Malawi	0.19	South Africa	0.37
Azerbaijan	0.00	Gabon	0.76	Malaysia	0.25	South Korea	0.10
Bangladesh	0.12	Gambia	0.72	Mali	0.62	Spain	0.88
Belarus	0.00	Georgia	0.39	Mauritania	0.72	Sri Lanka	0.58
Belgium	0.97	Germany	0.28	Mexico	0.12	Sudan	0.03
Benin	0.31	Ghana	0.25	Moldova	0.47	Sweden	0.90
Bhutan	0.00	Greece	0.66	Mongolia	0.41	Switzerland	1.23
Bolivia	0.79	Guatemala	1.08	Morocco	0.20	Syria	0.06
Bosnia and Herz.	0.00	Guinea	0.13	Mozambique	0.11	Taiwan	0.00
Botswana	4.67	Guinea-Bissau	4.15	Myanmar	0.00	Tajikistan	0.16
Brazil	0.09	Guyana	0.00	Namibia	1.01	Tanzania	0.09
Bulgaria	0.25	Haiti	0.00	Nepal	0.50	Thailand	0.05
Burkina Faso	0.34	Honduras	0.74	Netherlands	1.98	Togo	0.00
Burundi	0.00	Hungary	0.59	New Zealand	1.78	Trin. and Tob.	0.00
Cambodia	0.08	Iceland	7.04	Nicaragua	1.31	Tunisia	0.61
Cameroon	0.13	India	0.02	Niger	0.18	Turkey	0.07
Canada	1.15	Indonesia	0.00	Nigeria	0.03	Turkmenistan	0.21
Central Afr. Rep.	0.00	Iran	0.06	North Korea	0.04	Uganda	0.28
Chad	0.00	Iraq	0.00	Norway	1.32	Ukraine	0.06
Chile	0.38	Ireland	0.77	Oman	0.39	United Arab. Em.	0.93
China	0.01	Israel	0.61	P. N. Guinea	0.19	United Kingdom	0.89
Colombia	0.21	Italy	0.38	Pakistan	0.16	United States	0.25
Congo	0.55	Jamaica	1.53	Panama	4.08	Uruguay	1.19
Costa Rica	3.55	Japan	0.15	Paraguay	1.09	Uzbekistan	0.04
Côte d'Ivoire	0.06	Jordan	2.13	Peru	0.30	Venezuela	0.20
Croatia	0.67	Kazakhstan	0.27	Philippines	0.04	Viet Nam	0.04
Cuba	0.18	Kenya	0.29	Poland	0.23	Yemen	0.11
Czech Rep.	0.49	Kuwait	1.29	Portugal	0.39	Zambia	0.59
Dem. Rep. Congo	0.08	Kyrgyzstan	0.20	Romania	0.13	Zimbabwe	1.62
Denmark	1.67	Laos	0.18	Russia	0.07		
Dominican Rep.	0.35	Latvia	0.43	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 56 **Code:** KNWLDG **Reference Year:** 1993, 1998, 2003

Description: Knowledge creation in environmental science, technology, and policy

Units: Average rank between 1 and 78 of three individual regressions with small values corresponding to above average performance

Source*: Yale Center for Environmental Law and Policy (YCELP) Knowledge Divide Project, plus country data.

Logic: Creation and dissemination of knowledge about, inter alia, environmental, ecological, and socio-economic processes is important for achieving environmental sustainability for several reasons: i) it promotes decision-making on the basis of sound information and data, ii) it facilitates knowledge exchange and propagation between producers and users, iii) it allows adoption of new knowledge and technologies in other regions and sectors ("leapfrogging").

Methodology: Publication of scientific knowledge in the top-rated peer-reviewed journals in the fields of environmental science, technology, and policy. We collected data on the primary author's institutional affiliation and the location where the research was carried out for 9 highly ranked peer-reviewed journals for each paper published during 1993, 1998, and 2003. The 9 journals are: Ecology, Conservation Biology, Environmental Science and Technology, Biological Conservation, Global Change Biology (founded in 1995), Environmental Health Perspectives, Water Resources Research, Environmental Toxicology and Chemistry, and Global Biogeochemical Cycles. Three regressions were carried out: Publications per author per million population ~ Researchers per million population + R&D spending as % of GDP + Publications per area and population; Publications about foreign countries ~ log(GDP) + Publications per area; Publications per area ~ Publications per author + Population. The residuals of each regression were ranked and aggregated to form an average rank score.

	Mean		39.5	Max		74.67	2.5 Percentile		9.85
	Median		42.67	Min		1.67	97.5 Percentile		67.04
Albania	..	Ecuador	19.00	Lebanon	..	Saudi Arabia	..		
Algeria	..	Egypt	..	Liberia	..	Senegal	28.33		
Angola	..	El Salvador	46.33	Libya	..	Serbia and Mont.	..		
Argentina	19.33	Estonia	55.00	Lithuania	59.33	Sierra Leone	..		
Armenia	46.33	Ethiopia	..	Macedonia	..	Slovakia	48.33		
Australia	10.00	Finland	23.33	Madagascar	17.33	Slovenia	42.67		
Austria	66.67	France	28.33	Malawi	..	South Africa	..		
Azerbaijan	48.00	Gabon	..	Malaysia	32.33	South Korea	65.33		
Bangladesh	..	Gambia	..	Mali	..	Spain	64.00		
Belarus	47.00	Georgia	55.33	Mauritania	..	Sri Lanka	42.00		
Belgium	48.33	Germany	71.67	Mexico	10.33	Sudan	..		
Benin	..	Ghana	..	Moldova	50.33	Sweden	12.00		
Bhutan	..	Greece	42.00	Mongolia	..	Switzerland	19.33		
Bolivia	50.33	Guatemala	..	Morocco	..	Syria	49.67		
Bosnia and Herz.	..	Guinea	..	Mozambique	..	Taiwan	54.67		
Botswana	..	Guinea-Bissau	..	Myanmar	..	Tajikistan	..		
Brazil	14.33	Guyana	..	Namibia	..	Tanzania	..		
Bulgaria	58.33	Haiti	..	Nepal	..	Thailand	22.00		
Burkina Faso	26.33	Honduras	..	Netherlands	48.67	Togo	..		
Burundi	..	Hungary	59.67	New Zealand	8.00	Trin. and Tob.	35.00		
Cambodia	..	Iceland	42.67	Nicaragua	38.67	Tunisia	55.67		
Cameroon	..	India	33.33	Niger	..	Turkey	59.00		
Canada	1.67	Indonesia	..	Nigeria	..	Turkmenistan	..		
Central Afr. Rep.	..	Iran	..	North Korea	..	Uganda	43.33		
Chad	..	Iraq	..	Norway	12.67	Ukraine	48.33		
Chile	18.00	Ireland	65.00	Oman	..	United Arab. Em.	..		
China	30.33	Israel	32.00	P. N. Guinea	..	United Kingdom	49.33		
Colombia	23.67	Italy	15.00	Pakistan	..	United States	32.67		
Congo	..	Jamaica	..	Panama	25.00	Uruguay	45.33		
Costa Rica	..	Japan	74.67	Paraguay	33.67	Uzbekistan	..		
Côte d'Ivoire	..	Jordan	57.00	Peru	15.67	Venezuela	37.33		
Croatia	56.67	Kazakhstan	32.33	Philippines	..	Viet Nam	..		
Cuba	44.33	Kenya	..	Poland	47.33	Yemen	..		
Czech Rep.	47.00	Kuwait	48.67	Portugal	52.33	Zambia	..		
Dem. Rep. Congo	..	Kyrgyzstan	40.33	Romania	42.67	Zimbabwe	..		
Denmark	28.33	Laos	..	Russia	33.00				
Dominican Rep.	..	Latvia	49.33	Rwanda	..				

* Full source information for this variable can be found at the end of this Appendix. Data in "[]" indicate imputed values; ".." means the data point is missing.

Variable #: 57 **Code:** POLITY **Reference Year:** Average of 1993-2002 Polity

Description: Democracy measure

Units: Trend-adjusted 10-year average score with high values corresponding to high levels of democratic institutions

Source*: Polity IV Project, University of Maryland.

Logic: The presence of democratic institutions increases the likelihood that important environmental issues will be debated, that alternative views will be aired, and that decision-making and implementation will be carried out in an open manner. These factors improve the quality of environmental governance.

Methodology: Average of the Polity IV scores for 10 years 1993-2002 adjusted for trend: if the trend was positive, the average was increased by 1, if the trend was negative, the average was reduced by 1. The purpose of the adjustment was to reward improvement.

Mean	2.79	Max	10.7	2.5 Percentile	-9		
Median	5.2	Min	-10	97.5 Percentile	10		
Albania	5.70	Ecuador	7.00	Lebanon	..	Saudi Arabia	-10.00
Algeria	-2.80	Egypt	-5.20	Liberia	0.00	Senegal	2.70
Angola	-3.40	El Salvador	7.00	Libya	-7.00	Serbia and Mont.	-1.50
Argentina	8.40	Estonia	6.00	Lithuania	10.00	Sierra Leone	0.00
Armenia	4.00	Ethiopia	1.00	Macedonia	7.30	Slovakia	9.00
Australia	10.00	Finland	10.00	Madagascar	6.90	Slovenia	10.00
Austria	10.00	France	9.00	Malawi	6.10	South Africa	9.90
Azerbaijan	-6.90	Gabon	-4.00	Malaysia	2.20	South Korea	8.00
Bangladesh	6.00	Gambia	-5.20	Mali	5.40	Spain	10.00
Belarus	-4.50	Georgia	5.80	Mauritania	-6.00	Sri Lanka	6.20
Belgium	10.00	Germany	10.00	Mexico	6.40	Sudan	-5.90
Benin	6.00	Ghana	2.90	Moldova	8.20	Sweden	10.00
Bhutan	-8.00	Greece	10.00	Mongolia	10.70	Switzerland	10.00
Bolivia	9.00	Guatemala	7.50	Morocco	-5.50	Syria	-7.40
Bosnia and Herz.	0.00	Guinea	-0.80	Mozambique	5.80	Taiwan	9.30
Botswana	9.60	Guinea-Bissau	4.20	Myanmar	-7.00	Tajikistan	-2.40
Brazil	8.00	Guyana	6.00	Namibia	6.00	Tanzania	-0.10
Bulgaria	9.20	Haiti	1.40	Nepal	3.40	Thailand	9.00
Burkina Faso	-2.50	Honduras	7.40	Netherlands	10.00	Togo	-2.00
Burundi	-0.30	Hungary	10.00	New Zealand	10.00	Trin. and Tob.	10.60
Cambodia	1.70	Iceland	..	Nicaragua	8.60	Tunisia	-4.10
Cameroon	-4.00	India	9.80	Niger	1.20	Turkey	6.40
Canada	10.00	Indonesia	-0.20	Nigeria	-0.70	Turkmenistan	-9.00
Central Afr. Rep.	5.00	Iran	0.40	North Korea	-9.00	Uganda	-4.00
Chad	-1.60	Iraq	-9.00	Norway	10.00	Ukraine	7.70
Chile	9.30	Ireland	10.00	Oman	-7.90	United Arab. Em.	-8.00
China	-7.00	Israel	10.40	P. N. Guinea	10.00	United Kingdom	10.00
Colombia	6.40	Italy	10.00	Pakistan	1.30	United States	10.00
Congo	-2.30	Jamaica	9.00	Panama	9.90	Uruguay	10.00
Costa Rica	10.00	Japan	10.00	Paraguay	5.90	Uzbekistan	-9.00
Côte d'Ivoire	-1.60	Jordan	-2.00	Peru	3.78	Venezuela	6.40
Croatia	0.60	Kazakhstan	-5.00	Philippines	8.00	Viet Nam	-7.00
Cuba	-7.00	Kenya	-1.20	Poland	9.80	Yemen	-2.00
Czech Rep.	10.00	Kuwait	-7.00	Portugal	10.00	Zambia	1.50
Dem. Rep. Congo	0.00	Kyrgyzstan	-3.00	Romania	8.10	Zimbabwe	-7.00
Denmark	10.00	Laos	-7.00	Russia	5.90		
Dominican Rep.	8.20	Latvia	..	Rwanda	-4.40		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 58 **Code:** ENEFF **Reference Year:** MRYA 1998-2002

Description: Energy efficiency

Units: Terajoules energy consumption per million dollars GDP (PPP)

Source*: US Energy Information Agency (EIA).

Logic: The more efficient an economy is, the less energy it needs to produce a given set of goods and services.

Methodology: The original data are in billion British Thermal Units (BTUs), which are converted to terajoules. The factor applied to convert 10⁹ BTUs to terajoules is .9478 (Source: Energy Information Administration). Total energy consumption was normalized by GDP in million US dollars in purchasing power parities (PPPs).

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	8.17		47.74		1.04		
	5.91		0.24		31.46		
Albania	5.99	Ecuador	7.55	Lebanon	11.09	Saudi Arabia	17.60
Algeria	6.77	Egypt	8.80	Liberia	[3.22]	Senegal	3.84
Angola	4.30	El Salvador	3.57	Libya	[17.48]	Serbia and Mont.	[13.19]
Argentina	5.66	Estonia	9.88	Lithuania	11.89	Sierra Leone	4.79
Armenia	15.96	Ethiopia	1.28	Macedonia	7.89	Slovakia	11.54
Australia	9.54	Finland	8.56	Madagascar	2.21	Slovenia	7.87
Austria	5.62	France	6.51	Malawi	3.40	South Africa	9.42
Azerbaijan	21.90	Gabon	4.18	Malaysia	9.94	South Korea	9.86
Bangladesh	2.34	Gambia	1.65	Mali	1.19	Spain	6.33
Belarus	19.93	Georgia	15.37	Mauritania	7.74	Sri Lanka	2.67
Belgium	9.08	Germany	6.04	Mexico	6.94	Sudan	2.37
Benin	3.54	Ghana	3.08	Moldova	24.88	Sweden	9.09
Bhutan	[2.7]	Greece	6.57	Mongolia	18.95	Switzerland	5.50
Bolivia	6.71	Guatemala	3.29	Morocco	3.86	Syria	13.21
Bosnia and Herz.	[10.99]	Guinea	1.37	Mozambique	4.93	Taiwan	11.28
Botswana	3.49	Guinea-Bissau	4.84	Myanmar	[3.23]	Tajikistan	35.43
Brazil	6.03	Guyana	6.79	Namibia	3.77	Tanzania	3.25
Bulgaria	14.21	Haiti	1.87	Nepal	1.72	Thailand	6.75
Burkina Faso	1.27	Honduras	5.38	Netherlands	7.90	Togo	2.37
Burundi	1.60	Hungary	7.33	New Zealand	9.72	Trin. and Tob.	38.67
Cambodia	0.30	Iceland	15.61	Nicaragua	4.44	Tunisia	4.84
Cameroon	2.47	India	4.73	Niger	1.78	Turkey	6.59
Canada	13.39	Indonesia	6.18	Nigeria	7.80	Turkmenistan	24.07
Central Afr. Rep.	1.19	Iran	12.68	North Korea	[22.57]	Uganda	1.01
Chad	0.34	Iraq	[12.03]	Norway	11.38	Ukraine	26.19
Chile	6.54	Ireland	4.16	Oman	10.11	United Arab. Em.	32.28
China	6.98	Israel	5.88	P. N. Guinea	3.56	United Kingdom	5.86
Colombia	4.12	Italy	4.76	Pakistan	6.17	United States	8.99
Congo	4.48	Jamaica	13.66	Panama	10.78	Uruguay	5.45
Costa Rica	4.19	Japan	6.07	Paraguay	14.67	Uzbekistan	47.74
Côte d'Ivoire	3.95	Jordan	9.78	Peru	4.03	Venezuela	20.39
Croatia	7.80	Kazakhstan	22.63	Philippines	3.35	Viet Nam	4.46
Cuba	[5.52]	Kenya	4.62	Poland	7.77	Yemen	8.79
Czech Rep.	9.29	Kuwait	23.89	Portugal	5.50	Zambia	11.59
Dem. Rep. Congo	2.31	Kyrgyzstan	26.83	Romania	11.12	Zimbabwe	5.99
Denmark	4.75	Laos	3.98	Russia	21.93		
Dominican Rep.	4.39	Latvia	8.43	Rwanda	1.25		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 59 **Code:** RENPC **Reference Year:** MRYA 2002-2003

Description: Hydropower and renewable energy production as a percentage of total energy consumption

Units: Hydropower and renewable energy production as a percentage of total energy consumption

Source*: US Energy Information Agency.

Logic: The higher the proportion of hydroelectric and other renewable energy sources, the less reliance on more environmentally damaging sources such as fossil fuel and nuclear energy.

Methodology: Hydroelectric, biomass, geothermal, solar and wind electric power production were calculated as a percent of total energy consumption. Some countries exceed 100 percent because they are net exporters of renewable energy.

	Mean		Max		2.5 Percentile		0
	Median		Min		97.5 Percentile		73.33
Albania	39.60	Ecuador	20.25	Lebanon	1.09	Saudi Arabia	0.00
Algeria	0.05	Egypt	6.21	Liberia	0.00	Senegal	0.00
Angola	8.74	El Salvador	31.34	Libya	0.00	Serbia and Mont.	..
Argentina	14.92	Estonia	0.09	Lithuania	7.89	Sierra Leone	0.00
Armenia	10.58	Ethiopia	30.47	Macedonia	10.33	Slovakia	6.27
Australia	3.45	Finland	16.95	Madagascar	19.20	Slovenia	11.46
Austria	23.15	France	5.95	Malawi	48.12	South Africa	0.52
Azerbaijan	2.16	Gabon	23.27	Malaysia	2.92	South Korea	0.43
Bangladesh	1.85	Gambia	0.00	Mali	38.28	Spain	5.92
Belarus	0.02	Georgia	29.01	Mauritania	1.00	Sri Lanka	17.14
Belgium	0.76	Germany	3.54	Mexico	5.47	Sudan	8.70
Benin	7.72	Ghana	47.20	Moldova	1.98	Sweden	32.40
Bhutan	108.47	Greece	2.68	Mongolia	0.00	Switzerland	29.10
Bolivia	14.97	Guatemala	17.20	Morocco	1.85	Syria	12.45
Bosnia and Herz.	16.79	Guinea	21.41	Mozambique	87.52	Taiwan	1.55
Botswana	0.00	Guinea-Bissau	0.00	Myanmar	..	Tajikistan	65.31
Brazil	34.94	Guyana	0.35	Namibia	23.64	Tanzania	37.23
Bulgaria	2.55	Haiti	10.23	Nepal	30.71	Thailand	2.50
Burkina Faso	4.46	Honduras	22.38	Netherlands	1.19	Togo	0.17
Burundi	17.35	Hungary	0.26	New Zealand	34.59	Trin. and Tob.	0.08
Cambodia	4.39	Iceland	70.73	Nicaragua	12.26	Tunisia	0.33
Cameroon	42.81	India	5.23	Niger	0.00	Turkey	11.03
Canada	25.00	Indonesia	3.87	Nigeria	7.46	Turkmenistan	0.01
Central Afr. Rep.	15.33	Iran	1.38	North Korea	22.42	Uganda	48.81
Chad	0.00	Iraq	0.51	Norway	63.68	Ukraine	1.58
Chile	22.19	Ireland	1.94	Oman	0.00	United Arab. Em.	0.00
China	7.29	Israel	0.01	P. N. Guinea	20.96	United Kingdom	1.24
Colombia	29.30	Italy	7.17	Pakistan	10.15	United States	3.72
Congo	20.75	Jamaica	1.46	Panama	12.10	Uruguay	60.56
Costa Rica	49.63	Japan	4.87	Paraguay	124.46	Uzbekistan	2.91
Côte d'Ivoire	17.41	Jordan	0.22	Peru	31.97	Venezuela	20.53
Croatia	18.62	Kazakhstan	4.21	Philippines	24.30	Viet Nam	24.15
Cuba	2.26	Kenya	26.11	Poland	0.90	Yemen	0.00
Czech Rep.	2.00	Kuwait	0.00	Portugal	9.14	Zambia	78.23
Dem. Rep. Congo	73.89	Kyrgyzstan	46.68	Romania	9.88	Zimbabwe	13.11
Denmark	8.59	Laos	87.48	Russia	6.74		
Dominican Rep.	2.07	Latvia	16.16	Rwanda	12.15		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 60 **Code:** DJSGI **Reference Year:** 2004-2005

Description: Dow Jones Sustainability Group Index (DJSGI)

Units: Ratio of the market capitalization of the firms included in the 2005 Dow Jones Sustainability Index to the market capitalization of the firms eligible for inclusion in the Dow Jones Sustainability Index

Source*: Dow Jones SAM Sustainability Group.

Logic: The Dow Jones Sustainability Group Index tracks a group of companies that have been rated as the top 10% in terms of sustainability. Firms that are already in the Dow Jones Global Index are eligible to enter the Sustainability Group Index. Countries in which a higher percentage of eligible firms meet the requirements have a private sector that is contributing more strongly to environmental sustainability.

Methodology: This variable measures the ratio of the market capitalization of the firms included in the 2005 Dow Jones Sustainability Index (World) and the market capitalization of the firms eligible for inclusion in the Dow Jones Sustainability Index (World). Market capitalization is as of 30 July 2004.

	Mean	0.28	Max	0.89	2.5 Percentile	0	
	Median	0.18	Min	0	97.5 Percentile	0.86	
Albania	..	Ecuador	..	Lebanon	..	Saudi Arabia	..
Algeria	..	Egypt	..	Liberia	..	Senegal	..
Angola	..	El Salvador	..	Libya	..	Serbia and Mont.	..
Argentina	..	Estonia	..	Lithuania	..	Sierra Leone	..
Armenia	..	Ethiopia	..	Macedonia	..	Slovakia	..
Australia	0.45	Finland	0.89	Madagascar	..	Slovenia	..
Austria	0.00	France	0.46	Malawi	..	South Africa	0.16
Azerbaijan	..	Gabon	..	Malaysia	0.03	South Korea	0.03
Bangladesh	..	Gambia	..	Mali	..	Spain	0.70
Belarus	..	Georgia	..	Mauritania	..	Sri Lanka	..
Belgium	0.18	Germany	0.64	Mexico	0.00	Sudan	..
Benin	..	Ghana	..	Moldova	..	Sweden	0.43
Bhutan	..	Greece	0.00	Mongolia	..	Switzerland	0.85
Bolivia	..	Guatemala	..	Morocco	..	Syria	..
Bosnia and Herz.	..	Guinea	..	Mozambique	..	Taiwan	0.15
Botswana	..	Guinea-Bissau	..	Myanmar	..	Tajikistan	..
Brazil	0.21	Guyana	..	Namibia	..	Tanzania	..
Bulgaria	..	Haiti	..	Nepal	..	Thailand	0.23
Burkina Faso	..	Honduras	..	Netherlands	0.79	Togo	..
Burundi	..	Hungary	..	New Zealand	0.00	Trin. and Tob.	..
Cambodia	..	Iceland	..	Nicaragua	..	Tunisia	..
Cameroon	..	India	..	Niger	..	Turkey	..
Canada	0.19	Indonesia	0.00	Nigeria	..	Turkmenistan	..
Central Afr. Rep.	..	Iran	..	North Korea	..	Uganda	..
Chad	..	Iraq	..	Norway	0.66	Ukraine	..
Chile	0.00	Ireland	0.18	Oman	..	United Arab. Em.	..
China	..	Israel	..	P. N. Guinea	..	United Kingdom	0.80
Colombia	..	Italy	0.29	Pakistan	..	United States	0.22
Congo	..	Jamaica	..	Panama	..	Uruguay	..
Costa Rica	..	Japan	..	Paraguay	..	Uzbekistan	..
Côte d'Ivoire	..	Jordan	..	Peru	..	Venezuela	0.00
Croatia	..	Kazakhstan	..	Philippines	0.00	Viet Nam	..
Cuba	..	Kenya	..	Poland	..	Yemen	..
Czech Rep.	..	Kuwait	..	Portugal	0.00	Zambia	..
Dem. Rep. Congo	..	Kyrgyzstan	..	Romania	..	Zimbabwe	..
Denmark	..	Laos	..	Russia	..		
Dominican Rep.	..	Latvia	..	Rwanda	..		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 61 **Code:** ECOVAL **Reference Year:** 2004

Description: Average Innovest EcoValue rating of firms headquartered in a country

Units: Average weighted score of EcoValue rating weighted by market capitalization share (values > 0 mean better environmental performance relative to peer countries, values < 0 mean poorer environmental performance)

Source*: Innovest Strategic Value Advisors.

Logic: The Innovest EcoValue '21 rating measures environmental performance at the firm level. Countries in which firm-level scores are higher have a private sector that is contributing more strongly to environmental

Methodology: Each country starts with a neutral score (0.0 -- equal to Innovest's BBB). Then the weighted average EV21 score for all rated companies in a given country either raises or lowers the neutral weight. A relevance factor, based on EV21 coverage in a given country, determines the allowed deviation from neutral. Having a country score greater than zero means that, on average, companies in a given country have better environmental performance relative to their global peer group. Within each country, EcoValue levels were weighted by market capitalization share and then averaged to get a value for the individual country, based on the location of company headquarters.

	Mean		Max		2.5 Percentile	
	Median		Min		97.5 Percentile	
	0.18		1.62		-0.74	
	0		-1.29		1.59	
Albania	..	Ecuador	..	Lebanon	..	Saudi Arabia
Algeria	..	Egypt	..	Liberia	..	Senegal
Angola	..	El Salvador	..	Libya	..	Serbia and Mont.
Argentina	..	Estonia	..	Lithuania	..	Sierra Leone
Armenia	..	Ethiopia	..	Macedonia	..	Slovakia
Australia	0.01	Finland	1.62	Madagascar	..	Slovenia
Austria	-0.39	France	0.27	Malawi	..	South Africa
Azerbaijan	..	Gabon	..	Malaysia	0.00	South Korea
Bangladesh	..	Gambia	..	Mali	..	Spain
Belarus	..	Georgia	..	Mauritania	..	Sri Lanka
Belgium	-0.02	Ghana	0.94	Mexico	-0.15	Sudan
Benin	..	Greece	-0.63	Moldova	..	Sweden
Bhutan	..	Guatemala	..	Mongolia	..	Switzerland
Bolivia	..	Guinea	..	Morocco	..	Syria
Bosnia and Herz.	..	Guinea-Bissau	..	Mozambique	..	Taiwan
Botswana	..	Honduras	..	Myanmar	..	Tajikistan
Brazil	0.02	Hungary	-0.31	Namibia	..	Tanzania
Bulgaria	..	Iceland	..	Nepal	..	Thailand
Burkina Faso	..	India	..	Netherlands	1.54	Togo
Burundi	..	Indonesia	-0.01	New Zealand	0.04	Trin. and Tob.
Cambodia	..	Iran	..	Nicaragua	..	Tunisia
Cameroon	..	Iraq	..	Niger	..	Turkey
Canada	0.47	Ireland	-0.63	Nigeria	..	Turkmenistan
Central Afr. Rep.	..	Israel	0.00	North Korea	..	Uganda
Chad	..	Italy	-0.60	Norway	0.96	Ukraine
Chile	..	Jamaica	..	Oman	..	United Arab. Em.
China	-0.68	Japan	1.55	P. N. Guinea	..	United Kingdom
Colombia	..	Jordan	..	Pakistan	..	United States
Congo	..	Kazakhstan	..	Panama	..	Uruguay
Costa Rica	..	Kenya	..	Paraguay	..	Uzbekistan
Côte d'Ivoire	..	Kuwait	..	Peru	..	Venezuela
Croatia	..	Kyrgyzstan	..	Philippines	..	Viet Nam
Cuba	..	Laos	..	Poland	-0.34	Yemen
Czech Rep.	-0.20	Latvia	..	Portugal	-0.55	Zambia
Dem. Rep. Congo	..			Romania	..	Zimbabwe
Denmark	-0.13			Russia	-1.29	
Dominican Rep.	..			Rwanda	..	

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 62 **Code:** ISO14 **Reference Year:** ISO14001: 2003, GDP: MRYA 1998-2002

Description: Number of ISO 14001 certified companies per billion dollars GDP (PPP)

Units: Number of ISO 14001 certified companies per billion GDP in US dollars (PPP)

Source*: Reinhard Peglau, Federal Environmental Agency, Germany.

Logic: ISO 14001 specifies standards for environmental management. The more firms that receive ISO 14001 certification, the more likely it is that industries are instituting management practices that reduce waste and resource consumption.

Methodology: Number of ISO 14001 certified companies divided by their GDP in billion US dollars (PPP).

	Mean		0.85	Max	41.51	2.5 Percentile	0.00
	Median		0.03	Min	0.00	97.5 Percentile	5.40
Albania	0.00	Ecuador	0.04	Lebanon	0.26	Saudi Arabia	0.03
Algeria	0.02	Egypt	0.77	Liberia	0.00	Senegal	0.13
Angola	0.00	El Salvador	0.00	Libya	0.00	Serbia and Mont.	..
Argentina	41.51	Estonia	4.45	Lithuania	2.01	Sierra Leone	0.00
Armenia	0.00	Ethiopia	0.00	Macedonia	0.08	Slovakia	1.06
Australia	1.50	Finland	7.78	Madagascar	0.00	Slovenia	5.63
Austria	2.13	France	1.46	Malawi	0.48	South Africa	0.58
Azerbaijan	0.19	Gabon	0.00	Malaysia	1.66	South Korea	1.85
Bangladesh	0.02	Gambia	0.00	Mali	0.00	Spain	5.54
Belarus	0.04	Georgia	0.00	Mauritania	0.00	Sri Lanka	0.19
Belgium	1.06	Germany	1.86	Mexico	0.45	Sudan	0.02
Benin	0.00	Ghana	0.02	Moldova	0.00	Sweden	9.94
Bhutan	0.00	Greece	0.45	Mongolia	0.00	Switzerland	5.28
Bolivia	0.23	Guatemala	0.04	Morocco	0.10	Syria	0.55
Bosnia and Herz.	..	Guinea	0.00	Mozambique	0.05	Taiwan	..
Botswana	0.14	Guinea-Bissau	0.00	Myanmar	0.03	Tajikistan	0.00
Brazil	0.74	Guyana	0.92	Namibia	0.32	Tanzania	0.05
Bulgaria	0.30	Haiti	0.00	Nepal	0.03	Thailand	1.70
Burkina Faso	0.00	Honduras	0.11	Netherlands	2.47	Togo	0.00
Burundi	0.00	Hungary	4.68	New Zealand	1.17	Trin. and Tob.	0.57
Cambodia	0.04	Iceland	0.36	Nicaragua	0.00	Tunisia	0.27
Cameroon	0.06	India	0.22	Niger	0.11	Turkey	0.30
Canada	1.34	Indonesia	0.36	Nigeria	0.09	Turkmenistan	..
Central Afr. Rep.	0.00	Iran	0.22	North Korea	0.00	Uganda	0.09
Chad	0.00	Iraq	0.00	Norway	2.11	Ukraine	0.02
Chile	0.52	Ireland	0.75	Oman	0.18	United Arab. Em.	1.71
China	0.86	Israel	0.87	P. N. Guinea	0.00	United Kingdom	1.88
Colombia	0.32	Italy	2.05	Pakistan	0.09	United States	0.34
Congo	0.00	Jamaica	0.10	Panama	0.06	Uruguay	1.22
Costa Rica	1.15	Japan	4.03	Paraguay	0.00	Uzbekistan	0.00
Côte d'Ivoire	0.00	Jordan	0.73	Peru	0.23	Venezuela	0.13
Croatia	1.14	Kazakhstan	0.05	Philippines	0.50	Viet Nam	0.30
Cuba	0.00	Kenya	0.03	Poland	1.06	Yemen	0.00
Czech Rep.	3.76	Kuwait	0.08	Portugal	1.33	Zambia	0.23
Dem. Rep. Congo	0.00	Kyrgyzstan	0.00	Romania	0.66	Zimbabwe	..
Denmark	4.28	Laos	0.00	Russia	0.04		
Dominican Rep.	0.02	Latvia	0.93	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 63 **Code:** WFPRI **Reference Year:** 2003/4

Description: World Economic Forum Survey on private sector environmental innovation

Units: Principal components of several survey questions

Source*: World Economic Forum (WEF).

Logic: Private sector innovation contributes to solutions to environmental problems.

Methodology: This represents principal components of survey questions addressing several aspects of private sector environmental innovation: environmental competitiveness, prevalence of environmental management systems, and private sector cooperation with government (questions Q1112-1114).

	Mean		Max		2.5 Percentile		7.87
	Median		Min		97.5 Percentile		14.07
Albania	[9.79]	Ecuador	8.12	Lebanon	[10.17]	Saudi Arabia	[10.84]
Algeria	9.43	Egypt	10.42	Liberia	[8.64]	Senegal	10.21
Angola	7.45	El Salvador	8.71	Libya	[10.27]	Serbia and Mont.	9.49
Argentina	9.48	Estonia	10.46	Lithuania	10.79	Sierra Leone	[8.56]
Armenia	[10.21]	Ethiopia	9.22	Macedonia	9.27	Slovakia	10.85
Australia	12.88	Finland	14.71	Madagascar	9.47	Slovenia	11.19
Austria	12.92	France	12.46	Malawi	11.74	South Africa	11.63
Azerbaijan	[9.63]	Gabon	[9.29]	Malaysia	12.84	South Korea	12.43
Bangladesh	8.84	Gambia	11.96	Mali	10.37	Spain	11.38
Belarus	[9.84]	Georgia	[9.97]	Mauritania	[9.7]	Sri Lanka	10.07
Belgium	10.98	Germany	13.91	Mexico	10.31	Sudan	[9.35]
Benin	[10.42]	Ghana	12.26	Moldova	[9.15]	Sweden	13.76
Bhutan	[10.02]	Greece	10.41	Mongolia	[9.26]	Switzerland	13.64
Bolivia	7.82	Guatemala	8.45	Morocco	9.94	Syria	[9.55]
Bosnia and Herz.	[9.64]	Guinea	[9.53]	Mozambique	9.09	Taiwan	13.60
Botswana	11.09	Guinea-Bissau	[9.51]	Myanmar	[9.82]	Tajikistan	[8.99]
Brazil	11.81	Guyana	[9.02]	Namibia	11.26	Tanzania	11.61
Bulgaria	9.07	Haiti	7.97	Nepal	[9.81]	Thailand	11.81
Burkina Faso	[9.69]	Honduras	8.11	Netherlands	13.09	Togo	[9.53]
Burundi	[9.1]	Hungary	9.58	New Zealand	11.60	Trin. and Tob.	9.76
Cambodia	[10.39]	Iceland	12.86	Nicaragua	7.92	Tunisia	12.85
Cameroon	10.22	India	10.49	Niger	[9.03]	Turkey	9.19
Canada	12.79	Indonesia	10.24	Nigeria	10.64	Turkmenistan	[8.37]
Central Afr. Rep.	[10.01]	Iran	[9.68]	North Korea	[9.44]	Uganda	10.62
Chad	8.74	Iraq	[9.7]	Norway	12.79	Ukraine	8.82
Chile	10.56	Ireland	11.80	Oman	[10.73]	United Arab. Em.	[12.49]
China	10.60	Israel	10.90	P. N. Guinea	[8.72]	United Kingdom	13.17
Colombia	10.26	Italy	12.90	Pakistan	8.99	United States	12.61
Congo	[8.9]	Jamaica	11.16	Panama	9.37	Uruguay	9.88
Costa Rica	11.13	Japan	14.24	Paraguay	7.20	Uzbekistan	[9.22]
Côte d'Ivoire	[9.03]	Jordan	11.18	Peru	8.92	Venezuela	8.77
Croatia	10.66	Kazakhstan	[9.81]	Philippines	9.49	Viet Nam	11.16
Cuba	[10.35]	Kenya	10.22	Poland	10.28	Yemen	[9.36]
Czech Rep.	10.91	Kuwait	[11.38]	Portugal	10.07	Zambia	11.20
Dem. Rep. Congo	[8.34]	Kyrgyzstan	[9.74]	Romania	9.69	Zimbabwe	10.41
Denmark	13.39	Laos	[9.89]	Russia	9.04		
Dominican Rep.	9.58	Latvia	11.04	Rwanda	[10.01]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 64 **Code:** RESCARE **Reference Year:** 2002

Description: Participation in the Responsible Care Program of the Chemical Manufacturer's Association

Units: Score from 0 (low) to 4 (high) levels of participation

Source*: International Council of Chemical Associations (ICCA).

Logic: Responsible Care is an initiative of the global chemical industry in which companies, through their national associations, commit to work together to continuously improve the health, safety and environmental performance of their products and processes, and so contribute to the sustainable development of local communities and of society as a whole (Source: ICCA Responsible Care Status Report 2002, URL: <http://www.icca-chem.org/rcreport/>). Responsible handling of chemicals is important for environmental sustainability.

Methodology: The Responsible Care Program is an initiative of the chemical industry. Eight or more years of membership was considered a mature membership and allocated four points. Five to seven years of membership was considered a senior membership and allocated three points. Two to four years of membership was considered a junior membership and allocated 2 points. Up to one year of membership was considered a new membership and allocated 1 point. Not a member = 0 points.

Mean	0.77	Max	4	2.5 Percentile	0		
Median	0	Min	0	97.5 Percentile	4		
Albania	0.00	Ecuador	3.00	Lebanon	0.00	Saudi Arabia	0.00
Algeria	0.00	Egypt	0.00	Liberia	0.00	Senegal	0.00
Angola	0.00	El Salvador	0.00	Libya	0.00	Serbia and Mont.	0.00
Argentina	4.00	Estonia	0.00	Lithuania	0.00	Sierra Leone	0.00
Armenia	0.00	Ethiopia	0.00	Macedonia	0.00	Slovakia	4.00
Australia	4.00	Finland	4.00	Madagascar	0.00	Slovenia	0.00
Austria	4.00	France	4.00	Malawi	0.00	South Africa	4.00
Azerbaijan	0.00	Gabon	0.00	Malaysia	4.00	South Korea	3.00
Bangladesh	0.00	Gambia	0.00	Mali	0.00	Spain	4.00
Belarus	0.00	Georgia	0.00	Mauritania	0.00	Sri Lanka	0.00
Belgium	4.00	Germany	4.00	Mexico	4.00	Sudan	0.00
Benin	0.00	Ghana	0.00	Moldova	0.00	Sweden	4.00
Bhutan	0.00	Greece	4.00	Mongolia	0.00	Switzerland	4.00
Bolivia	0.00	Guatemala	0.00	Morocco	3.00	Syria	0.00
Bosnia and Herz.	0.00	Guinea	0.00	Mozambique	0.00	Taiwan	3.00
Botswana	0.00	Guinea-Bissau	0.00	Myanmar	0.00	Tajikistan	0.00
Brazil	4.00	Guyana	0.00	Namibia	0.00	Tanzania	0.00
Bulgaria	0.00	Haiti	0.00	Nepal	0.00	Thailand	4.00
Burkina Faso	0.00	Honduras	0.00	Netherlands	4.00	Togo	0.00
Burundi	0.00	Hungary	4.00	New Zealand	4.00	Trin. and Tob.	0.00
Cambodia	0.00	Iceland	0.00	Nicaragua	0.00	Tunisia	0.00
Cameroon	0.00	India	4.00	Niger	0.00	Turkey	4.00
Canada	4.00	Indonesia	3.00	Nigeria	0.00	Turkmenistan	0.00
Central Afr. Rep.	0.00	Iran	0.00	North Korea	0.00	Uganda	0.00
Chad	0.00	Iraq	0.00	Norway	4.00	Ukraine	0.00
Chile	4.00	Ireland	4.00	Oman	0.00	United Arab. Em.	0.00
China	0.00	Israel	2.00	P. N. Guinea	0.00	United Kingdom	4.00
Colombia	4.00	Italy	4.00	Pakistan	0.00	United States	4.00
Congo	0.00	Jamaica	0.00	Panama	0.00	Uruguay	3.00
Costa Rica	0.00	Japan	4.00	Paraguay	0.00	Uzbekistan	0.00
Côte d'Ivoire	0.00	Jordan	0.00	Peru	4.00	Venezuela	0.00
Croatia	0.00	Kazakhstan	0.00	Philippines	4.00	Viet Nam	0.00
Cuba	0.00	Kenya	0.00	Poland	4.00	Yemen	0.00
Czech Rep.	4.00	Kuwait	0.00	Portugal	4.00	Zambia	0.00
Dem. Rep. Congo	0.00	Kyrgyzstan	0.00	Romania	0.00	Zimbabwe	0.00
Denmark	4.00	Laos	0.00	Russia	0.00		
Dominican Rep.	0.00	Latvia	0.00	Rwanda	0.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 65 **Code:** INNOV **Reference Year:** 2003/4

Description: Innovation Index

Units: Standardized score between 1 (lowest) and 7 (highest)

Source*: World Economic Forum (WEF).

Logic: This index measures the underlying capacity of a country to engage in technological innovation by examining factors such as scientific infrastructure and policy environment.

Methodology: Objectively measures national innovation capacity of countries through indicators including investment in research and development and the number of new US patents.

	Mean		Max		2.5 Percentile		1.37
	Median		Min		97.5 Percentile		5.61
Albania	[2]	Ecuador	1.94	Lebanon	[2.43]	Saudi Arabia	[2.69]
Algeria	1.86	Egypt	2.71	Liberia	[1.13]	Senegal	1.70
Angola	1.34	El Salvador	2.05	Libya	[2.27]	Serbia and Mont.	2.13
Argentina	2.94	Estonia	3.38	Lithuania	3.14	Sierra Leone	[0.85]
Armenia	[2.25]	Ethiopia	1.36	Macedonia	2.12	Slovakia	2.58
Australia	3.96	Finland	5.71	Madagascar	1.55	Slovenia	3.51
Austria	3.87	France	3.92	Malawi	1.49	South Africa	2.27
Azerbaijan	[1.76]	Gabon	[1.93]	Malaysia	2.66	South Korea	4.69
Bangladesh	1.58	Gambia	1.48	Mali	1.42	Spain	3.46
Belarus	[2.47]	Georgia	[2.05]	Mauritania	[1.54]	Sri Lanka	1.76
Belgium	4.00	Germany	4.36	Mexico	2.25	Sudan	[1.17]
Benin	[1.23]	Ghana	1.69	Moldova	[2.02]	Sweden	5.52
Bhutan	[1.64]	Greece	3.02	Mongolia	[2.51]	Switzerland	4.65
Bolivia	2.31	Guatemala	1.74	Morocco	1.95	Syria	[1.88]
Bosnia and Herz.	[2.06]	Guinea	[1.31]	Mozambique	1.46	Taiwan	5.92
Botswana	1.73	Guinea-Bissau	[0.86]	Myanmar	[1.67]	Tajikistan	[1.55]
Brazil	2.25	Guyana	[2]	Namibia	1.82	Tanzania	1.63
Bulgaria	2.59	Haiti	1.37	Nepal	[1.38]	Thailand	2.76
Burkina Faso	[1.34]	Honduras	1.76	Netherlands	4.04	Togo	[1.14]
Burundi	[1.38]	Hungary	2.76	New Zealand	4.02	Trin. and Tob.	1.86
Cambodia	[1.45]	Iceland	3.70	Nicaragua	1.72	Tunisia	2.38
Cameroon	1.68	India	2.06	Niger	[1.17]	Turkey	2.01
Canada	4.45	Indonesia	2.08	Nigeria	1.66	Turkmenistan	[1.95]
Central Afr. Rep.	[1.41]	Iran	[2.21]	North Korea	[2.59]	Uganda	1.67
Chad	1.36	Iraq	[2]	Norway	4.23	Ukraine	2.79
Chile	2.79	Ireland	3.48	Oman	[2.7]	United Arab. Em.	[3.48]
China	1.97	Israel	4.80	P. N. Guinea	[1.41]	United Kingdom	4.11
Colombia	2.28	Italy	3.33	Pakistan	1.54	United States	6.44
Congo	[1.04]	Jamaica	2.10	Panama	2.64	Uruguay	2.51
Costa Rica	2.21	Japan	5.49	Paraguay	1.65	Uzbekistan	[1.97]
Côte d'Ivoire	[1.46]	Jordan	2.44	Peru	2.30	Venezuela	2.34
Croatia	2.44	Kazakhstan	[2.64]	Philippines	2.41	Viet Nam	1.98
Cuba	[2]	Kenya	1.68	Poland	3.20	Yemen	[1.45]
Czech Rep.	2.57	Kuwait	[3.18]	Portugal	2.98	Zambia	1.55
Dem. Rep. Congo	[1.35]	Kyrgyzstan	[1.8]	Romania	2.30	Zimbabwe	1.66
Denmark	4.26	Laos	[1.27]	Russia	3.36		
Dominican Rep.	2.30	Latvia	3.52	Rwanda	[1.5]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #:	66	Code:	DAI	Reference Year:	2003		
Description:	Digital Access Index						
Units:	Score between 0 and 1 with higher scores corresponding to better access						
Source*:	International Telecommunication Union (ITU).						
Logic:	The Internet has created a new economy and promoted an unprecedented increase in the amount of environmental information that can be accessed and disseminated worldwide. Access to the Internet thus is important for access to information, stakeholder participation, decision-making, and generation of innovative solutions to environmental problems.						
Methodology:	The DAI is a composite index composed of the equally average of Infrastructure, Affordability, Knowledge, Quality, and Usage. Each subcomponent is comprised of the weighted average of benchmarked variables. The variables and their weights are fixed telephone subscribers per 100 inhabitants (weight 0.5), Mobile cellular subscribers per 100 inhabitants (0.5), Internet access price as percentage of GNI per capita (1), Adult literacy (0.66), Combined primary, secondary, and tertiary school enrolment level (0.33), International internet bandwidth (bits) per capita (0.5), Broadband subscribers per 100 inhabitants (0.5), Internet users per 100 inhabitants (1).						
Mean	0.42	Max	0.85	2.5 Percentile	0.1		
Median	0.43	Min	0.04	97.5 Percentile	0.79		
Albania	0.39	Ecuador	0.41	Lebanon	0.48	Saudi Arabia	0.44
Algeria	0.37	Egypt	0.40	Liberia	[0.05]	Senegal	0.14
Angola	0.11	El Salvador	0.38	Libya	0.42	Serbia and Mont.	0.45
Argentina	0.53	Estonia	0.67	Lithuania	0.56	Sierra Leone	0.10
Armenia	0.30	Ethiopia	0.10	Macedonia	0.48	Slovakia	0.59
Australia	0.74	Finland	0.79	Madagascar	0.15	Slovenia	0.72
Austria	0.75	France	0.72	Malawi	0.15	South Africa	0.45
Azerbaijan	0.24	Gabon	0.34	Malaysia	0.57	South Korea	0.82
Bangladesh	0.18	Gambia	0.13	Mali	0.09	Spain	0.67
Belarus	0.49	Georgia	0.37	Mauritania	0.14	Sri Lanka	0.38
Belgium	0.74	Germany	0.74	Mexico	0.50	Sudan	0.13
Benin	0.12	Ghana	0.16	Moldova	0.37	Sweden	0.85
Bhutan	0.13	Greece	0.66	Mongolia	0.35	Switzerland	0.76
Bolivia	0.38	Guatemala	0.38	Morocco	0.33	Syria	0.28
Bosnia and Herz.	0.46	Guinea	0.10	Mozambique	0.12	Taiwan	0.79
Botswana	0.43	Guinea-Bissau	0.10	Myanmar	0.17	Tajikistan	0.21
Brazil	0.50	Guyana	0.43	Namibia	0.39	Tanzania	0.15
Bulgaria	0.53	Haiti	0.15	Nepal	0.19	Thailand	0.48
Burkina Faso	0.08	Honduras	0.29	Netherlands	0.79	Togo	0.18
Burundi	0.10	Hungary	0.63	New Zealand	0.72	Trin. and Tob.	0.53
Cambodia	0.17	Iceland	0.82	Nicaragua	0.19	Tunisia	0.41
Cameroon	0.16	India	0.32	Niger	0.04	Turkey	0.48
Canada	0.78	Indonesia	0.34	Nigeria	0.15	Turkmenistan	0.37
Central Afr. Rep.	0.10	Iran	0.43	North Korea	[0.38]	Uganda	0.17
Chad	0.10	Iraq	[0.29]	Norway	0.79	Ukraine	0.43
Chile	0.58	Ireland	0.69	Oman	0.43	United Arab. Em.	0.64
China	0.43	Israel	0.70	P. N. Guinea	0.26	United Kingdom	0.77
Colombia	0.45	Italy	0.72	Pakistan	0.24	United States	0.78
Congo	0.17	Jamaica	0.53	Panama	0.47	Uruguay	0.54
Costa Rica	0.52	Japan	0.75	Paraguay	0.39	Uzbekistan	0.31
Côte d'Ivoire	0.13	Jordan	0.45	Peru	0.44	Venezuela	0.47
Croatia	0.59	Kazakhstan	0.41	Philippines	0.43	Viet Nam	0.31
Cuba	0.38	Kenya	0.19	Poland	0.59	Yemen	0.18
Czech Rep.	0.66	Kuwait	0.51	Portugal	0.65	Zambia	0.17
Dem. Rep. Congo	0.12	Kyrgyzstan	0.32	Romania	0.48	Zimbabwe	0.29
Denmark	0.83	Laos	0.15	Russia	0.50		
Dominican Rep.	0.42	Latvia	0.54	Rwanda	0.15		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 67 **Code:** PECR **Reference Year:** MRYA 1998-2003

Description: Female primary education completion rate

Units: Female primary education completion rate as percentage of females in the relevant age group

Source*: United Nations Educational, Scientific and Cultural Organization (UNESCO), plus country data.

Logic: Female education is widely seen as an important factor for social and economic development. It also correlates with the overall level of schooling of a country and hence with the environmental and technological awareness, reduced incidences of water-borne diseases, and increased participation in decision-making at the household level.

Methodology: The proxy indicator for the primary completion rate is the gross intake rate at the last grade of primary education. It is calculated as the total number of new entrants in the last grade of primary education, regardless of age, expressed as a percentage of the population of the theoretical entrance age to the last grade (Source: UNESCO Institute for Statistics). Survival rates may at times exceed 100 due to fluctuations in enrolment. Where such results are published they should be interpreted as the country having a survival rate approaching 100%. Completion rates exceeding 100% are set to 100% so as not to give countries with greater than 100% PECR an advantage over countries with real or close to 100% PECR.

	Mean	91.43	Max	100	2.5 Percentile	48	
	Median	100	Min	0	97.5 Percentile	100	
Albania	97.00	Ecuador	100.00	Lebanon	96.00	Saudi Arabia	67.00
Algeria	100.00	Egypt	94.00	Liberia	49.00	Senegal	86.00
Angola	71.00	El Salvador	100.00	Libya	[94.72]	Serbia and Mont.	100.00
Argentina	100.00	Estonia	95.00	Lithuania	98.90	Sierra Leone	79.00
Armenia	95.00	Ethiopia	74.00	Macedonia	98.00	Slovakia	94.00
Australia	[97.54]	Finland	99.00	Madagascar	100.00	Slovenia	100.00
Austria	100.00	France	97.00	Malawi	100.00	South Africa	94.00
Azerbaijan	88.00	Gabon	92.00	Malaysia	93.00	South Korea	100.00
Bangladesh	100.00	Gambia	88.00	Mali	54.00	Spain	[101.7]
Belarus	100.00	Georgia	92.00	Mauritania	100.00	Sri Lanka	100.00
Belgium	[97.67]	Germany	97.00	Mexico	100.00	Sudan	48.00
Benin	100.00	Ghana	84.00	Moldova	92.00	Sweden	99.00
Bhutan	44.16	Greece	97.00	Mongolia	100.00	Switzerland	95.00
Bolivia	100.00	Guatemala	100.00	Morocco	100.00	Syria	100.00
Bosnia and Herz.	[90.00]	Guinea	67.00	Mozambique	100.00	Taiwan	100.00
Botswana	100.00	Guinea-Bissau	78.00	Myanmar	100.00	Tajikistan	100.00
Brazil	100.00	Guyana	100.00	Namibia	98.00	Tanzania	100.00
Bulgaria	98.00	Haiti	70.44	Nepal	50.70	Thailand	91.00
Burkina Faso	39.00	Honduras	100.00	Netherlands	97.00	Togo	100.00
Burundi	73.00	Hungary	96.00	New Zealand	[105.7]	Trin. and Tob.	98.00
Cambodia	100.00	Iceland	92.00	Nicaragua	100.00	Tunisia	99.00
Cameroon	99.00	India	100.00	Niger	48.00	Turkey	85.33
Canada	[98.48]	Indonesia	100.00	Nigeria	100.00	Turkmenistan	[90.43]
Central Afr. Rep.	53.00	Iran	86.00	North Korea	[92.83]	Uganda	61.71
Chad	70.00	Iraq	100.00	Norway	100.00	Ukraine	100.00
Chile	93.00	Ireland	100.00	Oman	74.00	United Arab. Em.	90.67
China	99.00	Israel	[90.89]	P. N. Guinea	83.00	United Kingdom	[96.07]
Colombia	100.00	Italy	100.00	Pakistan	79.00	United States	100.00
Congo	61.00	Jamaica	99.00	Panama	100.00	Uruguay	100.00
Costa Rica	100.00	Japan	[104.09]	Paraguay	100.00	Uzbekistan	100.00
Côte d'Ivoire	62.00	Jordan	100.00	Peru	100.00	Venezuela	100.00
Croatia	98.00	Kazakhstan	100.00	Philippines	100.00	Viet Nam	97.00
Cuba	96.00	Kenya	100.00	Poland	98.00	Yemen	79.00
Czech Rep.	100.00	Kuwait	95.00	Portugal	[97.17]	Zambia	79.00
Dem. Rep. Congo	54.00	Kyrgyzstan	100.00	Romania	100.00	Zimbabwe	86.00
Denmark	100.00	Laos	100.00	Russia	[101.5]		
Dominican Rep.	100.00	Latvia	90.00	Rwanda	100.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 68 **Code:** ENROL **Reference Year:** MRYA 1999-2003

Description: Gross tertiary enrollment rate

Units: Percentage of pupils (both sexes) of relevant age enrolled at tertiary level of schooling

Source*: United Nations Educational, Scientific and Cultural Organization (UNESCO), plus country data.

Logic: The higher the level of education within a population, the higher the capacity for scientific and technological innovation, environmental awareness and ability to address environmental problems.

Methodology: The measure was calculated on the basis of pupils enrolled in tertiary educational institutions as a proportion of the population in the relevant official age group.

	Mean		Max		2.5 Percentile		0.88
	Median		Min		97.5 Percentile		69.51
Albania	15.00	Ecuador	[26.6]	Lebanon	42.31	Saudi Arabia	22.44
Algeria	14.98	Egypt	39.00	Liberia	7.07	Senegal	[12.22]
Angola	0.67	El Salvador	17.53	Libya	48.79	Serbia and Mont.	26.16
Argentina	47.96	Estonia	57.55	Lithuania	35.00	Sierra Leone	2.18
Armenia	[28.02]	Ethiopia	1.58	Macedonia	24.45	Slovakia	30.32
Australia	63.26	Finland	45.50	Madagascar	2.16	Slovenia	60.55
Austria	45.80	France	53.58	Malawi	[-0.81]	South Africa	15.24
Azerbaijan	22.52	Gabon	7.97	Malaysia	28.16	South Korea	77.62
Bangladesh	6.61	Gambia	[1.9]	Mali	1.91	Spain	59.36
Belarus	55.95	Georgia	34.53	Mauritania	3.66	Sri Lanka	[16.47]
Belgium	58.05	Germany	46.30	Mexico	20.71	Sudan	6.85
Benin	3.60	Ghana	3.30	Moldova	27.91	Sweden	70.04
Bhutan	[6.34]	Greece	62.67	Mongolia	32.68	Switzerland	42.14
Bolivia	35.66	Guatemala	[9.61]	Morocco	10.30	Syria	[22.9]
Bosnia and Herz.	[28.64]	Guinea	[2.22]	Mozambique	0.57	Taiwan	68.00
Botswana	4.65	Guinea-Bissau	[-3.96]	Myanmar	11.53	Tajikistan	14.04
Brazil	16.51	Guyana	[19.27]	Namibia	5.94	Tanzania	0.61
Bulgaria	40.82	Haiti	[11.19]	Nepal	4.62	Thailand	35.27
Burkina Faso	[3.2]	Honduras	14.73	Netherlands	55.01	Togo	3.72
Burundi	1.23	Hungary	40.01	New Zealand	69.24	Trin. and Tob.	6.48
Cambodia	2.84	Iceland	48.66	Nicaragua	[16.38]	Tunisia	21.71
Cameroon	4.93	India	10.49	Niger	1.47	Turkey	23.61
Canada	59.20	Indonesia	14.58	Nigeria	[2.18]	Turkmenistan	[21.37]
Central Afr. Rep.	1.92	Iran	9.91	North Korea	[33.59]	Uganda	2.98
Chad	0.88	Iraq	13.57	Norway	70.01	Ukraine	43.30
Chile	37.52	Ireland	47.53	Oman	8.49	United Arab. Em.	18.10
China	12.61	Israel	52.67	P. N. Guinea	2.33	United Kingdom	59.53
Colombia	23.33	Italy	35.10	Pakistan	[15.11]	United States	72.62
Congo	5.04	Jamaica	16.44	Panama	34.90	Uruguay	36.10
Costa Rica	16.04	Japan	47.70	Paraguay	16.55	Uzbekistan	[30.42]
Côte d'Ivoire	7.00	Jordan	28.62	Peru	[20.11]	Venezuela	29.06
Croatia	32.58	Kazakhstan	30.92	Philippines	31.21	Viet Nam	9.73
Cuba	24.73	Kenya	3.00	Poland	55.54	Yemen	10.77
Czech Rep.	29.84	Kuwait	21.08	Portugal	50.20	Zambia	2.47
Dem. Rep. Congo	1.42	Kyrgyzstan	41.10	Romania	27.32	Zimbabwe	4.40
Denmark	58.86	Laos	3.32	Russia	64.09		
Dominican Rep.	[18.67]	Latvia	63.11	Rwanda	1.67		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 69 **Code:** RESEARCH **Reference Year:** 2003

Description: Number of researchers per million inhabitants

Units: Number of researchers per million inhabitants

Source*: United Nations Educational, Scientific and Cultural Organization (UNESCO), plus country data.

Logic: Scientific capacity is important for the development of new technologies for sustainable environmental

Methodology: The variable measures the number of scientific researchers per million inhabitants. Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the planning and management of R&D projects. Post-graduate students engaged in R&D are considered as

	Mean		Max		2.5 Percentile		15.85
	Median		Min		97.5 Percentile		5518.55
Albania	[451.31]	Ecuador	83.29	Lebanon	[2005.59]	Saudi Arabia	[969.33]
Algeria	[-4.23]	Egypt	[1321.94]	Liberia	[-977.07]	Senegal	1.82
Angola	[-354.55]	El Salvador	46.67	Libya	[1644.9]	Serbia and Mont.	[915.0]
Argentina	684.38	Estonia	1946.70	Lithuania	2303.2	Sierra Leone	[-623.94]
Armenia	1534.00	Ethiopia	[-544.65]	Macedonia	[641.0]	Slovakia	1773.6
Australia	3438.51	Finland	7110.45	Madagascar	15.03	Slovenia	2258.0
Austria	2313.29	France	2717.85	Malawi	[-971.19]	South Africa	[826.3]
Azerbaijan	2798.58	Gabon	[433.96]	Malaysia	159.93	South Korea	2879.7
Bangladesh	[-163.45]	Gambia	[545.27]	Mali	[-252.28]	Spain	1947.6
Belarus	[1004.23]	Georgia	2420.78	Mauritania	[671.54]	Sri Lanka	190.54
Belgium	2953.26	Germany	3153.01	Mexico	224.73	Sudan	[-991.66]
Benin	[-405.16]	Ghana	[557.12]	Moldova	329.49	Sweden	5186.0
Bhutan	[147.9]	Greece	1400.06	Mongolia	[1365.79]	Switzerland	3591.8
Bolivia	123.31	Guatemala	[-183.78]	Morocco	[257.41]	Syria	29.44
Bosnia and Herz.	[1136.14]	Guinea	[-975.42]	Mozambique	[37.06]	Taiwan	1258.4
Botswana	[1051.19]	Guinea-Bissau	[-194.44]	Myanmar	[280.15]	Tajikistan	[965.55]
Brazil	323.36	Guyana	[607.39]	Namibia	[1086.91]	Tanzania	[174.8]
Bulgaria	1166.65	Haiti	[-1027.86]	Nepal	[56.42]	Thailand	73.81
Burkina Faso	16.00	Honduras	[-631.7]	Netherlands	2572.2	Togo	[-670.92]
Burundi	[-713.55]	Hungary	1439.68	New Zealand	2197.1	Trin. and Tob.	455.82
Cambodia	[166.95]	Iceland	6639.29	Nicaragua	72.67	Tunisia	336.41
Cameroon	[-111.32]	India	[285.91]	Niger	[143.07]	Turkey	305.52
Canada	2978.16	Indonesia	[218.59]	Nigeria	[-851.62]	Turkmenistan	[116.29]
Central Afr. Rep.	[184.72]	Iran	[-14.32]	North Korea	[1516.76]	Uganda	23.56
Chad	[29.32]	Iraq	[257.49]	Norway	4376.6	Ukraine	2117.6
Chile	418.58	Ireland	2190.03	Oman	[761.3]	United Arab. Em.	[2327.82]
China	583.93	Israel	1563.29	P. N. Guinea	[100.9]	United Kingdom	2666.4
Colombia	100.70	Italy	1127.85	Pakistan	[86.7]	United States	4099.3
Congo	[197.44]	Jamaica	[762.49]	Panama	95.27	Uruguay	276.29
Costa Rica	[1014.64]	Japan	5320.77	Paraguay	166.03	Uzbekistan	[1261.55]
Côte d'Ivoire	[-631.24]	Jordan	1948.37	Peru	228.83	Venezuela	193.08
Croatia	1186.95	Kazakhstan	715.80	Philippines	[-391.16]	Viet Nam	[525.62]
Cuba	489.40	Kenya	[-47.48]	Poland	1473.0	Yemen	[1.13]
Czech Rep.	1465.87	Kuwait	212.08	Portugal	1754.1	Zambia	[283.39]
Dem. Rep. Congo	[-962.82]	Kyrgyzstan	581.27	Romania	879.25	Zimbabwe	[295.33]
Denmark	3475.75	Laos	[116.56]	Russia	3494.1		
Dominican Rep.	[-339.29]	Latvia	1078.24	Rwanda	[-238.34]		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 70 **Code:** EIONUM **Reference Year:** 2003-2004

Description: Number of memberships in environmental intergovernmental organizations

Units: Number of memberships environmental intergovernmental organizations (out of a maximum of 100)

Source*: Union of International Associations.

Logic: Countries contribute to global environmental governance by participating in intergovernmental environmental organizations.

Methodology: Based on a list of 100 Intergovernmental organizations classified as "environmental" and selected by the ESI Team, the number of memberships for each country were counted.

	Mean	7.1	Max	29	2.5 Percentile	0	
	Median	6	Min	0	97.5 Percentile	20	
Albania	3.00	Ecuador	16.00	Lebanon	8.00	Saudi Arabia	4.00
Algeria	11.00	Egypt	16.00	Liberia	9.00	Senegal	11.00
Angola	9.00	El Salvador	11.00	Libya	10.00	Serbia and Mont.	5.00
Argentina	16.00	Estonia	6.00	Lithuania	4.00	Sierra Leone	8.00
Armenia	2.00	Ethiopia	10.00	Macedonia	1.00	Slovakia	7.00
Australia	13.00	Finland	20.00	Madagascar	8.00	Slovenia	5.00
Austria	17.00	France	29.00	Malawi	10.00	South Africa	12.00
Azerbaijan	2.00	Gabon	13.00	Malaysia	11.00	South Korea	17.00
Bangladesh	9.00	Gambia	6.00	Mali	13.00	Spain	19.00
Belarus	4.00	Georgia	2.00	Mauritania	8.00	Sri Lanka	9.00
Belgium	19.00	Germany	28.00	Mexico	15.00	Sudan	13.00
Benin	11.00	Ghana	12.00	Moldova	3.00	Sweden	18.00
Bhutan	2.00	Greece	16.00	Mongolia	4.00	Switzerland	16.00
Bolivia	12.00	Guatemala	13.00	Morocco	15.00	Syria	9.00
Bosnia and Herz.	2.00	Guinea	11.00	Mozambique	6.00	Taiwan	5.00
Botswana	3.00	Guinea-Bissau	6.00	Myanmar	4.00	Tajikistan	1.00
Brazil	19.00	Guyana	8.00	Namibia	5.00	Tanzania	13.00
Bulgaria	7.00	Haiti	6.00	Nepal	4.00	Thailand	11.00
Burkina Faso	8.00	Honduras	9.00	Netherlands	22.00	Togo	11.00
Burundi	6.00	Hungary	8.00	New Zealand	8.00	Trin. and Tob.	8.00
Cambodia	5.00	Iceland	5.00	Nicaragua	10.00	Tunisia	15.00
Cameroon	15.00	India	18.00	Niger	0.00	Turkey	8.00
Canada	17.00	Indonesia	12.00	Nigeria	18.00	Turkmenistan	0.00
Central Afr. Rep.	9.00	Iran	12.00	North Korea	2.00	Uganda	10.00
Chad	7.00	Iraq	11.00	Norway	15.00	Ukraine	7.00
Chile	12.00	Ireland	14.00	Oman	16.00	United Arab. Em.	6.00
China	12.00	Israel	6.00	P. N. Guinea	6.00	United Kingdom	22.00
Colombia	14.00	Italy	20.00	Pakistan	9.00	United States	21.00
Congo	9.00	Jamaica	8.00	Panama	12.00	Uruguay	10.00
Costa Rica	12.00	Japan	19.00	Paraguay	8.00	Uzbekistan	3.00
Côte d'Ivoire	17.00	Jordan	8.00	Peru	11.00	Venezuela	10.00
Croatia	5.00	Kazakhstan	4.00	Philippines	11.00	Viet Nam	7.00
Cuba	15.00	Kenya	15.00	Poland	11.00	Yemen	5.00
Czech Rep.	7.00	Kuwait	8.00	Portugal	17.00	Zambia	0.00
Dem. Rep. Congo	10.00	Kyrgyzstan	2.00	Romania	9.00	Zimbabwe	10.00
Denmark	20.00	Laos	1.00	Russia	16.00		
Dominican Rep.	11.00	Latvia	5.00	Rwanda	6.00		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 71 **Code:** FUNDING **Reference Year:** 2004

Description: Contribution to international and bilateral funding of environmental projects and development aid

Units: Score from 0-100 based on aid given and aid received (0 corresponds to low levels of aid and 100 corresponds to high levels of aid)

Source*: Global Environmental Facility (GEF) and Organisation for Economic Co-operation and Development (OECD).

Logic: Participation in environment and development assistance programs, either as a donor or a recipient (depending on income level), is an important sign of government commitment to environmental sustainability.

Methodology: Two sets of rank percentiles based on standardized residuals were combined. The first is based on the residuals from regressing log aid donated on log population, log gni, log gni/cap, and (log gni)². The second set of rank percentiles is based on the residuals from regressing log aid received on the same regressors. Three countries have both donations and receipts and in these cases the most favorable rank was chosen.

	Mean		Max		2.5 Percentile		
	Median		Min		97.5 Percentile		
	50.96		100		4.21		
	50.96		0.64		97.8		
Albania	88.46	Ecuador	80.13	Lebanon	64.10	Saudi Arabia	13.46
Algeria	14.74	Egypt	93.59	Liberia	9.62	Senegal	80.77
Angola	37.18	El Salvador	31.41	Libya	1.92	Serbia and Mont.	[49.99]
Argentina	19.87	Estonia	16.03	Lithuania	51.92	Sierra Leone	5.77
Armenia	82.05	Ethiopia	58.33	Macedonia	[52.84]	Slovakia	39.74
Australia	36.00	Finland	92.00	Madagascar	75.64	Slovenia	80.00
Austria	16.00	France	32.00	Malawi	74.36	South Africa	44.23
Azerbaijan	99.36	Gabon	18.59	Malaysia	100.00	South Korea	4.00
Bangladesh	50.00	Gambia	36.54	Mali	85.26	Spain	24.00
Belarus	15.38	Georgia	92.95	Mauritania	66.67	Sri Lanka	62.82
Belgium	44.00	Germany	96.00	Mexico	68.59	Sudan	3.21
Benin	81.41	Ghana	73.08	Moldova	41.67	Sweden	88.00
Bhutan	75.00	Greece	20.00	Mongolia	94.23	Switzerland	56.00
Bolivia	89.74	Guatemala	83.97	Morocco	69.23	Syria	48.08
Bosnia and Herz.	89.10	Guinea	41.03	Mozambique	67.31	Taiwan	[44.41]
Botswana	40.38	Guinea-Bissau	56.41	Myanmar	10.26	Tajikistan	28.85
Brazil	48.72	Guyana	38.46	Namibia	97.44	Tanzania	85.90
Bulgaria	58.97	Haiti	27.56	Nepal	91.67	Thailand	98.72
Burkina Faso	86.54	Honduras	77.56	Netherlands	84.00	Togo	8.33
Burundi	28.21	Hungary	22.44	New Zealand	68.00	Trin. and Tob.	39.10
Cambodia	46.79	Iceland	[78.68]	Nicaragua	90.38	Tunisia	92.31
Cameroon	53.85	India	42.95	Niger	71.79	Turkey	78.85
Canada	28.00	Indonesia	49.36	Nigeria	34.62	Turkmenistan	21.15
Central Afr. Rep.	35.90	Iran	7.69	North Korea	17.95	Uganda	82.69
Chad	50.64	Iraq	[1.75]	Norway	76.00	Ukraine	4.49
Chile	60.26	Ireland	48.00	Oman	14.10	United Arab. Em.	[34.31]
China	76.28	Israel	[63.27]	P. N. Guinea	54.49	United Kingdom	52.00
Colombia	43.59	Italy	8.00	Pakistan	33.33	United States	40.00
Congo	20.51	Jamaica	45.51	Panama	55.13	Uruguay	57.69
Costa Rica	87.82	Japan	100.00	Paraguay	60.90	Uzbekistan	33.97
Côte d'Ivoire	71.15	Jordan	95.51	Peru	87.18	Venezuela	25.64
Croatia	64.74	Kazakhstan	51.28	Philippines	96.15	Viet Nam	84.62
Cuba	53.21	Kenya	61.54	Poland	23.72	Yemen	57.05
Czech Rep.	60.00	Kuwait	[25.09]	Portugal	64.00	Zambia	[64.92]
Dem. Rep. Congo	1.28	Kyrgyzstan	11.54	Romania	[38.15]	Zimbabwe	63.46
Denmark	72.00	Laos	76.92	Russia	17.31		
Dominican Rep.	29.49	Latvia	26.92	Rwanda	32.05		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 72 **Code:** PARTICIP **Reference Year:** 2004

Description: Participation in international environmental agreements

Units: Score between 0 and 1 with 0 corresponding to no participation and 1 to full participation

Source*: United Nations Framework Convention on Climate Change (UNFCCC), Vienna Convention on the Protection of the Ozone Layer, Convention on the Trade in Endangered Species (CITES), Basel Convention on the Transboundary Movement of Hazardous Waste, United Nations Convention to Combat Desertification (UNCCD), United Nations Convention on Biological Diversity, and the Ramsar Convention on Wetlands.

Logic: Participation in international environmental efforts should be measured beyond signatures to treaties. For this reason, this variable combines ratifications of treaties and conventions with the level of active participation in, contribution to, and compliance with the treaties' obligations.

Methodology: For each convention, protocol, and amendment points were allocated as follows: 1 point for signature, accession, and ratification without signature. An additional point for ratification with signature, acceptance, approval, or succession. The maximum number of points achievable is: 2 points for UNCCD, 12 points for Vienna Convention, Montreal Protocol, and its Amendments, 2 points for CITES, 4 points for UNFCCC and the Kyoto Protocol, 2 points for the Basel convention, 4 points for UNCBD, and 4 points for the Ramsar convention and the Cartagena Protocol. Due to the varying allocation of points, the observed value for each convention/protocol was re-scaled from 0-1 by dividing the observed points by the maximum number of points achievable. The re-scaled values were then aggregated using equal weights of 1/7 each. Countries or territories not listed under the list of parties to a convention/protocol/amendment were assigned 0 points for the respective convention/protocol/amendment.

Mean	0.52	Max	1	2.5 Percentile	0		
Median	0.57	Min	0	97.5 Percentile	1		
Albania	0.42	Ecuador	0.89	Lebanon	0.56	Saudi Arabia	0.40
Algeria	0.60	Egypt	0.76	Liberia	0.48	Senegal	0.75
Angola	0.31	El Salvador	0.74	Libya	0.54	Serbia and Mont.	0.35
Argentina	0.93	Estonia	0.64	Lithuania	0.73	Sierra Leone	0.50
Armenia	0.58	Ethiopia	0.52	Macedonia	0.49	Slovakia	0.71
Australia	0.79	Finland	0.92	Madagascar	0.79	Slovenia	0.69
Austria	0.82	France	1.00	Malawi	0.63	South Africa	0.76
Azerbaijan	0.57	Gabon	0.46	Malaysia	0.77	South Korea	0.75
Bangladesh	0.85	Gambia	0.73	Mali	0.75	Spain	0.85
Belarus	0.54	Georgia	0.56	Mauritania	0.52	Sri Lanka	0.61
Belgium	0.88	Germany	1.00	Mexico	0.85	Sudan	0.50
Benin	0.64	Ghana	0.73	Moldova	0.58	Sweden	1.00
Bhutan	0.50	Greece	0.85	Mongolia	0.64	Switzerland	1.00
Bolivia	0.85	Guatemala	0.71	Morocco	0.75	Syria	0.67
Bosnia and Herz.	0.35	Guinea	0.61	Mozambique	0.55	Taiwan	0.00
Botswana	0.65	Guinea-Bissau	0.50	Myanmar	0.39	Tajikistan	0.29
Brazil	0.80	Guyana	0.49	Namibia	0.68	Tanzania	0.75
Bulgaria	0.76	Haiti	0.45	Nepal	0.57	Thailand	0.79
Burkina Faso	0.71	Honduras	0.43	Netherlands	0.95	Togo	0.81
Burundi	0.65	Hungary	0.75	New Zealand	0.82	Trin. and Tob.	0.69
Cambodia	0.63	Iceland	0.64	Nicaragua	0.71	Tunisia	0.79
Cameroon	0.61	India	0.82	Niger	0.76	Turkey	0.76
Canada	0.93	Indonesia	0.70	Nigeria	0.48	Turkmenistan	0.39
Central Afr. Rep.	0.42	Iran	0.81	North Korea	0.36	Uganda	0.73
Chad	0.63	Iraq	0.00	Norway	1.00	Ukraine	0.63
Chile	0.93	Ireland	0.94	Oman	0.37	United Arab. Em.	0.42
China	0.73	Israel	0.92	P. N. Guinea	0.55	United Kingdom	1.00
Colombia	0.82	Italy	0.94	Pakistan	0.67	United States	0.71
Congo	0.56	Jamaica	0.58	Panama	0.90	Uruguay	0.65
Costa Rica	0.79	Japan	0.85	Paraguay	0.87	Uzbekistan	0.58
Côte d'Ivoire	0.57	Jordan	0.83	Peru	0.81	Venezuela	0.82
Croatia	0.69	Kazakhstan	0.50	Philippines	0.83	Viet Nam	0.58
Cuba	0.71	Kenya	0.75	Poland	0.82	Yemen	0.42
Czech Rep.	0.77	Kuwait	0.60	Portugal	0.89	Zambia	0.62
Dem. Rep. Congo	0.58	Kyrgyzstan	0.42	Romania	0.65	Zimbabwe	0.46
Denmark	0.95	Laos	0.38	Russia	0.75		
Dominican Rep.	0.51	Latvia	0.65	Rwanda	0.57		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 73 **Code:** CO2GDP **Reference Year:** 2000

Description: Carbon emissions per million US dollars GDP

Units: Metric tons of carbon emissions per million GDP in constant 1995 US dollars

Source*: Carbon Dioxide Information Analysis Center (CDIAC), plus country data.

Logic: Emissions of carbon dioxide are not immediately harmful to any given country but contribute to global climate change. Every country emits carbon dioxide. However, the amount of emissions per unit economic activity varies widely, with some countries being far more efficient than others.

Methodology: Total annual CO2 emissions in metric tons have been normalized by million GDP in constant 1995 US dollars for each country. For the People's Republic of Korea, World Bank data were not available and GDP at market prices, so current prices, US\$ (UN estimates) for 2000 were used instead.

	Mean		Max		2.5 Percentile		38.72
	Median		Min		97.5 Percentile		1919.04
Albania	224.52	Ecuador	328.00	Lebanon	332.42	Saudi Arabia	631.76
Algeria	499.89	Egypt	498.70	Liberia	182.17	Senegal	196.73
Angola	254.02	El Salvador	164.71	Libya	445.46	Serbia and Mont.	837.50
Argentina	128.71	Estonia	840.85	Lithuania	360.14	Sierra Leone	200.21
Armenia	507.50	Ethiopia	204.44	Macedonia	593.02	Slovakia	419.30
Australia	208.95	Finland	88.87	Madagascar	162.30	Slovenia	171.74
Austria	61.65	France	55.81	Malawi	120.85	South Africa	518.89
Azerbaijan	1845.85	Gabon	177.35	Malaysia	352.28	South Korea	187.84
Bangladesh	163.25	Gambia	153.29	Mali	51.13	Spain	109.51
Belarus	850.78	Georgia	471.12	Mauritania	642.69	Sri Lanka	166.83
Belgium	88.11	Germany	79.76	Mexico	310.61	Sudan	147.60
Benin	169.63	Ghana	201.67	Moldova	1159.3	Sweden	43.94
Bhutan	252.08	Greece	175.77	Mongolia	1992.2	Switzerland	31.71
Bolivia	380.60	Guatemala	151.66	Morocco	253.75	Syria	1152.2
Bosnia and Herz.	828.48	Guinea	77.93	Mozambique	95.24	Taiwan	212.00
Botswana	162.39	Guinea-Bissau	286.28	Myanmar	33.50	Tajikistan	878.60
Brazil	106.65	Guyana	613.14	Namibia	119.58	Tanzania	181.85
Bulgaria	919.37	Haiti	135.63	Nepal	166.61	Thailand	315.73
Burkina Faso	94.45	Honduras	284.26	Netherlands	76.17	Togo	335.49
Burundi	69.75	Hungary	271.77	New Zealand	126.63	Trin. and Tob.	1059.1
Cambodia	31.08	Iceland	67.69	Nicaragua	400.16	Tunisia	212.55
Cameroon	177.77	India	621.43	Niger	149.30	Turkey	294.29
Canada	168.23	Indonesia	351.54	Nigeria	305.31	Turkmenistan	3121.7
Central Afr. Rep.	58.80	Iran	802.44	North Korea	4859.0	Uganda	52.80
Chad	21.15	Iraq	[659.25]	Norway	77.14	Ukraine	2147.4
Chile	201.26	Ireland	108.76	Oman	378.21	United Arab. Em.	300.48
China	731.44	Israel	154.62	P. N. Guinea	135.94	United Kingdom	118.39
Colombia	164.79	Italy	96.74	Pakistan	401.62	United States	170.72
Congo	206.90	Jamaica	548.60	Panama	173.90	Uruguay	68.90
Costa Rica	99.32	Japan	56.88	Paraguay	106.91	Uzbekistan	2007.3
Côte d'Ivoire	219.89	Jordan	540.61	Peru	133.16	Venezuela	539.60
Croatia	240.26	Kazakhstan	1436.89	Philippines	235.39	Viet Nam	540.47
Cuba	262.59	Kenya	258.31	Poland	578.54	Yemen	407.46
Czech Rep.	586.45	Kuwait	474.16	Portugal	125.68	Zambia	124.74
Dem. Rep. Congo	161.57	Kyrgyzstan	580.11	Romania	718.19	Zimbabwe	515.90
Denmark	59.13	Laos	47.50	Russia	913.98		
Dominican Rep.	378.42	Latvia	264.29	Rwanda	75.71		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 74 **Code:** CO2PC **Reference Year:** MRYA 1996-2001

Description: Carbon emissions per capita

Units: Metric tons of carbon emissions per capita

Source*: United Nations Statistics Division, Millennium Indicator Database.

Logic: Emissions of carbon dioxide are not immediately harmful to any given country, but contribute to climate change. Every country emits some carbon dioxide, but the amount per person varies widely, with some countries having much lower per capita emissions than others.

Methodology: Total annual carbon dioxide emissions in metric tons of carbon were normalized by total population (de facto) for each country for the same year. For Slovenia the most recent available non-zero figure was for the year 1996, for the Ukraine for the year 1998, and for the Russian Federation for the year 1999.

	Mean		Max		2.5 Percentile		0.06
	Median		Min		97.5 Percentile		20.67
Albania	0.92	Ecuador	2.05	Lebanon	4.36	Saudi Arabia	16.91
Algeria	2.96	Egypt	2.10	Liberia	0.14	Senegal	0.45
Angola	0.52	El Salvador	1.07	Libya	10.92	Serbia and Mont.	3.96
Argentina	3.73	Estonia	12.63	Lithuania	4.40	Sierra Leone	0.13
Armenia	1.13	Ethiopia	0.09	Macedonia	5.53	Slovakia	7.80
Australia	18.32	Finland	13.05	Madagascar	0.14	Slovenia	8.20
Austria	8.53	France	6.91	Malawi	0.07	South Africa	7.44
Azerbaijan	3.56	Gabon	2.78	Malaysia	6.28	South Korea	9.12
Bangladesh	0.21	Gambia	0.21	Mali	0.05	Spain	7.52
Belarus	5.90	Georgia	1.17	Mauritania	1.16	Sri Lanka	0.55
Belgium	12.34	Germany	10.57	Mexico	4.29	Sudan	0.17
Benin	0.26	Ghana	0.30	Moldova	1.54	Sweden	6.24
Bhutan	0.19	Greece	9.67	Mongolia	3.00	Switzerland	6.25
Bolivia	1.33	Guatemala	0.87	Morocco	1.26	Syria	3.27
Bosnia and Herz.	4.84	Guinea	0.16	Mozambique	0.07	Taiwan	2.59
Botswana	2.23	Guinea-Bissau	0.19	Myanmar	0.19	Tajikistan	0.65
Brazil	1.79	Guyana	2.11	Namibia	0.96	Tanzania	0.12
Bulgaria	6.11	Haiti	0.18	Nepal	0.14	Thailand	3.26
Burkina Faso	0.09	Honduras	0.74	Netherlands	11.25	Togo	0.39
Burundi	0.04	Hungary	8.30	New Zealand	8.50	Trin. and Tob.	20.47
Cambodia	0.04	Iceland	7.69	Nicaragua	0.74	Tunisia	1.93
Cameroon	0.43	India	1.05	Niger	0.11	Turkey	3.25
Canada	18.25	Indonesia	1.28	Nigeria	0.32	Turkmenistan	7.45
Central Afr. Rep.	0.07	Iran	4.67	North Korea	8.49	Uganda	0.06
Chad	0.02	Iraq	3.29	Norway	9.26	Ukraine	6.23
Chile	3.91	Ireland	12.02	Oman	7.58	United Arab. Em.	20.91
China	2.19	Israel	10.45	P. N. Guinea	0.46	United Kingdom	9.47
Colombia	1.39	Italy	8.01	Pakistan	0.74	United States	20.12
Congo	0.53	Jamaica	4.18	Panama	2.15	Uruguay	1.62
Costa Rica	1.38	Japan	9.54	Paraguay	0.67	Uzbekistan	[3.17]
Côte d'Ivoire	0.66	Jordan	3.09	Peru	1.14	Venezuela	6.50
Croatia	4.59	Kazakhstan	7.76	Philippines	1.02	Viet Nam	0.74
Cuba	2.76	Kenya	0.31	Poland	8.22	Yemen	0.47
Czech Rep.	12.48	Kuwait	21.33	Portugal	6.47	Zambia	0.18
Dem. Rep. Congo	0.06	Kyrgyzstan	0.94	Romania	4.96	Zimbabwe	1.17
Denmark	10.18	Laos	0.08	Russia	10.32		
Dominican Rep.	3.01	Latvia	3.32	Rwanda	0.07		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 75 **Code:** SO2EXP **Reference Year:** EMEP: 2001, IIASA Europe: 2000, IIASA RAINS-Asia: 1997

Description: SO2 Exports

Units: Gigagrams of SO2 produced in country that is carried across its boundaries to other countries

Source*: Europe Meteorological Synthesizing Centre West and International Institute for Applied Systems Analysis.

Logic: The transport of sulfur emissions across territorial boundaries contributes to poor air quality and acid rain in receiving countries.

Methodology: The data are merged from EMEP, IIASA Europe, and IIASA RAINS-Asia. Kola and the rest of the Russian Federation are aggregated to the Russian Federation (RUS) in the EMEP data.

	Mean		305.52	Max	2112	2.5 Percentile	0.56
	Median		85.24	Min	0.4	97.5 Percentile	1717.12
Albania	58.00	Ecuador	..	Lebanon	..	Saudi Arabia	..
Algeria	..	Egypt	..	Liberia	..	Senegal	..
Angola	..	El Salvador	..	Libya	..	Serbia and Mont.	394.10
Argentina	..	Estonia	91.70	Lithuania	48.77	Sierra Leone	..
Armenia	4.40	Ethiopia	..	Macedonia	136.53	Slovakia	128.57
Australia	..	Finland	85.24	Madagascar	..	Slovenia	96.00
Austria	36.67	France	609.85	Malawi	..	South Africa	..
Azerbaijan	14.70	Gabon	..	Malaysia	40.10	South Korea	43.80
Bangladesh	23.80	Gambia	..	Mali	..	Spain	1394.0
Belarus	150.72	Georgia	9.00	Mauritania	..	Sri Lanka	8.15
Belgium	161.86	Germany	649.91	Mexico	..	Sudan	..
Benin	..	Ghana	..	Moldova	12.00	Sweden	56.77
Bhutan	0.41	Greece	485.00	Mongolia	0.69	Switzerland	21.08
Bolivia	..	Guatemala	..	Morocco	..	Syria	..
Bosnia and Herz.	419.00	Guinea	..	Mozambique	..	Taiwan	..
Botswana	..	Guinea-Bissau	..	Myanmar	2.36	Tajikistan	134.00
Brazil	..	Guyana	..	Namibia	..	Tanzania	..
Bulgaria	845.93	Haiti	..	Nepal	18.80	Thailand	..
Burkina Faso	..	Honduras	..	Netherlands	88.93	Togo	..
Burundi	..	Hungary	400.48	New Zealand	..	Trin. and Tob.	..
Cambodia	0.40	Iceland	27.00	Nicaragua	..	Tunisia	..
Cameroon	..	India	340.00	Niger	..	Turkey	2112.0
Canada	..	Indonesia	132.00	Nigeria	..	Turkmenistan	..
Central Afr. Rep.	..	Iran	..	North Korea	61.70	Uganda	..
Chad	..	Iraq	..	Norway	24.75	Ukraine	1029.0
Chile	..	Ireland	131.00	Oman	..	United Arab. Em.	..
China	1230.00	Israel	..	P. N. Guinea	..	United Kingdom	1125.3
Colombia	..	Italy	758.00	Pakistan	42.00	United States	..
Congo	..	Jamaica	..	Panama	..	Uruguay	..
Costa Rica	..	Japan	142.00	Paraguay	..	Uzbekistan	..
Côte d'Ivoire	..	Jordan	..	Peru	..	Venezuela	..
Croatia	58.00	Kazakhstan	236.99	Philippines	72.30	Viet Nam	20.10
Cuba	..	Kenya	..	Poland	1564.0	Yemen	..
Czech Rep.	251.00	Kuwait	..	Portugal	286.00	Zambia	..
Dem. Rep. Congo	..	Kyrgyzstan	..	Romania	912.00	Zimbabwe	..
Denmark	25.33	Laos	0.82	Russia	1904.2		
Dominican Rep.	..	Latvia	13.37	Rwanda	..		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Variable #: 76 **Code:** POLEXP **Reference Year:** 2002

Description: Import of polluting goods and raw materials as percentage of total imports of goods and services

Units: Import of polluting goods and raw materials as percentage of total imports of goods and services

Source*: United Nations Commodity Trade Statistics database (COMTRADE).

Logic: Countries that import a large volume of commodities that are associated with negative environmental externalities at the point of extraction or processing may not be pursuing an environmentally sustainable path because of the likelihood that their actions are contributing to damage abroad. This measure does not take into account variation in actual environmental externalities within exporting countries, nor does it factor in other relevant imports that are not classified as commodities; as such it should be considered a rough proxy.

Methodology: The following commodities from the Harmonized Commodity Description and Coding System (HS-1996) are used: salt, sulphur, earth, stone, plaster, lime and cement; ores, slag and ash; paper and paperboard, articles of pulp, etc.; stone, plaster, cement, asbestos, mica, etc.; iron and steel; copper, nickel, aluminum, lead, zinc, tin, other base metals, cermet, and articles thereof; nuclear reactors, boilers, machinery, etc.; vehicles other than railway, tramway; ships, boats and other floating structures; and aircraft, spacecraft, and parts thereof. The import data in US dollars for these codes are added up and divided by the value of total imports of goods and services in US dollars. Countries with no recorded imports of goods and raw materials for the selected HS codes were set to missing.

	Mean		Max		2.5 Percentile		11.75
	Median		Min		97.5 Percentile		39.33
Albania	17.26	Ecuador	31.90	Lebanon	21.30	Saudi Arabia	32.20
Algeria	30.84	Egypt	[24.86]	Liberia	[19.31]	Senegal	14.81
Angola	[24.96]	El Salvador	17.33	Libya	[28.4]	Serbia and Mont.	25.69
Argentina	22.92	Estonia	29.10	Lithuania	[22.03]	Sierra Leone	[19.94]
Armenia	12.10	Ethiopia	24.83	Macedonia	19.99	Slovakia	30.21
Australia	29.72	Finland	26.71	Madagascar	10.09	Slovenia	31.55
Austria	23.53	France	30.17	Malawi	22.11	South Africa	24.85
Azerbaijan	15.19	Gabon	[24.09]	Malaysia	21.32	South Korea	19.60
Bangladesh	[14.1]	Gambia	13.97	Mali	[18.84]	Spain	31.62
Belarus	23.10	Georgia	[22.79]	Mauritania	[23.13]	Sri Lanka	16.78
Belgium	30.11	Germany	25.85	Mexico	31.09	Sudan	49.76
Benin	20.20	Ghana	[20.82]	Moldova	15.94	Sweden	25.93
Bhutan	[19.1]	Greece	30.58	Mongolia	[22.05]	Switzerland	23.18
Bolivia	25.82	Guatemala	28.01	Morocco	22.17	Syria	22.77
Bosnia and Herz.	[23.11]	Guinea	17.26	Mozambique	[23.19]	Taiwan	[25.05]
Botswana	[26.36]	Guinea-Bissau	[22.16]	Myanmar	[21.29]	Tajikistan	[20.91]
Brazil	23.02	Guyana	18.29	Namibia	31.60	Tanzania	26.89
Bulgaria	25.21	Haiti	[21.92]	Nepal	[19.13]	Thailand	[20.23]
Burkina Faso	22.71	Honduras	19.42	Netherlands	23.13	Togo	18.66
Burundi	[18.71]	Hungary	29.52	New Zealand	31.16	Trin. and Tob.	32.05
Cambodia	[17.2]	Iceland	19.62	Nicaragua	23.56	Tunisia	24.54
Cameroon	[26.16]	India	13.03	Niger	14.56	Turkey	29.35
Canada	37.17	Indonesia	18.66	Nigeria	18.23	Turkmenistan	[23.79]
Central Afr. Rep.	12.60	Iran	31.98	North Korea	[26.28]	Uganda	20.68
Chad	[19.31]	Iraq	[25.32]	Norway	27.33	Ukraine	20.19
Chile	23.58	Ireland	20.22	Oman	33.85	United Arab. Em.	[24.04]
China	29.04	Israel	16.38	P. N. Guinea	26.88	United Kingdom	32.59
Colombia	25.68	Italy	27.09	Pakistan	7.03	United States	28.46
Congo	[23.77]	Jamaica	18.39	Panama	[24.3]	Uruguay	16.99
Costa Rica	23.29	Japan	18.12	Paraguay	19.15	Uzbekistan	[22.66]
Côte d'Ivoire	[21.21]	Jordan	21.87	Peru	20.01	Venezuela	28.86
Croatia	30.23	Kazakhstan	[24.16]	Philippines	23.11	Viet Nam	[21.42]
Cuba	[21.59]	Kenya	27.20	Poland	33.32	Yemen	[23.32]
Czech Rep.	31.67	Kuwait	[26.09]	Portugal	28.65	Zambia	23.76
Dem. Rep. Congo	[21.31]	Kyrgyzstan	19.66	Romania	23.84	Zimbabwe	49.50
Denmark	23.33	Laos	[23.52]	Russia	15.47		
Dominican Rep.	[24.24]	Latvia	26.70	Rwanda	15.26		

* Full source information for this variable can be found at the end of this Appendix. Data in “[]” indicate imputed values; “..” means the data point is missing.

Complete Source Information for 2005 ESI

Variable #: 1 **Code:** NO2

Description: **Urban population weighted NO2 concentration**

For ambient air pollutant concentrations: Organisation for Economic Co-operation and Development (OECD), Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_1_1_1_37465,00.html (accessed October 2004); United Nations Human Settlement Programme (UNHABITAT), Global Urban Observatory, Citibase, 1999, http://www.unchs.org/programmes/guo/guo_databases.asp (accessed July 2004); World Health Organization (WHO), Air Monitoring Information System 2.0, 1998; European Environment Agency, AirBase, July 2004, <http://air-climate.eionet.eu.int/databases> (accessed July 2004); World Resources Institute, World Resources 1998-99, Data Table 8.5;

For city population: OECD Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_1_1_1_37465,00.html (accessed October 2004); Center for International Earth Science Information Network (CIESIN), alpha version of the Europe City Population database (version of August 2004).

Additional and updated data as follows: Canada: Air quality data: National Air Pollution Surveillance (NAPS) Network, Annual Data Summary for 2002, http://www.etc-cte.ec.gc.ca/publications/naps/naps2002_annual.pdf, Population data: Statistics Canada, <http://www.statcan.ca/english/Pgdb/demo05a.htm>. Finland: Finnish Meteorological Institute, 2004. Slovak Republic: NO2 data: Slovak Hydrometeorological Institute, Ministry of Environment of the Slovak Republic, "Air pollution in the Slovak Republic in 2001", Bratislava 2003 (http://oko.shmu.sk/rocenky/SHMU_Air_pollution_in_the_SR_2001.pdf), to be published by Statistical Office of the Slovak Republic in "Statistical Yearbook of the Slovak Republic 2004" and "Environment in the Slovak Republic Selected indicators in 1999 - 2003". City population data: Statistical Office of the Slovak Republic, Demography and Social Statistics Section. Taiwan: Environmental Protection Agency, Taiwan, Air Quality Query Website, http://edb.epa.gov.tw/EnvStatistics/AirQlt/airpoll/-Air_pollution_tb3_1.asp. United Arab Emirates: Federal Environment Agency 2004, Environmental Annual Reports collected by respective municipalities.

Variable #: 2 **Code:** SO2

Description: **Urban population weighted SO2 concentration**

For ambient air pollutant concentrations: Organisation for Economic Co-operation and Development (OECD), Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_1_1_1_37465,00.html (accessed October 2004); United Nations Human Settlement Programme (UNHABITAT), Global Urban Observatory, Citibase, 1999, http://www.unchs.org/programmes/guo/guo_databases.asp (accessed July 2004); World Health Organization (WHO), Air Monitoring Information System 2.0, 1998; European Environment Agency, AirBase, July 2004, <http://air-climate.eionet.eu.int/databases> (accessed July 2004); World Resources Institute, World Resources 1998-99, Data Table 8.5.

For city population: OECD Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_1_1_1_37465,00.html (accessed October 2004); Center for International Earth Science Information Network (CIESIN), alpha version of the Europe City Population database (version of August 2004).

Additional and updated country data as follows: Belgium: Interregional Cell for the Environment (IRCEL), Frans Fierens, and Walloon State of the Environment Cell - Directorate-General for Natural Resources and the Environment (CEEW - DGRNE), Vincent Brahy, <http://statbel.fgov.be>. Canada: SO2 data, National Air Pollution Surveillance (NAPS) Network, Annual Data Summary for 2002, http://www.etc-cte.ec.gc.ca/publications/naps/naps2002_annual.pdf. City population data, <http://www.statcan.ca/english/Pgdb/demo05a.htm>. Taiwan: SO2 data, Environmental Protection Administration (EPA), Taiwan, <http://edb.epa.gov.tw/EnvStatistics/AirQlt/airpoll/index.asp>, <http://www.dgbas.gov.tw/dgbas03/bs8/look/looky.htm>. City population data, Directorate General of Budget Accounting and Statistics, The Third Bureau, Socio-Economic Data of Taiwan. Turkey: SO2 data, Ministry of Health, <http://www.die.gov.tr/ENGLISH/SONIST/CEVRE/-e05052004.html>. City population data, State Institute of Statistics., General Population Census 2000. United Arab Emirates: Federal Environment Agency, Environmental Annual Reports collected in respective municipalities.

Variable #: 3 **Code:** TSP

Description: **Urban population weighted TSP concentration**

For ambient air pollutant concentrations: Organisation for Economic Co-operation and Development (OECD), Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_1_1_1_37465,00.html (accessed October 2004); United Nations Human Settlement Programme (UNHABITAT), Global Urban Observatory, Citibase, 1999, http://www.unhcr.org/programmes/guo/guo_databases.asp (accessed July 2004); World Health Organization (WHO), Air Monitoring Information System 2.0, 1998; European Environment Agency, AirBase, July 2004, <http://air-climate.eionet.eu.int/databases> (accessed July 2004); World Resources Institute, World Resources 1998-99, Data Table 8.5.

For city population: OECD Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_1_1_1_37465,00.html (accessed October 2004); Center for International Earth Science Information Network (CIESIN), alpha version of the Europe City Population database (version of August 2004).

Additional and updated country data as follows: Albania: Ministry of Environment Canada: PM10 data: National Air Pollution Surveillance (NAPS) Network, Annual Data Summary for 2002, http://www.etc-cte.ec.gc.ca/publications/naps/naps2002_annual.pdf, City population data: <http://www.statcan.ca/english/Pgdb/demo05a.htm>. Costa Rica: TSP data: Universidad Nacional, Heredia, Costa Rica, Laboratorio de Contaminantes cited by Indicadores del Desarrollo Sostenible de Costa Rica 2002, Observatorio del Desarrollo (OdD), Universidad de Costa Rica, <http://www.odd.ucr.ac.cr>. Slovak Republic: PM10 data: Slovak Hydrometeorological Institute, Ministry of Environment of the Slovak Republic, "Air pollution in the Slovak Republic in 2001", Bratislava 2003 (http://oko.shmu.sk/rocnky/SHMU_Air_pollution_in_the_SR_2001.pdf), to be published by Statistical Office of the Slovak Republic in "Statistical Yearbook of the Slovak Republic 2004" and "Environment in the Slovak Republic Selected indicators in 1999 - 2003", City population data: Statistical Office of the Slovak Republic, Demography and Social Statistics Section. Taiwan: PM10 data, Air Quality Query Website, EPA, Taiwan, http://edb.epa.gov.tw/EnvStatistics/AirQlt/airpoll/Air_pollution_tb3_2.asp. Directorate General of Budget Accounting and Statistics, Socio-Economic Data of Taiwan, <http://www.dgbas.gov.tw/dgbas03/bs8/look/looky.htm>. United Arab Emirates: Federal Environment Agency, Environmental Annual Reports collected respective municipalities. United States: Environmental Protection Agency, <http://www.epa.gov/air/airtrends/aqtrnd01/pmatter.html>.

Variable #: 4 **Code:** INDOOR

Description: **Indoor air pollution from solid fuel use**

World Health Organization, "Assessing the environmental burden of disease at national and local levels", by Manish A. Desai, Sumi Mehta, Kirk R. Smith, http://www.who.int/quantifying_ehimpacts/publications/9241591358/en/ (accessed December 2004).

Variable #: 5 **Code:** ECORISK

Description: **Percentage of country's territory in threatened ecoregions**

Hoekstra, Jonathan M., Timothy M. Boucher, Taylor H. Ricketts, and Carter Roberts. 2005. Confronting a biome crisis: global disparities of habitat loss and protection. Ecology Letters, 8, pp. 23-29, see also <http://www.blackwellpublishing.com/abstract.asp?aid=4&iid=1&ref=1461-023X&vid=8> (accessed January 2005).

Variable #: 6 **Code:** PRTBRD

Description: **Threatened bird species as percentage of known breeding bird species in each country**

IUCN-The World Conservation Union Red List of Threatened Species 2002 and 2003, <http://www.redlist.org/info/tables.html> (accessed September 2004), and World Resources Institute (WRI) 2000-2001 Earthtrends Table BI.2 Globally Threatened Species: Mammals, Birds, and Reptiles, http://earthtrends.wri.org/pdf_library/data_tables/bi2n_2000.pdf (accessed January 2005).

Additional and updated country data as follows: Taiwan: The Agricultural Council, Taiwan, Birds, Animal Division, Endemic Species Research Center, http://www.tesri.gov.tw/content/animal/ani_bird.asp, Wild Bird Federation Taiwan, The list of conserved wild animals, http://www.bird.org.tw/ebird/b/webrace/school/10/new_page_4.htm.

Variable #: 7 **Code:** PRTMAM

Description: **Threatened mammal species as percentage of known mammal species in each country**

IUCN-The World Conservation Union Red List of Threatened Species 2002 and 2003, <http://www.redlist.org/info/tables.html> (accessed September 2004), and World Resources Institute (WRI) 2000-2001 Earthtrends Table BI.2 Globally Threatened Species: Mammals, Birds, and Reptiles, http://earthtrends.wri.org/pdf_library/data_tables/bi2n_2000.pdf (accessed January 2005).

Additional and updated country data as follows: Taiwan: The Agricultural Council, Taiwan, Mammal, Animal Division, Endemic Species Research Center, http://www.tesri.gov.tw/content/animal/ani_mamal.asp, Endemic Species Research Center, The list of conserved wild animals, <http://nature.tesri.gov.tw/tesriusr/internet/wildlist.cfm?Kind=0>.

Variable #: 8 **Code:** PRTAMPH

Description: **Threatened amphibian species as percentage of known amphibian species in each country**

IUCN-The World Conservation Union Species Survival Commission, Conservation International-Center for Applied Biodiversity Science, and NatureServe. 2004, IUCN Global Amphibian Assessment, <http://www.globalamphibians.org/> (accessed January 2005).

Variable #: 9 **Code:** NBI

Description: **National Biodiversity Index**

Convention on Biological Diversity, Global Biodiversity Outlook (2001, with second edition to be published in 2004), <http://www.biodiv.org/doc/publications/gbo/gbo-anx-01-en.pdf> (accessed January 2005).

Variable #: 10 **Code:** ANTH10

Description: **Percentage of total land area (including inland waters) having very low anthropogenic impact**

The Human Influence Index (HII) version 2, Center for International Earth Science Information Network (CIESIN) including nine underlying public domain data sets: World Roads (US Department of Defense National Imaging and Mapping Agency (NIMA) Vector MAP (VMAP0)), World Railroads (NIMA, VMAP0), Navigable Rivers (NIMA, VMAP0-hydropoly data set), Coastlines (NIMA, coastline data), GPW3 Population Density Data (CIESIN Gridded Population of the World version 3 Population Density Grid adjusted to match UN figures), GRUMP version 1 Urban Extent Data (CIESIN Gridded Rural-Urban Mapping Project, Urban extent dataset), DMSP Nighttime Stable Lights (US Department of Defense, Defense Meteorological Satellite Program), and Cropland Data (Center for Sustainability and Global Environment (SAGE), Navin Ramankutty), http://www.ciesin.columbia.edu/wild_areas/ (accessed January 2005).

Variable #: 11 **Code:** ANTH40

Description: **Percentage of total land area (including inland waters) having very high anthropogenic impact**

The Human Influence Index version 2 by the Center for International Earth Science Information Network (CIESIN) using 9 underlying public domain data sets. The underlying data sets are: World Roads (US Dept. of Defense National Imaging and Mapping Agency, NIMA, VMAP0), World Railroads (NIMA, VMAP0), Navigable Rivers (NIMA, VMAP0-hydropoly data set), Coastlines (NIMA, coastline data), GPW3 Population Density Data (CIESIN Gridded Population of the World v3 Population Density Grid adjusted to match UN figures), GRUMP v1 Urban Extent Data (CIESIN Gridded Rural Urban Mapping Project, Urban extent data), DMSP Nighttime Stable Lights (US Dept. of Defense, Defense Meteorological Satellite Program), and Cropland Data (SAGE Navin Ramankutty, Center for Sustainability and Global Environment), http://www.ciesin.columbia.edu/wild_areas/ (accessed January 2005).

Variable #: 12 **Code:** WQ_DO

Description: **Dissolved oxygen concentration**

United Nations Environment Programme (UNEP), Global Environmental Monitoring System/Water Quality Monitoring System, <http://www.gemswater.org/publications/index-e.html>, Organisation for Economic Co-operation and Development (OECD) Environmental Data Compendium 2002, Inland Water, 3.4A, <http://www.oecd.org/dataoecd/8/19/2958157.pdf> (accessed June 2004), European Environment Agency (EEA) Water Base: QUALITY_LAKES_EN_V4, <http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=661> (accessed June 2004), QUALITY_RIVERS_EN_V4, <http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=660> (accessed June 2004).

Additional and updated country data as follows: Belgium: Vlaamse Milieumaatschappij - Flemish Environment Agency (VMM), Rudy Vannevel, Direction Générale des Ressources Naturelles et de l'Environnement (DGRNE), Dominique Wyllock, data sent to United Nations Environment Programme - Global Environment Monitoring System/Water Division (UNEP-GEMS/Water). Finland: Finnish Environment Institute, Common Procedures for Exchange of Information (Council Decision 77/795/EEC). Japan: Ministry of the Environment, <http://www.env.go.jp/water/suiiki/index.html>. Slovak Republic: Slovak Hydrometeorological Institute, to be published in "Environment in the Slovak Republic (Selected indicators in 1999 - 2003)" by Statistical Office of the Slovak Republic. Taiwan: Environmental Protection Administration, The Statistical Yearbook of EPA, <http://www.epa.gov.tw/english/>.

Variable #: 13 **Code:** WQ_EC

Description: **Electrical conductivity**

United Nations Environment Programme (UNEP), Global Environmental Monitoring System/Water Quality Monitoring System, <http://www.gemswater.org/publications/index-e.html> (accessed June 2004), European Environment Agency (EEA) Water Base: QUALITY_LAKES_EN_V4, <http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=661> (accessed June 2004).

Additional and updated country data as follows: Belgium: Vlaamse Milieumaatschappij - Flemish Environment Agency (VMM), Rudy Vannevel, Direction Générale des Ressources Naturelles et de l'Environnement (DGRNE), Dominique Wyllock, data sent to United Nations Environment Programme - Global Environmental Monitoring System/Water Division (UNEP-GEMS/Water). Finland: Finnish Environment Institute, Common Procedures for Exchange of Information (Council Decision 77/795/EEC). Taiwan: Environmental Protection Administration, The Statistical Yearbook of EPA, <http://www.epa.gov.tw/english/>.

Variable #: 14 **Code:** WQ_PH

Description: **Phosphorus concentration**

United Nations Environment Programme (UNEP), Global Environmental Monitoring System/Water Quality Monitoring System, <http://www.gemswater.org/publications/index-e.html> (accessed June 2004), European Environment Agency (EEA) Water Base: QUALITY_LAKES_EN_V4, <http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=661> (accessed June 2004), European Environment Agency (EEA) Water Base: QUALITY_RIVERS_EN_V4, <http://dataservice.eea.eu.int/dataservice/metadetails.asp?id=660> 3 (accessed June 2004), Organisation for Economic Co-operation and Development (OECD) Environmental Data Compendium 2002, Inland Water, 3.4D, <http://www.oecd.org/dataoecd/8/19/2958157.pdf> (accessed April 2004).

Additional and updated country data as follows: Finland: Finnish Environment Institute, Common Procedures for Exchange of Information (Council Decision 77/795/EEC). Slovak Republic: Slovak Hydrometeorological Institute, to be published in "Environment in the Slovak Republic (Selected indicators in 1999 - 2003)" by Statistical Office of the Slovak Republic. Taiwan: Environmental Protection Administration (EPA), Reservoir Monitoring Database, http://alphapc.epa.gov.tw/get_river_fixed.html, http://alphapc.epa.gov.tw/get_dam_fixed.html. Zimbabwe: Harare City Health Department, Zimbabwe.

Variable #: 15 **Code:** WQ_SS

Description: **Suspended solids**

United Nations Environment Programme (UNEP), Global Environmental Monitoring System/Water Quality Monitoring System, <http://www.gemswater.org/publications/index-e.html> (accessed June 2004).

Additional and updated country data as follows: Belgium: Vlaamse Milieumaatschappij - Flemish Environment Agency (VMM), Rudy Vannevel, Direction Générale des Ressources Naturelles et de l'Environnement (DGRNE), Dominique Wyllock, data sent to United Nations Environment Programme - Global Environmental Monitoring System/Water Division (UNEP-GEMS/Water). Japan: Ministry of the Environment, <http://www.env.go.jp/water/suiiki/index.html>. Slovak Republic: Slovak Hydrometeorological Institute, to be published in "Environment in the Slovak Republic (Selected indicators in 1999 - 2003)" by Statistical Office of the Slovak Republic. Taiwan: Environmental Protection Administration, The Statistical Yearbook of EPA, <http://www.epa.gov.tw/english/>.

Variable #: 16 **Code:** WATAVL

Description: **Freshwater availability per capita**

Center for Environmental System Research, Kassel University, Water GAP 2.1e, 2004 (communication)

Variable #: 17 **Code:** GRDAVL

Description: **Internal groundwater availability per capita**

For groundwater data: Food and Agricultural Organization, United Nations, AQUASTAT database, Groundwater produced internally (cubic km/year); For population data: Population Reference Bureau, 2004 World Population Data Sheet, total mid-year population 2004, <http://www.prb.org/datafind/datafinder5.htm> (accessed December 2004); For the United States of America the substitute used is Internal Renewable Water Resources: Groundwater recharge, volume in cubic kilometers for the period 1977-2001 from FAO AQUASTAT (obtained through WRI EarthTrends portal at http://earthtrends.wri.org/searchable_db/index.cfm?step=countries&cID=190&theme=2-&variable_id=11&action=select_years (accessed December 2004).

Variable #: 18 **Code:** COALKM

Description: Coal consumption per populated land area

For coal data: United States Energy Information Agency, <http://www.eia.doe.gov/emeu/international/contents.html> (accessed January 2005);

For populated land area data: Center for International Earth Science Information Network (CIESIN) Gridded Population of the World version 3 (GPW).

Variable #: 19 **Code:** NOXKM

Description: Anthropogenic NOx emissions per populated land area

For NOx emissions data: United Nations Framework Convention on Climate Change (UNFCCC) Greenhouse Gas (GHG) emissions database, <http://ghg.unfccc.int/default1.htm?time=10%3A43%3A50+PM> (accessed April 2004), OECD Environmental Data Compendium 2002, Air and Climate, Emissions by Source, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565-1_1_1_37465,00.html (accessed October 2004), IPCC Special Report on Emissions Scenarios, Data Version 1.1 B1 Illustrative Marker Model with Model IMAGE with data for reference year 2000.

For Populated land area data: Gridded Population of the World Version 3, 2004, Center for International Earth Science Information Network (CIESIN). <http://sedac.ciesin.columbia.edu/plue/gpw/index.html?main.html&2> (2004).

Additional and updated country data as follows. Austria: United Nations Economic and Social Council Economic Commission for Europe, Convention on Long-Range Transboundary Air Pollution (UNECE-CLRTAP) - Submission 2004, <http://www.unece.org/env/lrtap/welcome.html>. Belgium: Vlaamse Milieu Maatschappij - Flemish Environment Agency, Miet D'heer. Denmark: http://europa.eu.int/comm/eurostat/newcronos/reference/display.do?screen=welcomeref&open=/envir/milieu/air&-language=en&product=EU_environment_energy&root=EU_environment_energy&scrollto=199. Estonia: http://pub.stat.ee/px-web.2001/-I_Databas/Environment/01Environmental_pressure/02Air_pollution/02Air_pollution.asp. Ireland: Environmental Protection Agency. 2002. "Environment in Focus 2002 Key Environmental Indicators for Ireland", Editors M. Lehane, O. Le Bolloch and P. Crawley, County Wexford, Environmental Protection Agency. Jordan: Ministry of Energy and Mineral Resources, Table 8.3 Estimated Quantities of NOx Emission from the Energy Usage in Different Sectors, 1996-2003. Lithuania: Statistics Lithuania, <http://www.std.lt> or Eurostat's website <http://europa.eu.int/comm/eurostat>. Mauritius: Digest of Environment Statistics, 2003, Table 3.6. Slovak Republic: Slovak Hydrometeorological Institute, Slovak Hydrometeorological Institute and Ministry of Environment, "Air quality in the Slovak Republic 2001", http://oko.shmu.sk/rocnky/SHMU_Air_pollution_in_the_SR_2001.pdf, "Statistical yearbook of the Slovak Republic 2004" and "Environment in the Slovak Republic, Selected indicators in 1999 - 2003" to be published by Statistical Office of the Slovak Republic. Taiwan: Environmental Protection Administration (EPA), Air Quality Protection Division, Taiwan, Query results from TEDS 5.1 System, Statistics Office, Environmental Protection Administration, Taipei, Taiwan. United Kingdom: Department of Environment, <http://www.defra.gov.uk/environment/statistics/airqual/download/xls/aqtb06.xls>, [http://www.defra.gov.uk/environment/statistics/airqual/download/xls/aqtb06.xls](http://www.defra.gov.uk/environment/statistics/airqual/aqnitrogen.htm), <http://www.defra.gov.uk/environment/statistics/airqual/aqnitrogen.htm> (for explanation).

Variable #: 20 **Code:** SO2KM

Description: Anthropogenic SO2 emissions per populated land area

For SO2 emissions data: United Nations Framework Convention on Climate Change (UNFCCC) Greenhouse Gas (GHG) emissions database, <http://ghg.unfccc.int/default1.htm?time=10%3A43%3A50+PM> (accessed April 2004), OECD Environmental Data Compendium 2002, Air and Climate, Emissions by Source, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565-1_1_1_37465,00.html (accessed October 2004), IPCC Special Report on Emissions Scenarios, Data Version 1.1 B1 Illustrative Marker Model with Model IMAGE with data for reference year 2000.

For Populated land area data: Gridded Population of the World Version 3, 2004, Center for International Earth Science Information Network (CIESIN). <http://sedac.ciesin.columbia.edu/plue/gpw/index.html?main.html&2> (2004).

Additional and updated country data as follows: Austria: United Nations Economic and Social Council Economic Commission for Europe, Convention on Long-Range Transboundary Air Pollution (UNECE-CLRTAP) - Submission 2004, <http://www.unece.org/env-lrtap/welcome.html>. Belgium: Vlaamse Milieu Maatschappij - Flemish Environment Agency (VMM), Miet D'heer. Ireland: Environmental Protection Agency. 2002. "Environment in Focus 2002 Key Environmental Indicators for Ireland", Editors M. Lehane, O. Le Bolloch and P. Crawley, County Wexford, Environmental Protection Agency. Mauritius: Central Statistics Office, Digest of Environment Statistics, 2003, Table 3.6. Slovak Republic: Slovak Republic: Slovak Hydrometeorological Institute, Slovak Hydrometeorological Institute and Ministry of Environment, "Air quality in the Slovak Republic 2001", http://oko.shmu.sk/rocnky/SHMU_Air_pollution_in_the_SR_2001.pdf, "Statistical yearbook of the Slovak Republic 2004" and "Environment in the Slovak Republic, Selected indicators in 1999 - 2003" to be published by Statistical Office of the Slovak Republic. Slovenia: Agencija Republike Slovenije za okolje (ARSO) - Environmental Agency of the Republic of Slovenia, "Kazalci okolja 2003" (Environmental Indicators), Editors Irena Rejec Brancelj, Urska Kusar Ljubljana, Slovenia, 2004, <http://kazalci.arso.gov.si/>. Taiwan: Query results from TEDS 5.1 System, Ms. Miou-Ru Huang, Statistics Office, Environmental Protection Administration, Taipei, Taiwan. Turkey: State Institution of Statistics, "Environmental Statistics Compendium of Turkey", January, 2003, published with MEDSTAT Programme financed by the European Union. United Kingdom: Department of Environment, <http://www.defra.gov.uk/environment/statistics/airqual/download/xls/aqtb08.xls>, [http://www.defra.gov.uk/environment/statistics/airqual/download/xls/aqtb08.xls](http://www.defra.gov.uk/environment/statistics/airqual/aqsulphurd.htm), <http://www.defra.gov.uk/environment/statistics/airqual/aqsulphurd.htm> (for explanation).

Variable #: 21 **Code:** VOCKM

Description: **Anthropogenic VOC emissions per populated land area**

For VOC emissions data: United Nations Framework Convention on Climate Change (UNFCCC) Greenhouse Gas (GHG) emissions database, <http://ghg.unfccc.int/default1.htm?time=10%3A43%3A50+PM> (accessed April 2004), OECD Environmental Data Compendium 2002, Air and Climate, Emissions by Source, http://www.oecd.org/document/21/0,2340,en_2649_37465_-2516565_1_1_1_37465,00.html. (accessed October 2004), IPCC Special Report on Emissions Scenarios, Data Version 1.1 B1 Illustrative Marker Model with Model IMAGE with data for reference year 2000.

For Populated land area data: Gridded Population of the World Version 3, 2004, Center for International Earth Science Information Network (CIESIN). <http://sedac.ciesin.columbia.edu/plue/gpw/index.html?main.html&2> (2004).

Additional and updated data as follows: Austria: United Nations Economic and Social Council Economic Commission for Europe – Convention on Long-Range Transboundary Air Pollution (UNECE-CLRTAP) - Submission 2004, <http://www.unece.org/env/lrtap/welcome.html>. Belgium: Vlaamse Milieu Maatschappij - Flemish Environment Agency (VMM), Miet D'heer. Ireland: Environmental Protection Agency. 2002. "Environment in Focus 2002 Key Environmental Indicators for Ireland", Editors M. Lehane, O. Le Bolloch and P. Crawley, County Wexford, Environmental Protection Agency. Jordan: Ministry of Energy and Mineral Resources, Table 8.5 Estimated Quantities of Non-Methane Volatile Organic Compound (NMVOC) Emission from the Energy Usage in Different Sectors, 1996-2003. Mauritius: Central Statistics Office, Digest of Environment Statistics, 2003, Table 3.6. Taiwan: Environmental Protection Administration (EPA), Taiwan, 2004, "Regulation operation plans of sectoral VOC pollutants from fixed sources", Mr. C. K. Yeh, Air Quality Protection Division, EPA. Turkey: State Institution of Statistics, "Environmental Statistics Compendium of Turkey", January, 2003, published with MEDSTAT Programme financed by the European Union. United Kingdom: Department of Environment, <http://www.defra.gov.uk/environment/statistics/airqual/download/xls/aqt16.xls>, <http://www.defra.gov.uk/environment/statistics/airqual/aqvoc.htm> (for explanation).

Variable #: 22 **Code:** CARSKM

Description: **Vehicles in use per populated land area**

For vehicles data: United Nations Statistics Division Common Database (UNCDB), http://unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp (accessed December 2004); For populated land area data: Center for International Earth Science Information Network (CIESIN) Gridded Population of the World version 3 (GPW).

Additional or updated country data as follows: Austria: Statistics Austria, Statistisches Jahrbuch Österreichs 2004 (Austrian Statistical Yearbook 2004), Table 28.04, Vienna 2003. Ireland: Environmental Protection Agency, "Environment in Focus 2002 Key Environmental Indicators for Ireland," Editors M. Lehane, O. Le Bolloch and P. Crawley, County Wexford. Italy: Automobili Club d'Italia, http://www.aci.it/wps/portal/cmd/cs/ce/155/s/1104/_s.155/1104. Jordan: Jordan Traffic Department, Table 7.3 Number of Registered Vehicles by Type of Vehicle and Center of Registration, 2003. Lithuania: Statistics Lithuania, <http://www.std.lt>. Mauritius: Digest of Road Transport & Road Accident Statistics, 2003, Table 1.2. Philippines: Philippine Economic-Environmental and Natural Resources Accounting (PEENRA), <http://www.nscb.gov.ph/peenra>. Taiwan: Ministry of Transportation and Communication, <http://www.motc.gov.tw/hypage.cgi?HYPAGE=stat01.asp>. United Arab Emirates: Ministry of Interior, Annual Statistical Report. Zimbabwe: Central Statistical Office, Motor Vehicle Report.

Variable #: 23 **Code:** FOREST

Description: **Annual average forest cover change rate from 1990 to 2000**

United Nations Food and Agriculture Organization (FAO) Forest resources assessment (FRA) 2000, <http://www.fao.org/forestry/fo/-fra/index.jsp> (accessed December 2004).

Variable #: 24 **Code:** ACEXC

Description: **Acidification exceedance from anthropogenic sulfur deposition**

Stockholm Environment Institute at York, Acidification in Developing Countries: Ecosystem Sensitivity and the Critical Loads Approach at the Global Scale, 2000, available in pdf at <http://www.york.ac.uk/inst/sei/pubs/globalassess.pdf> (accessed January 2005).

Variable #: 25 **Code:** GR2050

Description: **Percentage change in projected population 2004-2050**

Population Reference Bureau (PRB). 2004 World Population Data Sheet. <http://www.prb.org/datafind/datafinder5.htm> (accessed December 2004).

Variable #: 26 **Code:** TFR

Description: **Total Fertility Rate**

Population Reference Bureau (PRB), 2004 World Population Data Sheet, <http://www.prb.org/datafind/datafinder5.htm> (accessed January 2005).

Variable #: 27 **Code:** EFPC

Description: **Ecological Footprint per capita**

Primary source: Redefining Progress Ecological Footprint of Nations 2004, <http://www.redefiningprogress.org/newpubs/index.shtml> (accessed January 2005).

Additional country data as follows: Afghanistan, Niger, Somalia, Togo, Uzbekistan, Yemen: The World Wildlife Fund (WWF), Living Planet Report 2002, <http://www.wwf.org.uk/filelibrary/pdf/livingplanet2002.pdf> (accessed January 2005). Taiwan: Lee, Y.J. and A.C. Chen. 1998. Examining sustainable development of Taiwan in terms of ecological footprints. Review in Economic and Social Institutions, 22, pp. 437-458, published in Chinese by the Council for Economic Planning.

Variable #: 28 **Code:** RECYCLE

Description: **Waste recycling rates**

Organisation for Economic Co-operation and Development (OECD) Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_1_1_1_37465,00.html (accessed October 2004), and United Nations Human Settlement Programme (UNHABITAT) Global Urban Indicators Database 1998, http://www.unhabitat.org/programmes/guo/guo_indicators.asp (accessed December 2003).

Additional and updated country data as follows. Taiwan: Environmental Protection Administration (EPA), Taiwan, <http://210.69.101.88/WEBSTATIS/webindex.htm>.

Variable #: 29 **Code:** HAZWST

Description: **Generation of hazardous waste**

United Nations Environment Program, Secretariat of the Basel Convention for 1992-2000 data, "Global Trends in Generation and Transboundary Movements of Hazardous Wastes and Other wastes", Appendix 4, <http://www.basel.int/natreporting/trends2.pdf> (accessed November 2004), Secretariat of the Basel Convention, Data as Reported by Parties, <http://geodata.grid.unep.ch> for 2001 (accessed November 2004), Organisation for Economic Co-operation and Development (OECD) Environmental Data Compendium 2002, http://www.oecd.org/document/21/0,2340,en_2649_37465_2516565_119656_1_1_37465,00.html (accessed July 2004).

Additional and updated country data as follows: Austria: Umweltbundesamt (Federal Environment Agency), <http://www.umweltbundesamt.at>. Estonia: Statistical Office of Estonia, http://pub.stat.ee/px-web.2001/1_Databas/Environment/-01Environmental_pressure/06Generation_of_waste/06Generation_of_waste.asp. Lithuania: Ministry of Environment of the Republic of Lithuania, "State of Environment 2002", <http://www.am.lt>. Poland: National Fund for Environmental Protection and Water Management by order of the Polish Minister of Environment, "Environmental Statistics in Poland 2004", Environmental Inspection Data. Slovenia: Agencija Republike Slovenije za okolje (ARSO) - Environmental Agency of the Republic of Slovenia, "Kazalci okolja 2003" (Environmental Indicators), Editors Irena Rejec Brancelj, Urška Kušar Ljubljana, Slovenia, 2004, <http://kazalci.arso.gov.si/>. Taiwan: Industrial Waste Management Center, Environmental Protection Agency, Taiwan, http://waste.epa.gov.tw/prog/statistics_file/country_wide_waste/waste_wallchart-0412_s.files/sheet002.htm, Declaration Website for Hazardous and Non-hazardous Wastes, <http://waste.epa.gov.tw/prog/unit5.htm>. Turkey: Turkey State Institute of Statistics, sent to EUROSTAT by OECD/EUROSTAT joint questionnaires, 2004. United Arab Emirates: Federal Environment Agency, Annual Report 2003, Abu Dhabi National Oil Company (ADNOC), Environmental Research and Wildlife Development Agency (ERWDA), "Hazardous Waste Generation".

Variable #: 30 **Code:** BODWAT

Description: **Industrial organic water pollutant (BOD) emissions per available**

For BOD emissions data: World Bank Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/>; For water availability data: Center for Environmental Systems Research, University of Kassel, WATERGAP version 2.1 (communication).

For population data: World Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/> (accessed December 2004). Additional or updated country data as follows: Taiwan: Environmental Protection Administration (EPA), Taiwan, Statistical Manual for Environmental Protection, Table 3-6, September 2004.

Variable #: 31 **Code:** FERTHA

Description: **Fertilizer consumption per hectare of arable land**

World Bank World Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/> (accessed December 2004). Additional or updated country data as follows. Austria: Federal Ministry of Agriculture, Forestry, Environment and Water Management, "Grüner Bericht 2004" (Green Report 2004, report on the situation of the Austrian agriculture and forestry in 2003), page 198, table 4.8; http://www.gruener-bericht.at/2004/components/com_docman/dl2.php?archive=0&file=MTYxX3RhYmVsbGVudGVpbF9taXRfaW5oYX0c3ZlcnplaWNobmlzLnBkZg== (page 38 of 112). Belgium: Institut National de Statistiques - National Institute of Statistics (INS), <http://statbel.fgov.be>. Ireland: Environmental Protection Agency, "Environment in Focus 2002: Key Environmental Indicators for Ireland, Editors M Lehané, O Le Bolloch and P Crawley, County Wexford, Ireland, www.epa.ie. Mauritius: Central Statistics Office, data on consumption of fertilizers and utilization of agricultural area, Digest of Environment Statistics, 2003, Table 5.6 and 5.2 respectively. Slovak Republic: For Fertilizer data, Statistical Office of Slovak Republic, For Land Use data, Office of Geodesy, Cartography and Land register of the Slovak Republic. Published in "Statistical yearbook of the Slovak Republic 2003" and "Environment in the Slovak Republic (Selected indicators in 1998 - 2002)" by Statistical Office of the Slovak Republic. Taiwan: The Agricultural Council, Taiwan, Fertilizer consumption, <http://www.coa.gov.tw/file/10/195/207/1162/328.xls>, Farming area, <http://www.coa.gov.tw/file/10/195/207/1162/285.xls>. United Arab Emirates: Ministry of Agriculture and Fisheries, Annual Reports 2002 and 2003.

Variable #: 32 **Code:** PESTHA

Description: **Pesticide consumption per hectare of arable land**

Food and Agricultural Organisation (FAO), United Nations, FAOSTAT online database accessed from World Resources Institute (WRI) Earthtrends 2004, Agriculture and Food - Agricultural Inputs, http://earthtrends.wri.org/searchable_db/index.cfm?theme=8 (accessed December 2004).

Additional and updated country data as follows Albania: Ministry of Environment, Albania. Austria: Federal Ministry of Agriculture, Forestry, Environment and Water Management, "Grüner Bericht 2004" (Green Report 2004, report on the situation of the Austrian agriculture and forestry in 2003, page 198, table 4.6, Vienna 2004, http://www.gruener-bericht.at/2004/components/com_docman/dl2.php?archive=0&file=MTYxX3RhYmVsbGVudGVpbF9taXRfaW5oYX0c3ZlcnplaWNobmlzLnBkZg== (page 37 of 112). Belgium: CEEW - DGRNE (Cellule Etat de l'environnement wallon - Direction générale des ressources naturelles et de l'environnement, Walloon State of the Environment Cell - Directorate-General for Natural Resources and the Environment), V. Brahy, Report by the Ministère des classes moyennes et de l'agriculture (Ministry of Small Enterprises, Traders and Agriculture), "Use of phytopharmaceutical products in the main crops in Belgium during the decade 1991 – 2000". <http://statbel.fgov.be>. Italy: Istituto Nazionale di Statistica (Istat, National Institute of Statistics), Statistiche dell'agricoltura, vari anni, and Istat, Statistiche Ambientali, Annuario n. 7, 2002, <http://istat.it/>, http://catalogo.istat.it/20031029_01/. Republic of Korea: Food and Agriculture Organization of the United Nations (FAO), 2004, FAOSTAT on-line statistical service, Rome, <http://apps.fao.org>. Mauritius: Central Statistics Office, Digest of Environment Statistics, 2003 (Table 5.5). Poland: Polish Ministry of the Environment, "Environmental Statistics in Poland 2004", pg 30. Slovak Republic: Pesticide usage data: Ministry of Agriculture of the Slovak Republic, Central Control and Testing Institute of the Slovak Republic, Land Use data: Office of Geodesy, Cartography and Land register of the Slovak Republic. To be published in "Statistical yearbook of the Slovak Republic 2004" and "Environment in the Slovak Republic, Selected indicators in 1999 - 2003" by Statistical Office of the Slovak Republic. Slovenia: Statistical Office of the Republic of Slovenia, Statistical Yearbook, http://www.stat.si/letopis/index_vsebinska.asp?poglavje=16&leto=2003&jezik=en. Taiwan: The Agricultural Council, Taiwan, Pesticide consumption data, <http://www.coa.gov.tw/program/pesticides/statistic/statistic.htm>, Farming area data, <http://www.coa.gov.tw/8/195/202/894/894.html>. United Arab Emirates: Ministry of Agriculture and Fisheries, Annual Reports 2002 and 2003.

Variable #: 33 **Code:** WATSTR

Description: **Percentage of country under severe water stress**

Center for Environmental Systems Research, University of Kassel, WaterGap 2.1, 2000 (communication).

Variable #: 34 **Code:** OVRFSH

Description: **Productivity overfishing**

South Pacific Applied Geoscience Commission (SOPAC), Environmental Vulnerability Index, Indicator 34 -- Productivity overfishing.

For Fisheries data: Food and Agriculture Organization (FAO), United Nations, 1993-1998.

For Productivity data: University of British Columbia.

Variable #: 35 **Code:** FORCERT

Description: **Percentage of total forest area that is certified for sustainable management**

For certifications: The Forest Stewardship Council, URL: http://www.fsc.org/fsc/whats_new/documents/Docs_cent/4 (accessed December 2004) for FSC certified forest area and the Pan-European Forest Certification Council, <http://www.pefc.cz/register/statistics.asp> (accessed December 2004);

For Total forest area: World Resources Institute for Total Forest Area, URL: http://earthtrends.wri.org/searchable_db/index.cfm?-theme=9&variable_ID=296&action=select_countries (accessed January 2005).

Variable #: 36 **Code:** WEFSUB

Description: **World Economic Forum Survey on subsidies**

World Economic Forum (WEF) Survey, The Global Competitiveness Report 2003-2004, Porter, Michael E. et al, Oxford University Press, 2003-2004, <http://www.weforum.org/site/knowledgenavigator.nsf/Content/KB+Country+Profiles> (accessed January 2005).

Variable #: 37 **Code:** IRRSAL

Description: **Salinized area due to irrigation as percentage of total arable land**

United Nations Food and Agricultural Organization (FAO), <http://www.fao.org/> and also http://www.fao.org/documents/-show_cdr.asp?url_file=DOCREP/005/Y4263E/y4263e04.htm (accessed January 2005).

Variable #: 38 **Code:** AGSUB

Description: **Agricultural subsidies**

For producer support estimates (PSE) data: Organisation for Economic Co-operation and Development (OECD); OECD Producer Support Estimates for 2001 as a percentage of agricultural GDP and data for China and India were provided by John Finn (World Trade Organization);

For share of agricultural production of EU15 of total EU agricultural production: European Commission, Directorate General Agriculture, Agricultural Situation in the EU 2003; For currency exchange rates data: World Bank, World Development Indicators (WDI) 2004, <http://www.worldbank.org/data/wdi2004/> (accessed December 2004); For conversion of ECU into USD: <http://www.x-rates.com/d/USD/EUR/hist1999> (accessed December 2004).

Variable #: 39 **Code:** DISINT

Description: **Death rate from intestinal infectious diseases**

World Health Organization (WHO), Mortality databases for International Classification of Deaths (ICD) revisions 9 and 10, July 2000 <http://www3.who.int/whosis/menu.cfm?path=mort> (accessed January 2005).

Variable #: 40 **Code:** DISRES

Description: **Child death rate from respiratory diseases**

World Health Organization (WHO), Mortality databases for International Classification of Deaths (ICD) revisions 9 and 10, July 2004, <http://www3.who.int/whosis/menu.cfm?path=mort> (accessed January 2005).

Variable #: 41 **Code:** U5MORT

Description: **Children under five mortality rate per 1,000 live births**

United Nations Statistics Division (UNSD), Demographic Yearbook Database, primary data source: UNICEF, <http://unstats.un.org/unsd/demographic/default.htm> (accessed January 2005).

Additional and updated data as follows: Australia: Australian Bureau of Statistics, Births, Australia 2002 (cat. No. 3301.0), Deaths, Australia (cat. No. 3302.0). Austria: Statistics Austria. Costa Rica: Instituto Nacional de Estadística y Censos 2004, "Estadísticas Vitales del 2003", based on CIE-10 (Clasificación Internacional de Enfermedades y Problemas Relacionados con la Salud, X revisión, volumen I, Organización Panamericana de la Salud y Organización Mundial de la Salud, <http://www.inec.go.cr>). Lithuania: Statistics Lithuania, Eurostat. Mauritius: Ministry of Public Utilities, Statistics Unit. New Zealand: Statistics New Zealand, <http://www.stats.govt.nz/datasets/a-z-list.htm>. Poland: Central Statistical Office Dissemination information, Polish Census 2002. Taiwan: Department of Health, <http://www.doh.gov.tw/EN/Webpage/index.aspx>, Table 10. Number of deaths classified according to the basic tabulation list of death by sex and age, Taiwan Area, 2002, Age Composition of Population, Taiwan Area, <http://www.doh.gov.tw/-static/data/生命統計/91/02.XLS>. United Arab Emirates: Ministry of Health, Annual Statistical Report, 2003 and Annual Report of Preventive Medicine, 2003.

Variable #: 42 **Code:** UND_NO

Description: **Percentage of undernourished in total population**

United Nations Food and Agriculture Organization (FAO), The State of Food Insecurity in the World 2003 Report, <http://www.fao.org/docrep/006/j0083e/j0083e00.htm> (accessed January 2005).

Variable #: 43 **Code:** WATSUP

Description: **Percentage of population with access to improved drinking water source**

World Health Organization, United Nations Children's Fund, WHO/UNICEF Joint Monitoring Programme on Water Supply and Sanitation (JMP), http://www.who.int/water_sanitation_health/monitoring/jmp2004/en/ (accessed January 2005).

Additional and updated data as follows: Belgium: Institut National de Statistiques - National Institute of Statistics (INS), <http://statbel.fgov.be>, officially reported to Eurostat in 2003. Ireland: Central Statistics Office, Social Statistics Integration, Dublin. Italy: Istituto Nazionale di Statistica (Istat - National Institute of Statistics), "13° Censimento Generale della Popolazione, 1991". Taiwan: United Nations Statistical Division, http://unstats.un.org/unsd/mi/mi_goals.asp. United Arab Emirates: Ministry of Electricity

Variable #: 44 **Code:** DISCAS

Description: **Average number of deaths per million inhabitants from floods, tropical cyclones, and droughts**

United Nations Development Programme (UNDP) Bureau for Crisis Prevention and Recovery, A Global Report on Reducing Disaster Risk - A Challenge for Development, UNDP 2004, available at <http://www.undp.org/bcpr/disred/rdr.htm> (accessed January 2005).

Variable #: 45 **Code:** DISEXP

Description: **Environmental Hazard Exposure Index**

The World Bank, Natural Disaster Hotspots: A Global Risk Analysis, Maxx Dille, Robert Chen, Uwe Deichmann, Arthur L. Lerner-Lam and Margaret Arnold with Jonathan Agwe, Piet Buys, Oddvar Kjekstad, Bradfield Lyon and Greg Yetman, 2005, Washington DC, see also <http://iri.columbia.edu/impact/project/RiskHotspot/> (accessed January 2005).

Variable #: 46 **Code:** GASPR

Description: **Ratio of gasoline price to world average**

World Bank, World Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/>.

Additional and updated country data as follows: Mauritius: Digest of Road Transport & Road Accident Statistics, 2003, Table 3.1. Taiwan: US Energy Information Administration (EIA), <http://www.eia.doe.gov/emeu/international/petroleu.html#GasolinePrices>.

Variable #: 47 **Code:** GRAFT

Description: **Corruption measure**

World Bank, Governance Indicators: 1996-2002, <http://www.worldbank.org/wbi/governance/govdata2002/index.html> (accessed December 2004).

Variable #: 48 **Code:** GOVEFF

Description: **Government effectiveness**

World Bank, <http://www.worldbank.org/wbi/governance/govdata2002/index.html> (accessed January 2005).

Variable #: 49 **Code:** PRAREA

Description: **Percentage of total land area under protected status**

United Nations Environment Program - World Conservation Monitoring Centre (UNEP-WCMC), World Database on Protected Areas (WDPA) Version 6, World Database on Protected Areas Consortium, Cambridge, U.K., August, 2003, accessed through the World Resources Institute (WRI) <http://earthtrends.wri.org/> (accessed December 2003).

Additional and updated country data as follows: Belgium: Royal Belgian Institute of Natural Sciences (RBINS), Marianne Schlesser, <http://bch-cbd.naturalsciences.be/>. Costa Rica: Sistema Nacional de Áreas Protegidas (SINAC) - Ministerio de Ambiente y Energía (MINAE), <http://www.sinac.go.cr/asp/index.html>. United Arab Emirates: Federal Environment Agency Ministry of Economy and Planning, "Survey of Protected Areas in United Arab Emirates".

Variable #: 50 **Code:** WEFGOV

Description: **World Economic Forum Survey on environmental governance**

World Economic Forum (WEF) Survey, The Global Competitiveness Report 2003-2004, Porter, Michael E. et al, Oxford University Press, 2003-2004, <http://www.weforum.org/site/knowledgenavigator.nsf/Content/KB+Country+Profiles> (accessed January 2005).

Variable #: 51 **Code:** LAW

Description: **Rule of law**

World Bank, <http://www.worldbank.org/wbi/governance/govdata2002/index.html> (accessed January 2005).

Variable #: 52 **Code:** AGENDA21

Description: **Local Agenda 21 initiatives per million people**

For initiatives data: International Council for Local Environmental Initiatives (ICLEI), 2001, Second Local Agenda 21 Survey, Background Paper Number 15, New York, United Nations Department of Economic and Social Affairs (UNDESA), available at <http://www.johannesburgsummit.org/html/documents/backgrounddocs/icleisurvey2.pdf> (accessed January 2005).

For population data: World Bank, World Development Indicators (WDI) 2004, <http://www.worldbank.org/data/wdi2004/>.

Variable #: 53 **Code:** CIVLIB

Description: **Civil and Political Liberties**

Freedom House, Freedom in the World, available in pdf at <http://www.freedomhouse.org/research/freeworld/2003/averages.pdf> (accessed January 2005).

Variable #: 54 **Code:** CSDMIS

Description: **Percentage of variables missing from the CGSDI "Rio to Joburg Dashboard"**

Consultative Group on Sustainable Development Indicators, Dashboard of Sustainability, "Rio to Joburg Dashboard," 2002, <http://www.iisd.org/cgsdi/dashboard.asp> (accessed January 2005), and Jochen Jesinghaus, personal communication, 9 January 2002.

Variable #: 55 **Code:** IUCN

Description: **IUCN member organizations per million population**

For membership data: IUCN-The World Conservation Union, <http://www.iucn.org/members/Mem%20Statistics.htm> (accessed January 2005);

For population data: World Bank, World Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/> (accessed

Variable #: 56 **Code:** KNWLDG

Description: **Knowledge creation in environmental science, technology, and policy**

Index based on data from Yale Center for Environmental Law and Policy, Knowledge Divide Project (Dr. Sylvia Karlsson, Tanja Srebotnjak, Patricia Gonzalez).

For covariates data: Research and Development (R&D) spending as % of GDP, Researchers per million people: World Bank, World Development Indicators 2003, <http://www.worldbank.org/data/wdi2003/> (accessed January 2005), United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute of Statistics for selected R&D indicators, May 2004, http://www.uis.unesco.org/ev.php?ID=5180_201&ID2=DO_TOPIC (accessed January 2005); For GDP data: United Nations Statistics Division, Common Database, 2001 current GDP in USD, http://unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp (accessed January 2005); For Population data: World Bank, World Development Indicators 2003, <http://www.worldbank.org/data/wdi2003/> (accessed January 2005).

Additional or updated country data as follows: Taiwan: Researchers per million inhabitants are based on figures from National Statistics Taiwan, the Republic of China, at <http://www.dgbas.gov.tw/census-n/four/e4423.htm> (accessed December 2004) using a rough factor of 1 in 10 professionals, scientific and technical services personnel is a researcher, R&D spending as percent of GDP, Taiwan Headlines citing data from the Directorate-General of Budget, Accounting & Statistics (DGBAS), <http://www.taiwanheadlines.gov.tw/-20030402/20030402b3.html> (accessed December 2004).

Variable #: 57 **Code:** POLITY

Description: **Democracy measure**

Polity IV Project "Political Regime Characteristics and Transitions", 1800-2002, Monty Marshall, University of Maryland, 2004, <http://www.cidcm.umd.edu/inscr/polity/> (accessed January 2005).

Variable #: 58 **Code:** ENEFF

Description: **Energy efficiency**

For energy consumption data: US Energy Information Agency (EIA), <http://www.eia.doe.gov/emeu/iea/wecbtu.html> (accessed January 2005).

For GDP data: World Bank, World Development Indicators 2004, GDP in PPP, <http://www.worldbank.org/data/wdi2004/> (accessed December 2004).

Additional country data as follows: Taiwan: US Energy Information Administration (EIA), E.1g World Energy Intensity (Total Primary Energy Consumption, Per Dollar of Gross Domestic Product), 1980-2002, <http://www.eia.doe.gov/pub/international/iealf/tablee1.xls>, B.2 World Gross Domestic Product at Market Exchange Rates, 1980-2002, <http://www.eia.doe.gov/pub/international/iealf/tableb2.xls>.

Variable #: 59 **Code:** RENPC

Description: **Hydropower and renewable energy production as a percentage of total energy consumption**

US Energy Information Agency, <http://www.eia.doe.gov/emeu/iea/wecbtu.html> (accessed January 2005).

Additional and updated country data as follows: Austria: Statistics Austria, for renewable energy, http://www.statistik.at/fachbereich_energie/neue_tab.shtml, for gross inland consumption, http://www.statistik.at/fachbereich_energie/gesamt_tab.shtml. Ireland: Sustainable Energy Ireland, National Energy Balances, www.sei.ie. Lithuania: Statistics Lithuania, Statistical Yearbook of Lithuania 2003. Mauritius: Central Statistics Office, Digest of Energy and Water Statistics, 2003, Table 4.1 and Table 3.3.

Variable #: 60 **Code:** DJSJI

Description: **Dow Jones Sustainability Group Index (DJSJI)**

Dow Jones SAM Sustainability Group, http://www.sustainability-index.com/html/djsi_world/members.html (accessed January 2005) and communication.

Variable #: 61 **Code:** ECOVAL

Description: **Average InnoVest EcoValue rating of firms headquartered in a country**

InnoVest Strategic Value Advisors, <http://www.innoVestgroup.com> (communication).

Variable #: 62 **Code:** ISO14

Description: **Number of ISO 14001 certified companies per billion dollars GDP (PPP)**

For ISO14000/EMAS registered companies: Reinhard Peglau, c/o Federal Environmental Agency, Germany, <http://www.ecology.or.jp/isoworld/english/analy14k.htm> (accessed December 2004).

For GDP (PPP) data: World Bank World Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/> (accessed November 2004), UNSD Common Database, GDP at market prices, current prices, US\$ (UN Estimates) for Andorra, Brunei Darussalam, Liechtenstein, Monaco, Myanmar, Puerto Rico, and Qatar, http://unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp (accessed January 2005).

Variable #: 63 **Code:** WEFPRI

Description: **World Economic Forum Survey on private sector environmental**

World Economic Forum (WEF) Survey, The Global Competitiveness Report 2003-2004, Porter, Michael E. et al, Oxford University Press, 2003-2004, <http://www.weforum.org/site/knowledgenavigator.nsf/Content/KB+Country+Profiles> (accessed January 2005).

Variable #: 64 **Code:** RESCARE

Description: **Participation in the Responsible Care Program of the Chemical Manufacturer's Association**

International Council of Chemical Associations (ICCA), Responsible Care Status Report 2002, Appendix 4, <http://www.icca-chem.org/pdf/icca004.pdf> (accessed January 2005).

Variable #: 65 **Code:** INNOV

Description: **Innovation Index**

World Economic Forum, 2003-2004 Global Competitiveness Report, <http://www.weforum.org/site/homepublic.nsf/Content/-Global+Competitiveness+Programme%5CGlobal+Competitiveness+Report> (accessed January 2005).

Variable #: 66 **Code:** DAI

Description: **Digital Access Index**

Digital Access Index (DAI) of the International Telecommunication Union (ITU), <http://www.itu.int/ITU-D/ict/dai/> (accessed December 2004)

Variable #: 67 **Code:** PECR

Description: **Female primary education completion rate**

United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for Statistics. Global Education Digest 2004 - Comparing Education Statistics Across the World. Montreal, 2004 accessed from the UNSD Millennium Indicator Database, http://millenniumindicators.un.org/unsd/mi/mi_series_xrxx.asp?row_id=745 (accessed January 2005), and the World Bank World Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/> (accessed January 2005).

Additional and updated country data as follows: Albania: Albanian Institute of Statistics, Annual Statistical Report of Education 2002-2003. Austria: Statistics Austria. Italy: Ministero dell'Istruzione, dell'Università e della Ricerca, <http://www.miur.it/>; and Istat Rapporto Annuale, 2003, <http://www.istat.it/>. Lithuania: Statistics Lithuania, <http://www.std.lt> or Eurostat's website <http://europa.eu.int/comm/eurostat>. Mauritius: Digest of Educational Statistics, 2003, Table 3.22, <http://statsmauritius.gov.mu/hs/edu/hs.htm>. Nepal: Central Bureau of Statistics, Nepal, Population Census 2001. Taiwan: Directorate General of Budget Accounting and Statistics, Socio-Economic Data of Taiwan, <http://www.dgbase.gov.tw/dgbas03/bs2/gender/n9111.htm>. United Arab Emirates: Ministry of Education & Youth, Annual Statistical Report 2003. Zimbabwe: Central Statistical Office, Education Statistics in Zimbabwe.

Variable #: 68 **Code:** ENROL

Description: **Gross tertiary enrollment rate**

United Nations Educational, Scientific and Cultural Organization Institute for Statistics (UNESCO-UIS), http://www.uis.unesco.org/ev.php?URL_ID=5187&URL_DO=DO_TOPIC&URL_SECTION=201 (accessed January 2004).

Additional or updated country data as follows: Albania: Albanian Institute of Statistics, Annual Statistical report of Education 2002-2003. Austria: Statistics Austria, EU data collection (common data collection of UNESCO, OECD and EUROSTAT), school and university statistics. Finland: Statistics Finland, Statistical Yearbook 2003. Italy: Ministero dell'Istruzione, dell'Università e della Ricerca, <http://www.miur.it/> and Istat "Università e Lavoro," <http://www.istat.it/DATI/unilav2004/index.html>. Lithuania: Statistics Lithuania, various publications at <http://www.std.lt> or <http://europa.eu.int/comm/eurostat>. Mauritius: Central Statistics Office, "Participation tertiary education/ Tertiary Education Commission, 2003". Taiwan: Ministry of Education, Taiwan, The international comparative indices for education, http://www.edu.tw/EDU_WEB/EDU_MGT/STATISTICS/EDU7220001/temp1/oview.view.files/frame.htm?open. United Arab Emirates: Ministry of Education & Youth, Annual Statistical Report 2003. Zimbabwe: Central Statistical Office 2003, Zimbabwe.

Variable #: 69 **Code:** RESEARCH

Description: **Number of researchers per million inhabitants**

United Nations Economic, Scientific and Cultural Organization (UNESCO), Institute for Statistics, http://www.uis.unesco.org/ev.php?ID=5180_201&ID2=DO_TOPIC (accessed January 2005). Data on Researchers per million inhabitants for Taiwan are based on figures from National Statistics Taiwan, the Republic of China, at <http://www.dgbas.gov.tw/census-n/four/e4423.htm> (accessed 30 December 2004) using a rough factor of 1 in 10 professionals, scientific and technical services personnel is a researcher.

Variable #: 70 **Code:** EIONUM

Description: **Number of memberships in environmental intergovernmental organizations**

Yearbook of International Organizations 2003/04. Electronic access by subscription through Union of International Associations, <http://db.uia.org/scripts/sweb.dll/a?DD=OR> (accessed January 2005). List of environmental intergovernmental organizations available at <http://www.yale.edu/envirocenter/esifaq.htm>.

Additional or updated country data as follows: Republic of Korea: Ministry of the Environment, Policy Coordination Division.

Variable #: 71 **Code:** FUNDING

Description: **Contribution to international and bilateral funding of environmental projects and development aid**

For aid data: Global Environmental Facility (GEF) contributions and receipts and Organisation for Economic Co-operation and Development (OECD) bilateral environmental aid;

For ancillary economic data (GNI, PPP, USD current income): World Bank, World Development Indicators 2004, <http://www.worldbank.org/data/wdi2004/> (accessed November 2004);

For population data: CIA World Factbook, <http://www.cia.gov/cia/publications/factbook/> (accessed November 2004).

Variable #: 72 **Code:** PARTICIP

Description: **Participation in international environmental agreements**

Membership information, national communications, and initiatives related to the following conventions: United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, <http://www.unfccc.org> (accessed October 2004), Vienna Convention on the Protection of the Ozone Layer and Montreal Protocol with amendments, http://www.unep.org/ozone/Treaties_and_Ratification/-2A_vienna%20convention.asp (accessed October 2004), Convention on the Trade in Endangered Species (CITES), <http://www.cites.org> (accessed October 2004), Basel Convention on the Transboundary Movement of Hazardous Waste, <http://www.basel.int> (accessed October 2004), United Nations Convention to Combat Desertification (UNCCD), <http://www.unccd.int> (accessed October 2004), United Nations Convention on Biological Diversity, <http://www.biodiv.org> (accessed October 2004), and The Ramsar Convention on Wetlands and the Cartagena Protocol <http://www.ramsar.org/> (accessed October 2004).

Variable #: 73 **Code:** CO2GDP

Description: **Carbon emissions per million US dollars GDP**

For CO2 emission data: Carbon Dioxide Information Analysis Center (CDIAC), http://cdiac.esd.ornl.gov/trends/emis/tre_coun.htm (accessed January 2005);

For GDP data: World Bank World Development Indicators 2004, GDP in constant 1995 US dollars, <http://www.worldbank.org/data/wdi2004/> (accessed December 2004). Alternative GDP data as follows: Peoples Republic of Korea: from United Nations Statistics Division Common Database (UNCDB), GDP at market prices, current prices, USD for 2000 (UN Estimates), http://unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp (accessed December 2004), Cuba, Libya, and Myanmar: CIA World Fact Book 2004 GDP USD (PPP), <http://www.cia.gov/cia/publications/factbook/> (accessed December 2004).

Additional or updated country data as follows: Taiwan: CO2 data from CDIAC, <http://cdiac.esd.ornl.gov/ftp/ndp030/nation00.ems>, GDP data from US Energy Information Administration (EIA), B.2 World Gross Domestic Product at Market Exchange Rates, 1980-2002, <http://www.eia.doe.gov/pub/international/iealf/tableb2.xls> (in constant 1995 USD).

Variable #: 74 **Code:** CO2PC

Description: **Carbon emissions per capita**

Carbon emissions per capita: United Nations Statistics Division, Millennium Indicator Database, based on data from United Nations Framework Convention on Climate Change-United Nations Department of Economic and Social Affairs (UNFCCC-UNDESA), http://unstats.un.org/unsd/mi/mi_goals.asp (accessed January 2005).

Additional or updated country data as follows: Taiwan: CO2 data from Carbon Dioxide Information Analysis Center (CDIAC), <http://cdiac.esd.ornl.gov/ftp/ndp030/nation00.ems>, Population data from Ministry of the Interior, Taiwan Population Database, <http://www.ris.gov.tw/ch4/static/st20-1.xls>. Slovenia: CO2 and Population data from, UNFCCC, National Inventory Report.

Variable #: 75 **Code:** SO2EXP

Description: **SO2 Exports**

The Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe Meteorological Synthesizing Centre West Status Report (EMEP_MSC-W) 2003, ISSN 0804-2446, <http://webdab.emep.int/> (accessed January 2005), and US Committee for the International Institute for Applied Systems Analysis (IIASA) Regional Air Pollution Information and Simulation Europe (IIASA_RAINS_Europe), <http://www.iiasa.ac.at/rains/Rains-online.html?sb=8> (accessed January 2005) and IIASA RAINS-Asia data from the 2002 ESI.

Variable #: 76 **Code:** POLEXP

Description: **Import of polluting goods and raw materials as percentage of total imports of goods and services**

United Nations Commodity Trade Statistics database (COMTRADE), Department of Economic and Social Affairs/ Statistics Division, available online at <http://unstats.un.org/unsd/comtrade/> (accessed December 2004), World Bank World Development Indicators 2004 for Total Imports of Goods and Services in current 2002 USD.

2005 Environmental Sustainability Index

Benchmarking National Environmental Stewardship

Appendix D Component and Indicator Tables

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Component and Indicator Scores

This section provides tables that rank the 146 countries contained in the ESI according to the five components and the twenty-one indicators. These tables provide a more detailed view into comparative country positions than the overall ESI score.

The component scores are presented as standard normal percentiles, ranging from a theoretical low of 0 to a theoretical high of 100. The indicator scores are presented as averages of the constituent variable values. These variable values, as described in Appendix A, are in the form of z-scores, with

zero indicating the mean, +1 and -1 representing one standard deviation above and below the mean, +2 and -2 representing two standard deviations above and below the mean, and so on. In a “normal,” bell-shaped distribution 68 percent of the scores fall within one standard deviation of the mean, 95 percent within two standard deviations, and 99.7 percent within three standard deviations. The actual distributions vary among the ESI indicators and variables.

The tables appear in the following sequence (related indicators are grouped together):

Component:	Environmental Systems
Component:	Reducing Environmental Stresses
Component:	Reducing Human Vulnerability
Component:	Social and Institutional Capacity
Component:	Global Stewardship
Indicator:	Air Quality
Indicator:	Water Quantity
Indicator:	Water Quality
Indicator:	Biodiversity
Indicator:	Land
Indicator:	Reducing Air Pollution
Indicator:	Reducing Water Stress
Indicator:	Natural Resource Management
Indicator:	Reducing Ecosystem Stresses
Indicator:	Reducing Waste and Consumption Pressures
Indicator:	Reducing Population Growth
Indicator:	Basic Human Sustenance
Indicator:	Reducing Environment-Related Natural Disaster Vulnerability
Indicator:	Environmental Health
Indicator:	Science and Technology
Indicator:	Environmental Governance
Indicator:	Private Sector Responsiveness
Indicator:	Eco-Efficiency
Indicator:	Participation in International Collaborative Efforts
Indicator:	Greenhouse Gas Emissions
Indicator:	Reducing Transboundary Environmental Pressures

Component: Environmental Systems

1 Guyana	90.4	50 Kyrgyzstan	54.5	99 Mexico	40.5
2 Iceland	88.4	51 Armenia	54.4	100 Denmark	40.5
3 Gabon	85.9	52 Chile	54.3	101 Benin	40.4
4 Canada	85.0	53 Ireland	54.3	102 Georgia	39.5
5 Congo	84.0	54 Bhutan	54.2	103 Cuba	39.3
6 Norway	82.1	55 Costa Rica	54.2	104 Nepal	39.2
7 Bolivia	80.1	56 Niger	53.6	105 Germany	39.1
8 Australia	78.1	57 Bosnia & Herze.	53.2	106 United Kingdom	38.9
9 Central Afr. Rep.	75.5	58 Dem. Rep. Congo	52.8	107 Tanzania	38.9
10 Paraguay	75.5	59 Tajikistan	52.7	108 Syria	38.9
11 Finland	73.8	60 Cambodia	52.6	109 Hungary	38.4
12 Mongolia	72.9	61 Albania	52.4	110 Romania	38.4
13 Russia	72.7	62 Switzerland	51.9	111 Poland	37.5
14 P. N. Guinea	71.5	63 Myanmar	51.1	112 Burundi	37.2
15 Namibia	70.8	64 Azerbaijan	51.0	113 Greece	36.9
16 Botswana	70.6	65 Zimbabwe	50.5	114 Thailand	36.9
17 Uruguay	70.5	66 Turkmenistan	50.4	115 Kuwait	36.7
18 Nicaragua	70.2	67 Malawi	50.2	116 Turkey	36.6
19 Sweden	69.5	68 Moldova	50.2	117 North Korea	36.6
20 Colombia	68.6	69 Yemen	49.6	118 Ethiopia	36.5
21 Venezuela	68.0	70 Uganda	49.3	119 Viet Nam	36.2
22 Angola	67.9	71 United Arab Em.	48.9	120 Burkina Faso	36.0
23 New Zealand	67.7	72 Sudan	48.3	121 Italy	35.9
24 Argentina	67.6	73 Guinea	48.2	122 Trinidad & Tobago	35.6
25 Brazil	65.8	74 Ukraine	47.7	123 El Salvador	35.5
26 Panama	65.2	75 Slovakia	47.4	124 Czech Rep.	35.1
27 Peru	64.9	76 Macedonia	47.0	125 Iraq	34.8
28 Estonia	64.4	77 Bulgaria	46.7	126 Nigeria	34.8
29 Ecuador	63.6	78 Jordan	46.6	127 Bangladesh	32.7
30 Guinea-Bissau	62.9	79 Senegal	46.1	128 Iran	32.7
31 Slovenia	62.8	80 Kenya	46.1	129 Indonesia	32.6
32 Liberia	61.6	81 Uzbekistan	45.8	130 Japan	32.4
33 Kazakhstan	61.3	82 Saudi Arabia	45.6	131 Lebanon	32.3
34 Oman	60.5	83 France	45.1	132 Israel	32.0
35 United States	60.3	84 Gambia	45.0	133 Jamaica	32.0
36 Cameroon	60.2	85 South Africa	44.9	134 China	31.1
37 Zambia	60.1	86 Serbia & Monten.	44.6	135 Dominican Rep.	30.9
38 Mali	59.4	87 Rwanda	44.6	136 Spain	30.8
39 Austria	57.9	88 Madagascar	44.6	137 South Korea	30.6
40 Mauritania	57.7	89 Honduras	44.4	138 Sri Lanka	30.2
41 Laos	56.4	90 Portugal	44.0	139 Philippines	29.3
42 Latvia	56.3	91 Egypt	43.7	140 Pakistan	27.7
43 Libya	56.0	92 Lithuania	43.7	141 Netherlands	27.7
44 Belarus	55.8	93 Côte d'Ivoire	43.4	142 Morocco	25.3
45 Mozambique	55.6	94 Algeria	43.2	143 Belgium	24.3
46 Chad	55.3	95 Togo	42.9	144 India	23.1
47 Sierra Leone	54.8	96 Tunisia	41.4	145 Haiti	21.5
48 Malaysia	54.7	97 Ghana	40.6	146 Taiwan	17.5
49 Croatia	54.7	98 Guatemala	40.5		

Component: Reducing Environmental Stresses

1 P. N. Guinea	70.4	50 Panama	56.3	99 Mexico	46.8
2 Moldova	67.7	51 Ethiopia	56.2	100 New Zealand	46.4
3 Uruguay	67.3	52 Serbia & Monten.	56.2	101 Burundi	46.2
4 Georgia	67.2	53 Ecuador	55.9	102 Rwanda	45.8
5 Bhutan	67.1	54 Cameroon	55.7	103 Philippines	45.5
6 Algeria	66.3	55 Dem. Rep. Congo	55.6	104 Canada	45.4
7 Belarus	65.5	56 Venezuela	55.5	105 Pakistan	45.2
8 Albania	65.4	57 Gambia	54.9	106 Libya	45.2
9 Guyana	65.4	58 Argentina	54.9	107 Viet Nam	45.0
10 Lithuania	65.0	59 Haiti	54.6	108 Malawi	44.6
11 Latvia	64.8	60 Zambia	54.4	109 Greece	44.4
12 Croatia	64.5	61 Peru	53.7	110 Ireland	43.8
13 Myanmar	62.8	62 Ukraine	53.6	111 South Africa	43.5
14 Armenia	62.2	63 Côte d'Ivoire	53.6	112 Saudi Arabia	43.4
15 Kazakhstan	62.0	64 Botswana	53.3	113 Chile	43.2
16 Gabon	61.4	65 Nepal	53.1	114 Malaysia	42.9
17 Cuba	60.9	66 Ghana	52.9	115 Portugal	42.5
18 Tanzania	60.7	67 Kenya	52.9	116 Austria	42.4
19 Russia	60.6	68 Guinea	52.8	117 El Salvador	42.3
20 Mozambique	60.6	69 Colombia	52.6	118 China	42.0
21 Finland	60.5	70 Costa Rica	52.2	119 Yemen	41.8
22 Tajikistan	60.3	71 Tunisia	52.0	120 North Korea	41.7
23 Bolivia	60.1	72 Namibia	52.0	121 Trinidad & Tobago	41.5
24 Central Afr. Rep.	59.7	73 Chad	51.9	122 Egypt	41.0
25 Sudan	59.6	74 Togo	51.7	123 Australia	40.5
26 Zimbabwe	59.4	75 Senegal	51.5	124 United Arab Em.	39.8
27 Indonesia	59.3	76 Sri Lanka	51.4	125 Poland	39.2
28 Bosnia & Herze.	59.2	77 Syria	51.2	126 Switzerland	38.6
29 Angola	59.1	78 Liberia	51.1	127 Jordan	37.9
30 Azerbaijan	59.0	79 Mongolia	50.7	128 Japan	37.2
31 Dominican Rep.	58.9	80 Turkey	50.7	129 Uzbekistan	37.1
32 Nicaragua	58.7	81 Paraguay	50.6	130 Slovenia	36.6
33 Iran	58.7	82 India	49.9	131 Italy	36.5
34 Oman	58.7	83 Guatemala	49.8	132 Spain	36.0
35 Bangladesh	58.3	84 Mali	49.6	133 France	35.9
36 Laos	58.3	85 Hungary	49.5	134 Iceland	35.0
37 Honduras	58.2	86 Turkmenistan	49.4	135 Germany	34.7
38 Cambodia	57.9	87 Macedonia	49.3	136 Israel	34.3
39 Brazil	57.8	88 Thailand	49.3	137 Lebanon	33.8
40 Congo	57.7	89 Niger	48.9	138 Czech Rep.	33.2
41 Kyrgyzstan	57.4	90 Sweden	48.4	139 Kuwait	31.2
42 Nigeria	57.3	91 Benin	48.2	140 Denmark	30.6
43 Madagascar	57.0	92 Morocco	48.1	141 United Kingdom	28.9
44 Guinea-Bissau	56.9	93 Norway	48.0	142 Netherlands	27.6
45 Burkina Faso	56.8	94 Mauritania	47.7	143 United States	27.3
46 Sierra Leone	56.8	95 Jamaica	47.6	144 Taiwan	24.9
47 Estonia	56.5	96 Slovakia	47.6	145 Belgium	22.9
48 Bulgaria	56.4	97 Iraq	47.2	146 South Korea	22.2
49 Romania	56.4	98 Uganda	47.1		

Component: Reducing Human Vulnerability

1 Finland	81.5	50 Moldova	63.5	99 Azerbaijan	38.0
2 Canada	80.9	51 Panama	62.9	100 Nigeria	38.0
3 Slovenia	80.9	52 Romania	62.0	101 Guyana	37.2
4 Iceland	80.7	53 Brazil	61.9	102 Iraq	36.8
5 Czech Rep.	80.3	54 Mexico	61.8	103 Gambia	36.3
6 Austria	80.0	55 Namibia	61.6	104 Togo	35.2
7 Hungary	79.8	56 Oman	61.4	105 Burkina Faso	34.8
8 Poland	79.3	57 Tunisia	60.9	106 Viet Nam	33.9
9 Sweden	78.6	58 Costa Rica	58.9	107 Tanzania	32.8
10 Netherlands	78.3	59 Lebanon	58.7	108 El Salvador	32.7
11 Norway	78.2	60 Libya	58.4	109 Central Afr. Rep.	32.2
12 Denmark	78.1	61 Gabon	58.3	110 Uganda	31.5
13 Lithuania	78.1	62 Chile	57.7	111 P. N. Guinea	30.8
14 Uruguay	78.0	63 Jamaica	57.6	112 Zimbabwe	30.7
15 Greece	77.7	64 Algeria	57.5	113 Guinea	30.3
16 France	77.5	65 Syria	57.1	114 Guatemala	29.5
17 Israel	77.1	66 Peru	57.0	115 Mali	28.7
18 Belarus	77.0	67 South Korea	56.4	116 Guinea-Bissau	28.6
19 Germany	76.9	68 Botswana	56.2	117 Congo	27.7
20 Croatia	76.9	69 Iran	56.0	118 Malawi	26.9
21 Ireland	76.6	70 Colombia	56.0	119 Honduras	26.7
22 Spain	76.2	71 Kazakhstan	55.8	120 Laos	26.2
23 Belgium	76.0	72 Indonesia	55.8	121 Kenya	25.9
24 Slovakia	75.8	73 Georgia	55.7	122 Turkmenistan	24.9
25 New Zealand	75.7	74 Jordan	55.5	123 Bhutan	24.6
26 Estonia	75.5	75 Morocco	55.3	124 Taiwan	24.4
27 Australia	75.2	76 Ghana	55.3	125 Yemen	23.7
28 Italy	74.9	77 China	55.1	126 Zambia	23.2
29 Ukraine	74.7	78 Kyrgyzstan	54.7	127 Mauritania	22.6
30 Latvia	74.5	79 Paraguay	54.5	128 Rwanda	21.7
31 Portugal	74.2	80 South Africa	54.4	129 Philippines	20.1
32 Bosnia & Herze.	73.8	81 Thailand	52.2	130 Bangladesh	20.0
33 United States	73.5	82 Sri Lanka	51.4	131 Liberia	19.9
34 Albania	72.3	83 Armenia	50.8	132 Sierra Leone	18.1
35 Bulgaria	72.0	84 Myanmar	48.5	133 Madagascar	17.8
36 United Arab Em.	71.7	85 Côte d'Ivoire	46.8	134 Cambodia	17.7
37 Trinidad & Tobago	71.3	86 India	45.7	135 Niger	17.6
38 Russia	71.1	87 Uzbekistan	45.3	136 Burundi	17.6
39 United Kingdom	70.8	88 Benin	45.3	137 Haiti	17.4
40 Serbia & Monten.	70.6	89 Bolivia	45.0	138 North Korea	17.1
41 Turkey	70.4	90 Dominican Rep.	44.5	139 Nicaragua	13.5
42 Switzerland	70.1	91 Senegal	43.2	140 Chad	13.4
43 Argentina	69.9	92 Ecuador	43.0	141 Sudan	13.2
44 Cuba	68.7	93 Cameroon	42.9	142 Angola	11.8
45 Kuwait	68.6	94 Venezuela	40.9	143 Dem. Rep. Congo	9.7
46 Malaysia	67.7	95 Egypt	40.3	144 Tajikistan	8.4
47 Macedonia	65.9	96 Nepal	39.6	145 Ethiopia	4.6
48 Japan	64.4	97 Pakistan	38.6	146 Mozambique	1.9
49 Saudi Arabia	64.4	98 Mongolia	38.2		

Component: Social and Institutional Capacity

1 Finland	91.7	50 Ghana	53.3	99 Dem. Rep. Congo	37.1
2 Sweden	91.6	51 Turkey	52.5	100 Ethiopia	36.0
3 Norway	91.3	52 Jordan	52.4	101 Mongolia	35.9
4 Switzerland	91.0	53 Tanzania	51.6	102 Serbia &	35.8
5 Japan	88.7	54 India	51.2	103 Myanmar	35.8
6 Denmark	87.5	55 Sri Lanka	51.2	104 Bosnia and Herze.	35.3
7 Iceland	86.7	56 Tunisia	50.4	105 Rwanda	35.0
8 Netherlands	85.7	57 Bhutan	48.9	106 Armenia	34.9
9 Germany	85.4	58 Mozambique	48.9	107 P. N. Guinea	34.3
10 United Kingdom	84.8	59 Mexico	47.5	108 Syria	34.1
11 Austria	81.9	60 Ecuador	47.4	109 Kuwait	33.7
12 Spain	79.5	61 Uganda	47.1	110 Venezuela	33.5
13 New Zealand	79.5	62 Laos	47.0	111 Bangladesh	32.7
14 United States	78.1	63 Panama	46.8	112 Central Afr. Rep.	32.1
15 France	77.5	64 El Salvador	46.8	113 Kyrgyzstan	32.1
16 Canada	77.2	65 Albania	46.2	114 Mauritania	31.8
17 Australia	76.9	66 Morocco	45.5	115 Guinea	31.8
18 South Korea	74.8	67 Romania	45.3	116 Algeria	31.8
19 Slovenia	73.9	68 Bulgaria	44.9	117 Pakistan	31.5
20 Belgium	73.8	69 Lebanon	44.3	118 Saudi Arabia	31.3
21 Uruguay	73.6	70 Egypt	44.2	119 Belarus	31.2
22 Costa Rica	72.6	71 Cameroon	44.1	120 Guinea-Bissau	31.0
23 Ireland	71.9	72 Jamaica	43.9	121 Nigeria	30.9
24 Taiwan	70.9	73 Viet Nam	43.9	122 Togo	30.9
25 Italy	70.9	74 Bolivia	43.7	123 Côte d'Ivoire	30.0
26 Estonia	67.6	75 Paraguay	43.6	124 Congo	29.5
27 Hungary	67.0	76 Dominican Rep.	42.9	125 Burkina Faso	29.3
28 Portugal	66.9	77 Guatemala	42.1	126 Ukraine	29.2
29 Czech Rep.	66.8	78 Honduras	41.9	127 Iran	29.1
30 Israel	66.4	79 Kenya	41.4	128 Burundi	28.6
31 Slovakia	65.4	80 Guyana	40.9	129 Libya	28.5
32 Argentina	65.4	81 Indonesia	40.7	130 Kazakhstan	27.6
33 Poland	64.6	82 Madagascar	40.4	131 Tajikistan	27.3
34 Chile	63.0	83 Georgia	40.3	132 Niger	26.5
35 Latvia	63.0	84 Gabon	40.1	133 Trinidad & Tobago	26.1
36 Greece	61.8	85 United Arab Em.	40.0	134 Azerbaijan	25.5
37 Brazil	61.6	86 Macedonia	39.9	135 North Korea	25.3
38 Colombia	61.4	87 Mali	39.6	136 Chad	25.1
39 Lithuania	61.2	88 China	39.0	137 Moldova	25.0
40 Croatia	59.3	89 Nepal	38.9	138 Haiti	24.6
41 Peru	57.4	90 Senegal	38.5	139 Sierra Leone	23.9
42 Philippines	55.5	91 Benin	38.5	140 Yemen	23.5
43 Thailand	55.3	92 Cambodia	38.3	141 Sudan	23.3
44 Malaysia	55.2	93 Zimbabwe	38.1	142 Angola	22.1
45 Botswana	54.6	94 Nicaragua	37.7	143 Iraq	21.8
46 Namibia	54.6	95 Gambia	37.5	144 Liberia	19.8
47 Malawi	54.4	96 Russia	37.4	145 Uzbekistan	17.7
48 Zambia	54.1	97 Oman	37.4	146 Turkmenistan	14.8
49 South Africa	53.7	98 Cuba	37.3		

Component: Global Stewardship

1 Madagascar	87.3	50 Bhutan	60.7	99 Slovenia	40.3
2 Mali	87.1	51 Austria	60.6	100 Croatia	40.0
3 Central Afr. Rep.	83.6	52 Armenia	60.3	101 Angola	39.1
4 Uganda	81.9	53 Myanmar	60.1	102 Latvia	38.6
5 Senegal	80.9	54 Liberia	59.6	103 Greece	38.4
6 Chad	79.4	55 Honduras	59.3	104 United States	38.4
7 Niger	79.2	56 Malaysia	59.1	105 South Africa	38.2
8 Cambodia	79.1	57 Indonesia	58.7	106 Mexico	37.4
9 Rwanda	78.4	58 Argentina	58.5	107 Botswana	36.9
10 Japan	78.2	59 Albania	57.9	108 Syria	36.8
11 Gambia	77.3	60 Cuba	57.4	109 Dominican Rep.	36.5
12 Guinea	77.2	61 Ethiopia	57.1	110 Kyrgyzstan	36.4
13 Bangladesh	76.8	62 Panama	57.0	111 New Zealand	34.5
14 Sweden	75.6	63 Sierra Leone	56.9	112 Macedonia	34.4
15 Burundi	74.4	64 Chile	56.7	113 Spain	32.0
16 Switzerland	74.0	65 Nicaragua	56.6	114 Slovakia	31.8
17 Denmark	73.7	66 Portugal	56.3	115 Tajikistan	30.7
18 Uruguay	73.6	67 Zambia	55.3	116 Hungary	30.6
19 Burkina Faso	73.4	68 France	55.2	117 Australia	30.2
20 Netherlands	72.9	69 Jordan	54.9	118 Czech Rep.	29.1
21 Paraguay	72.8	70 Viet Nam	54.8	119 China	29.1
22 Peru	72.4	71 Kenya	54.8	120 Bosnia & Herze.	28.7
23 Malawi	72.1	72 Belgium	54.6	121 Bulgaria	27.7
24 Benin	71.4	73 Egypt	54.5	122 Romania	26.9
25 Ghana	69.8	74 Haiti	54.2	123 Venezuela	26.9
26 Nepal	69.7	75 Cameroon	54.0	124 United Arab Em.	26.6
27 Finland	68.1	76 Bolivia	53.9	125 Belarus	26.4
28 Sri Lanka	68.1	77 Guinea-Bissau	53.8	126 Russia	25.9
29 El Salvador	67.8	78 South Korea	53.7	127 Uzbekistan	25.8
30 Philippines	67.1	79 Colombia	53.7	128 Turkey	25.2
31 Costa Rica	67.0	80 Guatemala	53.6	129 Kazakhstan	24.5
32 Laos	66.9	81 Georgia	49.0	130 Serbia & Monten.	24.0
33 Israel	66.8	82 Jamaica	48.1	131 Kuwait	23.6
34 Nigeria	66.4	83 Italy	47.1	132 Estonia	22.5
35 Brazil	66.1	84 Guyana	46.9	133 Canada	21.3
36 Norway	66.1	85 Lebanon	46.9	134 Algeria	21.1
37 Côte d'Ivoire	65.9	86 Congo	46.5	135 Libya	19.5
38 Mozambique	65.7	87 Azerbaijan	45.2	136 Sudan	19.2
39 India	65.7	88 Lithuania	45.1	137 Iran	19.0
40 Germany	65.5	89 P. N. Guinea	45.1	138 Iraq	17.9
41 Thailand	63.9	90 Moldova	43.1	139 Ukraine	17.5
42 Tanzania	63.5	91 Mauritania	42.6	140 North Korea	15.6
43 Pakistan	63.4	92 Yemen	42.4	141 Turkmenistan	15.2
44 Ireland	63.1	93 United Kingdom	41.6	142 Oman	14.5
45 Morocco	62.5	94 Ecuador	41.6	143 Poland	14.3
46 Togo	61.9	95 Taiwan	41.5	144 Trinidad & Tobago	13.4
47 Dem. Rep. Congo	61.5	96 Gabon	41.1	145 Zimbabwe	12.9
48 Tunisia	61.0	97 Namibia	40.9	146 Saudi Arabia	8.7
49 Iceland	60.9	98 Mongolia	40.4		

Indicator: Air Quality

1	Moldova	2.17	50	Kyrgyzstan	0.26	99	Niger	-0.35
2	Ukraine	1.87	51	Hungary	0.26	100	Ecuador	-0.36
3	United Arab Em.	1.80	52	Jordan	0.24	101	Nicaragua	-0.36
4	Belarus	1.46	53	North Korea	0.23	102	Mali	-0.37
5	Kazakhstan	1.23	54	Jamaica	0.23	103	Kenya	-0.39
6	Armenia	1.21	55	Guyana	0.23	104	Cambodia	-0.39
7	Kuwait	0.99	56	Macedonia	0.23	105	Malawi	-0.40
8	Finland	0.89	57	Bosnia & Herze.	0.19	106	Bangladesh	-0.42
9	Estonia	0.87	58	Netherlands	0.18	107	Sri Lanka	-0.43
10	Sweden	0.86	59	Taiwan	0.18	108	Zambia	-0.44
11	Trinidad & Tobago	0.85	60	Tunisia	0.17	109	Nigeria	-0.44
12	Azerbaijan	0.80	61	Uzbekistan	0.14	110	Congo	-0.44
13	Iceland	0.76	62	Paraguay	0.08	111	Ghana	-0.45
14	Lithuania	0.72	63	Turkmenistan	0.08	112	Yemen	-0.45
15	Australia	0.70	64	Georgia	0.07	113	Pakistan	-0.47
16	Cuba	0.68	65	Japan	0.03	114	Thailand	-0.48
17	Bulgaria	0.67	66	Guinea-Bissau	0.02	115	Egypt	-0.49
18	New Zealand	0.65	67	Russia	0.01	116	Viet Nam	-0.50
19	Lebanon	0.64	68	Mauritania	0.01	117	Dem. Rep. Congo	-0.53
20	Turkey	0.62	69	United States	0.01	118	Brazil	-0.53
21	Romania	0.61	70	Ireland	-0.01	119	Benin	-0.56
22	Latvia	0.61	71	Syria	-0.01	120	Burundi	-0.57
23	Norway	0.60	72	Bhutan	-0.02	121	Burkina Faso	-0.61
24	Germany	0.59	73	Algeria	-0.02	122	Colombia	-0.62
25	Mongolia	0.58	74	Spain	-0.02	123	Côte d'Ivoire	-0.63
26	Saudi Arabia	0.57	75	Panama	-0.02	124	P. N. Guinea	-0.64
27	Canada	0.57	76	Senegal	-0.04	125	Nepal	-0.64
28	Austria	0.54	77	Greece	-0.05	126	Cameroon	-0.65
29	Slovenia	0.53	78	Dominican Rep.	-0.07	127	Myanmar	-0.67
30	Czech Rep.	0.51	79	South Korea	-0.08	128	Laos	-0.68
31	Switzerland	0.51	80	Gambia	-0.08	129	Guinea	-0.70
32	Oman	0.48	81	Italy	-0.08	130	Ethiopia	-0.70
33	Serbia & Monten.	0.48	82	Gabon	-0.10	131	Sudan	-0.70
34	Albania	0.45	83	Malaysia	-0.10	132	Uganda	-0.71
35	Tajikistan	0.45	84	Liberia	-0.12	133	Chile	-0.71
36	Uruguay	0.42	85	Venezuela	-0.14	134	Tanzania	-0.73
37	Denmark	0.42	86	Togo	-0.19	135	Madagascar	-0.74
38	Libya	0.41	87	Bolivia	-0.23	136	Angola	-0.77
39	Argentina	0.40	88	Morocco	-0.24	137	Peru	-0.82
40	Poland	0.40	89	South Africa	-0.26	138	El Salvador	-0.86
41	Belgium	0.35	90	Rwanda	-0.28	139	Philippines	-0.86
42	United Kingdom	0.32	91	Central Afr. Rep.	-0.29	140	Honduras	-0.88
43	Slovakia	0.30	92	Mozambique	-0.30	141	Iran	-0.95
44	Croatia	0.30	93	Namibia	-0.31	142	Costa Rica	-0.97
45	France	0.28	94	Zimbabwe	-0.31	143	India	-0.98
46	Iraq	0.28	95	Mexico	-0.31	144	Indonesia	-1.08
47	Portugal	0.27	96	Sierra Leone	-0.33	145	China	-1.58
48	Israel	0.26	97	Chad	-0.33	146	Guatemala	-1.60
49	Botswana	0.26	98	Haiti	-0.35			

Indicator: Biodiversity

Trinidad & Tobago	0.89	50 Australia	0.16	99 Bhutan	-0.12
2 Guyana	0.88	51 South Africa	0.16	100 Yemen	-0.13
3 Congo	0.84	52 Guinea	0.16	101 Bosnia & Herze.	-0.13
4 Malawi	0.81	53 P. N. Guinea	0.15	102 Azerbaijan	-0.13
5 Bolivia	0.79	54 Jordan	0.14	103 Denmark	-0.13
6 Gabon	0.78	55 Sweden	0.14	104 Indonesia	-0.14
7 Zambia	0.77	56 Israel	0.13	105 Croatia	-0.14
8 Venezuela	0.77	57 Argentina	0.10	106 Belarus	-0.15
9 Angola	0.77	58 Mali	0.09	107 Laos	-0.16
10 Zimbabwe	0.71	59 Brazil	0.09	108 Uruguay	-0.18
11 Central Afr. Rep.	0.68	60 Ethiopia	0.08	109 Saudi Arabia	-0.21
12 Botswana	0.68	61 Slovakia	0.07	110 Malaysia	-0.22
13 Namibia	0.65	62 Tajikistan	0.07	111 Italy	-0.22
14 Burundi	0.60	63 Chad	0.07	112 Hungary	-0.22
15 Dem. Rep. Congo	0.60	64 Latvia	0.06	113 Oman	-0.27
16 Guinea-Bissau	0.60	65 Kyrgyzstan	0.06	114 Belgium	-0.27
17 Gambia	0.59	66 Norway	0.06	115 Georgia	-0.27
18 Nicaragua	0.58	67 Slovenia	0.04	116 United Arab Em.	-0.28
19 Paraguay	0.57	68 United States	0.02	117 Portugal	-0.30
20 Peru	0.55	69 Czech Rep.	0.02	118 Morocco	-0.31
21 Uganda	0.51	70 Egypt	0.02	119 Ukraine	-0.32
22 Rwanda	0.48	71 Kazakhstan	0.02	120 Bulgaria	-0.32
23 Mozambique	0.46	72 Côte d'Ivoire	0.01	121 Germany	-0.32
24 Kenya	0.45	73 Estonia	0.00	122 Greece	-0.33
25 Panama	0.45	74 Mongolia	0.00	123 Netherlands	-0.34
26 Benin	0.43	75 Tunisia	0.00	124 Cambodia	-0.35
27 Togo	0.40	76 Mauritania	-0.01	125 Viet Nam	-0.35
28 Cameroon	0.40	77 Armenia	-0.02	126 Poland	-0.36
29 Switzerland	0.39	78 Liberia	-0.02	127 Iceland	-0.40
30 Sudan	0.38	79 Ireland	-0.03	128 France	-0.40
31 Costa Rica	0.38	80 Russia	-0.03	129 Turkey	-0.40
32 Finland	0.37	81 China	-0.04	130 Romania	-0.42
33 Guatemala	0.37	82 Myanmar	-0.04	131 Spain	-0.48
34 Syria	0.36	83 Nepal	-0.05	132 Bangladesh	-0.48
35 El Salvador	0.36	84 Macedonia	-0.05	133 Chile	-0.50
36 Colombia	0.32	85 Nigeria	-0.05	134 Madagascar	-0.57
37 Burkina Faso	0.32	86 Mexico	-0.05	135 India	-0.62
38 Austria	0.31	87 Taiwan	-0.05	136 Kuwait	-0.66
39 Uzbekistan	0.30	88 Pakistan	-0.06	137 North Korea	-0.76
40 Niger	0.23	89 Lebanon	-0.07	138 Japan	-0.80
41 Tanzania	0.23	90 Honduras	-0.07	139 Sri Lanka	-0.84
42 Canada	0.23	91 Algeria	-0.08	140 Jamaica	-1.20
43 Libya	0.22	92 Iran	-0.08	141 Dominican Rep.	-1.20
44 Ecuador	0.21	93 United Kingdom	-0.08	142 South Korea	-1.32
45 Turkmenistan	0.19	94 Moldova	-0.08	143 Philippines	-1.39
46 Sierra Leone	0.19	95 Lithuania	-0.09	144 Cuba	-1.49
47 Senegal	0.19	96 Iraq	-0.11	145 Haiti	-1.71
48 Ghana	0.18	97 Serbia & Monten.	-0.11	146 New Zealand	-1.99
49 Albania	0.17	98 Thailand	-0.12		

Indicator: Land

1	Mauritania	1.52	50	Malawi	0.32	99	Albania	-0.31
2	Mongolia	1.52	51	Zambia	0.31	100	Latvia	-0.34
3	Libya	1.50	52	Madagascar	0.28	101	India	-0.36
4	Namibia	1.50	53	Ethiopia	0.24	102	Turkey	-0.36
5	Australia	1.41	54	Tunisia	0.24	103	Thailand	-0.37
6	Iceland	1.40	55	United States	0.23	104	Gambia	-0.39
7	Guyana	1.39	56	Malaysia	0.21	105	Sri Lanka	-0.39
8	Canada	1.39	57	Cameroon	0.21	106	Belarus	-0.41
9	Algeria	1.34	58	Uganda	0.20	107	Bangladesh	-0.43
10	Gabon	1.32	59	Myanmar	0.17	108	Romania	-0.43
11	Egypt	1.28	60	Tanzania	0.17	109	United Arab Em.	-0.45
12	Niger	1.26	61	Kyrgyzstan	0.16	110	Dominican Rep.	-0.48
13	Botswana	1.26	62	Nicaragua	0.16	111	Lithuania	-0.52
14	Congo	1.24	63	Mexico	0.16	112	Macedonia	-0.52
15	Oman	1.19	64	Cambodia	0.15	113	Costa Rica	-0.52
16	Russia	1.11	65	Iran	0.11	114	Moldova	-0.53
17	Bolivia	1.07	66	Morocco	0.08	115	Cuba	-0.53
18	Chad	1.06	67	Honduras	0.08	116	Croatia	-0.57
19	Mali	1.04	68	Liberia	0.07	117	Ukraine	-0.58
20	Central Afr. Rep.	1.01	69	Laos	0.03	118	Bulgaria	-0.58
21	Peru	0.88	70	Senegal	0.01	119	Slovenia	-0.59
22	Paraguay	0.87	71	Guinea-Bissau	-0.01	120	Serbia & Monten.	-0.64
23	Kazakhstan	0.86	72	Burkina Faso	-0.02	121	Austria	-0.67
24	Angola	0.77	73	Côte d'Ivoire	-0.03	122	Ireland	-0.70
25	Chile	0.77	74	Bhutan	-0.03	123	Poland	-0.78
26	Yemen	0.77	75	Nepal	-0.03	124	Slovakia	-0.79
27	Brazil	0.76	76	Burundi	-0.05	125	Portugal	-0.84
28	South Africa	0.75	77	Panama	-0.06	126	France	-0.84
29	Saudi Arabia	0.74	78	Iraq	-0.07	127	Kuwait	-0.87
30	Venezuela	0.72	79	Benin	-0.07	128	Spain	-0.89
31	P. N. Guinea	0.72	80	Rwanda	-0.07	129	Switzerland	-0.89
32	Colombia	0.71	81	Guinea	-0.08	130	Greece	-0.92
33	Kenya	0.70	82	Zimbabwe	-0.08	131	Hungary	-0.92
34	Sudan	0.69	83	Pakistan	-0.08	132	El Salvador	-0.93
35	Argentina	0.66	84	Sierra Leone	-0.09	133	Czech Rep.	-0.96
36	Turkmenistan	0.64	85	Nigeria	-0.10	134	Germany	-1.01
37	New Zealand	0.61	86	Togo	-0.12	135	South Korea	-1.19
38	Jordan	0.61	87	Guatemala	-0.12	136	Jamaica	-1.39
39	Uzbekistan	0.55	88	Ghana	-0.13	137	Italy	-1.43
40	Indonesia	0.52	89	North Korea	-0.13	138	Lebanon	-1.46
41	Azerbaijan	0.50	90	Uruguay	-0.17	139	Denmark	-1.69
42	Mozambique	0.47	91	Haiti	-0.17	140	Israel	-1.72
43	China	0.46	92	Viet Nam	-0.20	141	United Kingdom	-1.74
44	Finland	0.43	93	Bosnia & Herze.	-0.20	142	Japan	-1.74
45	Norway	0.41	94	Armenia	-0.22	143	Netherlands	-2.24
46	Sweden	0.39	95	Georgia	-0.23	144	Belgium	-2.27
47	Dem. Rep. Congo	0.37	96	Philippines	-0.27	145	Taiwan	-2.31
48	Tajikistan	0.34	97	Estonia	-0.30	146	Trinidad & Tobago	-2.52
49	Ecuador	0.33	98	Syria	-0.31			

Indicator: Water Quality

1	Norway	1.64	50	Brazil	0.25	99	Peru	-0.31
2	Finland	1.61	51	Bhutan	0.22	100	Bulgaria	-0.31
3	Iceland	1.55	52	Colombia	0.21	101	Kazakhstan	-0.31
4	New Zealand	1.31	53	Germany	0.19	102	Dominican Rep.	-0.33
5	Canada	1.20	54	Zimbabwe	0.19	103	Nepal	-0.35
6	Russia	1.11	55	Laos	0.19	104	Bangladesh	-0.35
7	South Korea	1.06	56	Israel	0.18	105	Hungary	-0.38
8	Japan	1.06	57	Kuwait	0.16	106	Liberia	-0.38
9	Guyana	1.06	58	Myanmar	0.14	107	Tajikistan	-0.40
10	Nicaragua	1.04	59	Mauritania	0.12	108	Burkina Faso	-0.41
11	Austria	0.98	60	P. N. Guinea	0.11	109	Viet Nam	-0.41
12	Ireland	0.97	61	United Arab Em.	0.10	110	Tunisia	-0.42
13	Estonia	0.96	62	Sudan	0.07	111	Thailand	-0.43
14	Slovenia	0.95	63	Zambia	0.07	112	North Korea	-0.46
15	United Kingdom	0.92	64	Armenia	0.05	113	Egypt	-0.46
16	Sweden	0.87	65	Guinea-Bissau	0.03	114	Lithuania	-0.47
17	Australia	0.84	66	Netherlands	0.03	115	Saudi Arabia	-0.47
18	Switzerland	0.79	67	Kyrgyzstan	0.03	116	Venezuela	-0.48
19	Gabon	0.78	68	Mozambique	0.02	117	Benin	-0.48
20	Oman	0.74	69	Chile	0.02	118	Ukraine	-0.53
21	Denmark	0.70	70	Yemen	0.01	119	Honduras	-0.53
22	Bolivia	0.70	71	Malawi	0.01	120	Czech Rep.	-0.54
23	United States	0.70	72	Albania	0.00	121	Spain	-0.54
24	Macedonia	0.69	73	Chad	0.00	122	Azerbaijan	-0.56
25	Congo	0.68	74	El Salvador	-0.01	123	Ghana	-0.61
26	Portugal	0.66	75	Greece	-0.01	124	Togo	-0.62
27	Panama	0.63	76	Belarus	-0.03	125	Syria	-0.65
28	Costa Rica	0.62	77	Dem. Rep. Congo	-0.03	126	China	-0.66
29	Cuba	0.62	78	Poland	-0.06	127	Iran	-0.69
30	Cameroon	0.55	79	Georgia	-0.06	128	Lebanon	-0.70
31	France	0.55	80	Rwanda	-0.07	129	Serbia & Monten.	-0.71
32	Mali	0.52	81	Philippines	-0.08	130	Ethiopia	-0.73
33	Uruguay	0.51	82	Niger	-0.13	131	Mexico	-0.74
34	Latvia	0.50	83	Senegal	-0.15	132	Moldova	-0.74
35	Italy	0.50	84	Madagascar	-0.15	133	Uzbekistan	-0.78
36	Argentina	0.46	85	Turkmenistan	-0.17	134	Tanzania	-0.79
37	Mongolia	0.39	86	Angola	-0.17	135	Nigeria	-0.81
38	Ecuador	0.39	87	Guatemala	-0.18	136	Haiti	-0.83
39	Botswana	0.38	88	Sri Lanka	-0.19	137	Romania	-0.85
40	Croatia	0.37	89	Trinidad & Tobago	-0.19	138	Burundi	-0.86
41	Slovakia	0.36	90	Guinea	-0.19	139	Algeria	-0.89
42	Central Afr. Rep.	0.35	91	Jordan	-0.24	140	India	-0.96
43	Cambodia	0.33	92	South Africa	-0.25	141	Iraq	-1.04
44	Bosnia & Herze.	0.31	93	Belgium	-0.27	142	Turkey	-1.12
45	Jamaica	0.30	94	Côte d'Ivoire	-0.27	143	Pakistan	-1.48
46	Namibia	0.28	95	Gambia	-0.27	144	Taiwan	-1.57
47	Malaysia	0.27	96	Kenya	-0.29	145	Indonesia	-1.71
48	Uganda	0.25	97	Sierra Leone	-0.30	146	Morocco	-1.93
49	Paraguay	0.25	98	Libya	-0.30			

Indicator: Water Quantity

1	Guyana	2.96	50	Indonesia	0.16	99	Spain	-0.58
2	Iceland	2.66	51	Bulgaria	0.13	100	Netherlands	-0.58
3	Congo	2.66	52	Botswana	0.12	101	North Korea	-0.59
4	Gabon	2.60	53	Côte d'Ivoire	0.08	102	Ethiopia	-0.62
5	P. N. Guinea	2.50	54	Kyrgyzstan	0.06	103	Cuba	-0.63
6	Uruguay	2.11	55	Mozambique	0.06	104	China	-0.64
7	Liberia	1.93	56	Albania	-0.02	105	Iran	-0.64
8	Norway	1.89	57	Latvia	-0.04	106	Sudan	-0.65
9	Bolivia	1.89	58	Dem. Rep. Congo	-0.05	107	Mauritania	-0.68
10	Colombia	1.80	59	Mali	-0.10	108	Turkmenistan	-0.69
11	Canada	1.79	60	Tajikistan	-0.11	109	Lebanon	-0.71
12	Angola	1.73	61	Chad	-0.13	110	Malawi	-0.72
13	New Zealand	1.71	62	Philippines	-0.13	111	Macedonia	-0.73
14	Central Afr. Rep.	1.71	63	Finland	-0.14	112	Uzbekistan	-0.73
15	Paraguay	1.67	64	Belarus	-0.14	113	Ukraine	-0.73
16	Peru	1.61	65	Austria	-0.18	114	Rwanda	-0.73
17	Brazil	1.47	66	Ghana	-0.19	115	Burundi	-0.75
18	Venezuela	1.45	67	France	-0.21	116	Sri Lanka	-0.75
19	Laos	1.43	68	Hungary	-0.21	117	India	-0.75
20	Nicaragua	1.23	69	Yemen	-0.25	118	Moldova	-0.79
21	Ecuador	1.17	70	Mexico	-0.25	119	Poland	-0.81
22	Sierra Leone	1.13	71	Slovakia	-0.28	120	Syria	-0.81
23	Costa Rica	1.01	72	Thailand	-0.28	121	Oman	-0.82
24	Guinea-Bissau	1.00	73	Jamaica	-0.28	122	Japan	-0.82
25	Panama	0.97	74	Tanzania	-0.29	123	United Kingdom	-0.83
26	Chile	0.95	75	Nepal	-0.30	124	Georgia	-0.83
27	Russia	0.81	76	Viet Nam	-0.30	125	Germany	-0.83
28	Cameroon	0.78	77	Uganda	-0.34	126	Haiti	-0.87
29	Australia	0.77	78	Greece	-0.36	127	Pakistan	-0.87
30	Slovenia	0.72	79	Kazakhstan	-0.36	128	Trinidad & Tobago	-0.88
31	Honduras	0.71	80	Togo	-0.37	129	Taiwan	-0.91
32	Argentina	0.66	81	Romania	-0.39	130	Morocco	-0.92
33	Croatia	0.63	82	Dominican Rep.	-0.40	131	Czech Rep.	-0.95
34	Namibia	0.61	83	El Salvador	-0.43	132	Kenya	-0.97
35	Guinea	0.60	84	Lithuania	-0.44	133	South Korea	-1.00
36	Cambodia	0.58	85	Turkey	-0.45	134	Iraq	-1.02
37	Zambia	0.57	86	Zimbabwe	-0.45	135	Belgium	-1.04
38	Mongolia	0.55	87	Gambia	-0.47	136	South Africa	-1.05
39	Myanmar	0.54	88	Armenia	-0.48	137	Burkina Faso	-1.06
40	Madagascar	0.51	89	Azerbaijan	-0.49	138	Libya	-1.08
41	Bhutan	0.48	90	Senegal	-0.50	139	Tunisia	-1.08
42	Malaysia	0.42	91	Denmark	-0.51	140	Egypt	-1.14
43	United States	0.34	92	Benin	-0.53	141	Jordan	-1.18
44	Guatemala	0.33	93	Portugal	-0.56	142	Saudi Arabia	-1.18
45	Estonia	0.32	94	Nigeria	-0.56	143	Israel	-1.20
46	Serbia & Montenegro	0.32	95	Niger	-0.56	144	Algeria	-1.23
47	Ireland	0.30	96	Switzerland	-0.56	145	Kuwait	-1.31
48	Sweden	0.29	97	Bangladesh	-0.56	146	United Arab Em.	-1.31
49	Bosnia & Herzegovina	0.23	98	Italy	-0.57			

Indicator: Reducing Air Pollution

1	Dem. Rep. Congo	1.56	50	Nepal	0.41	99	Norway	-0.26
2	Bhutan	1.55	51	Viet Nam	0.39	100	Namibia	-0.27
3	P. N. Guinea	1.42	52	Zambia	0.37	101	India	-0.28
4	Burkina Faso	1.41	53	Ecuador	0.37	102	Moldova	-0.29
5	Ethiopia	1.30	54	Colombia	0.37	103	Thailand	-0.35
6	Madagascar	1.07	55	Pakistan	0.33	104	Jordan	-0.37
7	Côte d'Ivoire	1.06	56	Dominican Rep.	0.33	105	Ukraine	-0.38
8	Guinea	1.02	57	Algeria	0.33	106	China	-0.39
9	Panama	1.02	58	Benin	0.33	107	Bulgaria	-0.42
10	Mali	1.00	59	Kazakhstan	0.31	108	Serbia & Monten.	-0.43
11	Chad	0.98	60	Costa Rica	0.30	109	Ireland	-0.48
12	Congo	0.95	61	Zimbabwe	0.30	110	Botswana	-0.49
13	Turkmenistan	0.90	62	Paraguay	0.30	111	Switzerland	-0.54
14	Laos	0.86	63	Tajikistan	0.30	112	Austria	-0.55
15	Bolivia	0.85	64	Yemen	0.29	113	Romania	-0.60
16	Sudan	0.85	65	Morocco	0.27	114	New Zealand	-0.61
17	Niger	0.84	66	Haiti	0.26	115	Kuwait	-0.65
18	Nicaragua	0.83	67	Brazil	0.25	116	Jamaica	-0.67
19	Mozambique	0.83	68	Uzbekistan	0.24	117	United Arab Em.	-0.68
20	Togo	0.83	69	Syria	0.24	118	Slovakia	-0.69
21	Tanzania	0.80	70	Belarus	0.21	119	Hungary	-0.71
22	Malawi	0.79	71	Iraq	0.20	120	South Africa	-0.75
23	Cameroon	0.78	72	Rwanda	0.18	121	Egypt	-0.76
24	Guinea-Bissau	0.77	73	Guatemala	0.17	122	France	-0.84
25	Gabon	0.76	74	Georgia	0.16	123	Greece	-0.86
26	Myanmar	0.75	75	Tunisia	0.15	124	Slovenia	-0.86
27	Uruguay	0.71	76	Mongolia	0.12	125	Denmark	-0.91
28	Senegal	0.69	77	Saudi Arabia	0.10	126	Canada	-0.92
29	Liberia	0.68	78	Mexico	0.09	127	Libya	-0.98
30	Argentina	0.67	79	Malaysia	0.09	128	Spain	-1.01
31	Mauritania	0.64	80	El Salvador	0.06	129	North Korea	-1.03
32	Nigeria	0.62	81	Bosnia & Herze.	0.03	130	Poland	-1.05
33	Honduras	0.60	82	Venezuela	0.02	131	Israel	-1.06
34	Cuba	0.58	83	Indonesia	0.02	132	Portugal	-1.09
35	Gambia	0.58	84	Latvia	0.01	133	Italy	-1.13
36	Kyrgyzstan	0.58	85	Sri Lanka	0.00	134	Iceland	-1.16
37	Sierra Leone	0.57	86	Bangladesh	-0.01	135	Czech Rep.	-1.31
38	Burundi	0.56	87	Lithuania	-0.03	136	Trinidad & Tobago	-1.32
39	Angola	0.55	88	Azerbaijan	-0.05	137	Germany	-1.39
40	Central Afr. Rep.	0.54	89	Sweden	-0.11	138	Lebanon	-1.46
41	Peru	0.53	90	Croatia	-0.11	139	United Kingdom	-1.48
42	Cambodia	0.51	91	Estonia	-0.13	140	United States	-1.48
43	Iran	0.51	92	Armenia	-0.15	141	Japan	-1.55
44	Uganda	0.50	93	Turkey	-0.17	142	South Korea	-1.81
45	Ghana	0.48	94	Finland	-0.17	143	Netherlands	-1.85
46	Oman	0.46	95	Macedonia	-0.18	144	Belgium	-1.91
47	Albania	0.42	96	Chile	-0.19	145	Australia	-2.17
48	Kenya	0.42	97	Philippines	-0.21	146	Taiwan	-2.49
49	Guyana	0.42	98	Russia	-0.23			

Indicator: Reducing Ecosystem Stress

1	Uruguay	1.82	50	Hungary	0.25	99	Myanmar	-0.18
2	Oman	1.82	51	Congo	0.24	100	Pakistan	-0.18
3	Israel	1.82	52	Australia	0.23	101	Zimbabwe	-0.18
4	Kuwait	1.38	53	Burkina Faso	0.22	102	Jamaica	-0.18
5	Egypt	1.32	54	Mozambique	0.22	103	France	-0.22
6	United Arab Em.	1.16	55	Tanzania	0.22	104	Panama	-0.22
7	Belarus	1.12	56	North Korea	0.20	105	Sri Lanka	-0.22
8	Kyrgyzstan	1.10	57	Bolivia	0.19	106	Italy	-0.22
9	Kazakhstan	0.97	58	Guyana	0.19	107	Ghana	-0.25
10	Iceland	0.97	59	Angola	0.16	108	Guatemala	-0.25
11	Libya	0.72	60	Croatia	0.16	109	Nepal	-0.28
12	Portugal	0.71	61	Dem. Rep. Congo	0.16	110	Romania	-0.29
13	Cuba	0.69	62	P. N. Guinea	0.16	111	Yemen	-0.31
14	Algeria	0.69	63	Peru	0.16	112	Slovakia	-0.34
15	Bangladesh	0.69	64	Colombia	0.16	113	Liberia	-0.34
16	Azerbaijan	0.69	65	Brazil	0.16	114	Indonesia	-0.36
17	Armenia	0.69	66	Venezuela	0.16	115	Benin	-0.43
18	Russia	0.67	67	Lebanon	0.16	116	Malawi	-0.47
19	Finland	0.64	68	Japan	0.14	117	Uganda	-0.48
20	Gambia	0.60	69	China	0.14	118	Nigeria	-0.53
21	Greece	0.47	70	Guinea	0.13	119	Ireland	-0.55
22	Gabon	0.47	71	Kenya	0.13	120	Mauritania	-0.56
23	Estonia	0.47	72	Paraguay	0.13	121	Sierra Leone	-0.62
24	Taiwan	0.45	73	Mongolia	0.13	122	Viet Nam	-0.63
25	Tajikistan	0.44	74	Canada	0.11	123	Zambia	-0.64
26	New Zealand	0.44	75	Chad	0.10	124	Nicaragua	-0.65
27	Ukraine	0.38	76	Cambodia	0.10	125	Sweden	-0.67
28	Spain	0.35	77	Mali	0.07	126	Côte d'Ivoire	-0.68
29	Uzbekistan	0.35	78	Senegal	0.07	127	Togo	-0.78
30	Tunisia	0.35	79	Thailand	0.06	128	Laos	-0.81
31	Lithuania	0.35	80	Ethiopia	0.03	129	Switzerland	-0.81
32	Moldova	0.35	81	Argentina	0.03	130	Bosnia & Herze.	-0.85
33	Turkey	0.35	82	Costa Rica	0.03	131	Niger	-0.87
34	Latvia	0.35	83	Trinidad & Tobago	0.03	132	Rwanda	-0.93
35	India	0.32	84	Bulgaria	0.00	133	Slovenia	-0.98
36	Morocco	0.30	85	Madagascar	0.00	134	United Kingdom	-1.05
37	Bhutan	0.28	86	Cameroon	0.00	135	Burundi	-1.07
38	Turkmenistan	0.28	87	Guinea-Bissau	0.00	136	Haiti	-1.07
39	Iran	0.28	88	Namibia	0.00	137	El Salvador	-1.07
40	Dominican Rep.	0.28	89	Botswana	0.00	138	Netherlands	-1.08
41	Syria	0.28	90	Honduras	-0.03	139	Austria	-1.34
42	Iraq	0.28	91	Albania	-0.05	140	Poland	-1.43
43	Georgia	0.28	92	Mexico	-0.08	141	Denmark	-1.43
44	Saudi Arabia	0.28	93	Ecuador	-0.09	142	Germany	-1.44
45	Jordan	0.28	94	Malaysia	-0.09	143	Macedonia	-1.49
46	Central Afr. Rep.	0.25	95	United States	-0.11	144	South Korea	-1.52
47	Chile	0.25	96	Norway	-0.12	145	Czech Rep.	-1.53
48	Serbia & Monten.	0.25	97	Sudan	-0.15	146	Belgium	-1.55
49	South Africa	0.25	98	Philippines	-0.15			

Indicator: Reducing Population Pressure

1	Moldova	1.20	50	Albania	0.64	99	Kenya	-0.45
2	Bulgaria	1.20	51	Australia	0.63	100	Paraguay	-0.47
3	Romania	1.19	52	Iceland	0.62	101	P. N. Guinea	-0.47
4	Armenia	1.18	53	Tunisia	0.62	102	Gabon	-0.48
5	Hungary	1.17	54	New Zealand	0.60	103	Oman	-0.48
6	Latvia	1.15	55	Botswana	0.57	104	Central Afr. Rep.	-0.50
7	Ukraine	1.15	56	Brazil	0.56	105	Ghana	-0.52
8	Georgia	1.14	57	Uruguay	0.55	106	Nepal	-0.57
9	Japan	1.14	58	Azerbaijan	0.54	107	Côte d'Ivoire	-0.58
10	Slovenia	1.11	59	United States	0.46	108	Honduras	-0.60
11	Estonia	1.11	60	Viet Nam	0.45	109	Pakistan	-0.62
12	Bosnia & Herze.	1.11	61	Chile	0.40	110	Mozambique	-0.66
13	Poland	1.10	62	Costa Rica	0.40	111	Cambodia	-0.68
14	Slovakia	1.10	63	Turkey	0.38	112	Haiti	-0.68
15	Belarus	1.09	64	Jamaica	0.38	113	Cameroon	-0.70
16	Czech Rep.	1.08	65	United Arab Em.	0.37	114	Guatemala	-0.72
17	Croatia	1.08	66	Algeria	0.37	115	Togo	-0.74
18	Russia	1.08	67	Argentina	0.37	116	Laos	-0.74
19	South Korea	1.07	68	Iran	0.33	117	Zambia	-0.75
20	Greece	1.05	69	Indonesia	0.32	118	Bhutan	-0.80
21	Italy	1.05	70	Morocco	0.31	119	Saudi Arabia	-0.88
22	Lithuania	1.05	71	Colombia	0.27	120	Tanzania	-0.91
23	Germany	1.04	72	Myanmar	0.27	121	Iraq	-0.97
24	Taiwan	1.02	73	Mexico	0.26	122	Sudan	-1.00
25	Portugal	1.02	74	Kyrgyzstan	0.16	123	Senegal	-1.01
26	Spain	1.01	75	Panama	0.16	124	Rwanda	-1.04
27	Switzerland	0.98	76	El Salvador	0.16	125	Kuwait	-1.11
28	Austria	0.95	77	Peru	0.16	126	Nigeria	-1.16
29	Trinidad & Tobago	0.94	78	Turkmenistan	0.15	127	Sierra Leone	-1.21
30	Finland	0.91	79	Dominican Rep.	0.12	128	Benin	-1.31
31	Cuba	0.90	80	Zimbabwe	0.12	129	Ethiopia	-1.32
32	Serbia & Monten.	0.89	81	Venezuela	0.12	130	Mauritania	-1.42
33	Guyana	0.87	82	India	0.12	131	Burundi	-1.46
34	Denmark	0.87	83	Israel	0.11	132	Gambia	-1.46
35	Belgium	0.85	84	Ecuador	0.11	133	Congo	-1.72
36	Macedonia	0.83	85	Tajikistan	0.11	134	Burkina Faso	-1.80
37	Canada	0.80	86	Mongolia	0.07	135	Liberia	-1.89
38	United Kingdom	0.79	87	Lebanon	0.06	136	Madagascar	-1.91
39	China	0.79	88	Uzbekistan	-0.09	137	Guinea	-1.98
40	Netherlands	0.78	89	Egypt	-0.09	138	Chad	-2.01
41	Kazakhstan	0.78	90	Namibia	-0.09	139	Angola	-2.06
42	France	0.76	91	Malaysia	-0.18	140	Guinea-Bissau	-2.09
43	Thailand	0.76	92	Philippines	-0.20	141	Dem. Rep. Congo	-2.11
44	Sweden	0.73	93	Jordan	-0.27	142	Malawi	-2.15
45	Sri Lanka	0.72	94	Bolivia	-0.28	143	Uganda	-2.17
46	North Korea	0.70	95	Bangladesh	-0.30	144	Mali	-2.23
47	Norway	0.68	96	Libya	-0.33	145	Yemen	-2.23
48	Ireland	0.67	97	Nicaragua	-0.39	146	Niger	-2.23
49	South Africa	0.65	98	Syria	-0.42			

Indicator: Reducing Waste and Consumption Pressure

1	Nigeria	1.14	50	Turkey	0.22	99	Norway	-0.12
2	Algeria	1.06	51	Jamaica	0.21	100	Malaysia	-0.14
3	Haiti	0.99	52	Dem. Rep. Congo	0.21	101	Cuba	-0.14
4	Tajikistan	0.98	53	Belgium	0.21	102	Saudi Arabia	-0.16
5	Zambia	0.96	54	Iraq	0.20	103	Libya	-0.17
6	Moldova	0.95	55	Burkina Faso	0.20	104	El Salvador	-0.17
7	Angola	0.92	56	Denmark	0.18	105	Ireland	-0.18
8	Niger	0.88	57	Gambia	0.17	106	Gabon	-0.21
9	Sierra Leone	0.86	58	Egypt	0.16	107	Israel	-0.21
10	Tanzania	0.86	59	Croatia	0.16	108	Hungary	-0.21
11	Madagascar	0.82	60	Lebanon	0.15	109	Panama	-0.21
12	Georgia	0.80	61	Botswana	0.14	110	Germany	-0.22
13	Nepal	0.79	62	Armenia	0.11	111	Serbia & Montenegro	-0.23
14	Bangladesh	0.78	63	Mozambique	0.11	112	Oman	-0.23
15	Guinea-Bissau	0.77	64	Burundi	0.11	113	Paraguay	-0.24
16	Indonesia	0.76	65	Cameroon	0.11	114	Italy	-0.24
17	Laos	0.75	66	Colombia	0.10	115	Poland	-0.25
18	Sudan	0.70	67	Ethiopia	0.10	116	Spain	-0.27
19	P. N. Guinea	0.67	68	Peru	0.08	117	Czech Rep.	-0.28
20	Congo	0.56	69	Brazil	0.08	118	Namibia	-0.29
21	Bosnia & Herzegovina	0.55	70	Venezuela	0.08	119	Mexico	-0.30
22	Uganda	0.55	71	Rwanda	0.07	120	Mauritania	-0.31
23	Macedonia	0.54	72	Pakistan	0.06	121	Latvia	-0.33
24	Honduras	0.53	73	Guinea	0.05	122	New Zealand	-0.33
25	Nicaragua	0.51	74	Liberia	0.05	123	Chile	-0.35
26	Albania	0.50	75	Togo	0.05	124	Viet Nam	-0.37
27	Malawi	0.50	76	Guatemala	0.03	125	Australia	-0.43
28	Iran	0.45	77	Guyana	0.03	126	Taiwan	-0.43
29	Dominican Rep.	0.45	78	Kenya	0.01	127	Iceland	-0.46
30	Syria	0.44	79	Lithuania	0.00	128	Belarus	-0.49
31	Yemen	0.43	80	Bulgaria	0.00	129	Kyrgyzstan	-0.50
32	Trinidad & Tobago	0.42	81	Philippines	-0.01	130	Argentina	-0.53
33	Benin	0.40	82	Turkmenistan	-0.02	131	United Kingdom	-0.54
34	Ecuador	0.38	83	Finland	-0.02	132	Uruguay	-0.58
35	Bhutan	0.36	84	Romania	-0.02	133	China	-0.58
36	Austria	0.35	85	Mali	-0.03	134	Kazakhstan	-0.60
37	India	0.35	86	Slovakia	-0.03	135	Ukraine	-0.62
38	South Korea	0.34	87	Ghana	-0.04	136	South Africa	-0.63
39	Myanmar	0.34	88	Senegal	-0.04	137	France	-0.67
40	Sri Lanka	0.34	89	Morocco	-0.04	138	North Korea	-0.76
41	Azerbaijan	0.34	90	Slovenia	-0.05	139	Kuwait	-0.84
42	Costa Rica	0.34	91	Chad	-0.06	140	Uzbekistan	-0.93
43	Jordan	0.31	92	Greece	-0.07	141	Canada	-0.97
44	Zimbabwe	0.31	93	Côte d'Ivoire	-0.08	142	Russia	-1.05
45	Switzerland	0.30	94	Thailand	-0.09	143	Mongolia	-1.17
46	Cambodia	0.29	95	Portugal	-0.09	144	United Arab Em.	-1.21
47	Tunisia	0.25	96	Central Afr. Rep.	-0.11	145	Estonia	-1.25
48	Netherlands	0.25	97	Sweden	-0.11	146	United States	-1.40
49	Japan	0.24	98	Bolivia	-0.12			

Indicator: Reducing Water Stress

1	Angola	1.03	50	Canada	0.40	99	Iran	-0.33
2	Bhutan	1.03	51	Bolivia	0.39	100	Dominican Rep.	-0.33
3	Liberia	1.03	52	Nicaragua	0.33	101	Kyrgyzstan	-0.34
4	Central Afr. Rep.	1.00	53	Moldova	0.33	102	Syria	-0.36
5	Sierra Leone	0.99	54	Romania	0.23	103	Pakistan	-0.38
6	Niger	0.97	55	Paraguay	0.22	104	New Zealand	-0.38
7	Cambodia	0.95	56	Zimbabwe	0.21	105	Iceland	-0.39
8	Guinea	0.95	57	Guatemala	0.18	106	Viet Nam	-0.40
9	Gambia	0.94	58	Estonia	0.18	107	North Korea	-0.40
10	Burundi	0.93	59	Kazakhstan	0.17	108	Poland	-0.41
11	Ghana	0.93	60	Sweden	0.17	109	Libya	-0.41
12	Guinea-Bissau	0.91	61	Finland	0.15	110	Oman	-0.51
13	Tanzania	0.91	62	Brazil	0.15	111	Ireland	-0.51
14	Mauritania	0.91	63	Argentina	0.14	112	Colombia	-0.52
15	Rwanda	0.91	64	Hungary	0.12	113	France	-0.52
16	Cameroon	0.90	65	Venezuela	0.11	114	Malaysia	-0.53
17	Togo	0.89	66	Australia	0.10	115	Sri Lanka	-0.54
18	Dem. Rep. Congo	0.89	67	Thailand	0.09	116	Switzerland	-0.56
19	Nigeria	0.88	68	Norway	0.09	117	Germany	-0.56
20	Laos	0.87	69	Belarus	0.09	118	China	-0.57
21	Namibia	0.87	70	Serbia & Monten.	0.08	119	Greece	-0.61
22	Madagascar	0.86	71	Peru	0.08	120	Denmark	-0.63
23	Benin	0.84	72	Bangladesh	0.07	121	Italy	-0.67
24	Mali	0.82	73	Yemen	0.06	122	Slovenia	-0.70
25	Uganda	0.81	74	Iraq	0.05	123	South Africa	-0.71
26	Gabon	0.81	75	Panama	0.04	124	Chile	-0.75
27	Congo	0.81	76	Uruguay	0.03	125	Morocco	-0.79
28	Burkina Faso	0.76	77	Armenia	0.02	126	Turkmenistan	-0.83
29	Mongolia	0.73	78	Slovakia	0.01	127	Saudi Arabia	-0.83
30	P. N. Guinea	0.72	79	Croatia	-0.05	128	Portugal	-0.84
31	Zambia	0.72	80	Honduras	-0.05	129	Uzbekistan	-0.86
32	Myanmar	0.72	81	Algeria	-0.06	130	Tunisia	-0.88
33	Senegal	0.71	82	Bulgaria	-0.07	131	Japan	-0.89
34	Russia	0.69	83	Cuba	-0.07	132	Costa Rica	-0.91
35	Malawi	0.68	84	Ecuador	-0.10	133	United Kingdom	-0.92
36	Chad	0.68	85	Macedonia	-0.10	134	United Arab Em.	-1.03
37	Ethiopia	0.67	86	Austria	-0.11	135	Netherlands	-1.07
38	Mozambique	0.67	87	Georgia	-0.16	136	Czech Rep.	-1.09
39	Côte d'Ivoire	0.66	88	Nepal	-0.16	137	Egypt	-1.13
40	Sudan	0.65	89	Philippines	-0.16	138	Spain	-1.14
41	Guyana	0.64	90	Tajikistan	-0.18	139	Kuwait	-1.21
42	Latvia	0.58	91	El Salvador	-0.21	140	South Korea	-1.32
43	Indonesia	0.53	92	Azerbaijan	-0.21	141	Trinidad & Tobago	-1.47
44	Botswana	0.52	93	Mexico	-0.24	142	Lebanon	-1.50
45	Kenya	0.51	94	United States	-0.27	143	Belgium	-1.55
46	Albania	0.49	95	India	-0.27	144	Jordan	-1.57
47	Lithuania	0.47	96	Jamaica	-0.28	145	Taiwan	-2.16
48	Bosnia & Herze.	0.46	97	Turkey	-0.30	146	Israel	-2.25
49	Haiti	0.42	98	Ukraine	-0.33			

Indicator: Natural Resource Management

1	Croatia	1.00	50	Mongolia	0.22	99	Ghana	-0.15
2	Honduras	0.79	51	Ecuador	0.22	100	United Arab Em.	-0.16
3	Angola	0.79	52	Guyana	0.22	101	Malawi	-0.17
4	Haiti	0.77	53	Moldova	0.21	102	Senegal	-0.18
5	P. N. Guinea	0.72	54	Germany	0.20	103	Iraq	-0.18
6	Nicaragua	0.69	55	South Africa	0.20	104	Tunisia	-0.18
7	Guinea-Bissau	0.68	56	Kazakhstan	0.20	105	Kenya	-0.18
8	Zimbabwe	0.66	57	Australia	0.19	106	Viet Nam	-0.20
9	Liberia	0.64	58	Jamaica	0.19	107	Mexico	-0.21
10	Chad	0.61	59	Rwanda	0.18	108	Malaysia	-0.22
11	Estonia	0.60	60	Ethiopia	0.16	109	Cameroon	-0.23
12	Guatemala	0.55	61	Uruguay	0.16	110	Botswana	-0.24
13	Czech Rep.	0.53	62	Costa Rica	0.16	111	Sweden	-0.24
14	Latvia	0.52	63	Côte d'Ivoire	0.16	112	Jordan	-0.24
15	Yemen	0.51	64	Nigeria	0.15	113	Tanzania	-0.25
16	Saudi Arabia	0.50	65	Paraguay	0.15	114	India	-0.25
17	Bolivia	0.50	66	Panama	0.14	115	New Zealand	-0.26
18	Dominican Rep.	0.50	67	Dem. Rep. Congo	0.14	116	Cuba	-0.31
19	Lithuania	0.47	68	Indonesia	0.13	117	Morocco	-0.33
20	Russia	0.46	69	Trinidad & Tobago	0.12	118	Turkey	-0.38
21	Georgia	0.45	70	Algeria	0.12	119	Chile	-0.39
22	Libya	0.45	71	Kyrgyzstan	0.12	120	Slovakia	-0.41
23	Romania	0.45	72	Ireland	0.11	121	Peru	-0.45
24	Mozambique	0.44	73	Finland	0.09	122	Taiwan	-0.46
25	Sierra Leone	0.44	74	Lebanon	0.09	123	Austria	-0.46
26	Sudan	0.41	75	Bosnia & Herze.	0.09	124	Belgium	-0.50
27	Mauritania	0.40	76	Namibia	0.08	125	Kuwait	-0.51
28	Poland	0.39	77	Iran	0.07	126	Norway	-0.56
29	Belarus	0.38	78	Philippines	0.07	127	Turkmenistan	-0.57
30	Albania	0.37	79	El Salvador	0.07	128	Slovenia	-0.57
31	Gabon	0.37	80	Pakistan	0.07	129	Thailand	-0.58
32	Serbia & Monten.	0.36	81	Argentina	0.06	130	China	-0.59
33	Burundi	0.35	82	Azerbaijan	0.06	131	Netherlands	-0.61
34	Uganda	0.34	83	Myanmar	0.06	132	France	-0.68
35	Venezuela	0.34	84	Bangladesh	0.03	133	Uzbekistan	-0.69
36	Ukraine	0.33	85	North Korea	0.03	134	Hungary	-0.69
37	Congo	0.32	86	Cambodia	0.02	135	United States	-0.82
38	Laos	0.31	87	Colombia	0.01	136	Greece	-0.83
39	Mali	0.31	88	Zambia	0.01	137	Israel	-0.83
40	Macedonia	0.30	89	Armenia	0.00	138	Portugal	-0.84
41	Central Afr. Rep.	0.28	90	Syria	0.00	139	Egypt	-0.86
42	Nepal	0.28	91	Togo	-0.01	140	Italy	-0.87
43	Bulgaria	0.26	92	Brazil	-0.02	141	Japan	-1.05
44	Oman	0.26	93	Tajikistan	-0.07	142	Spain	-1.10
45	Guinea	0.25	94	Gambia	-0.07	143	Switzerland	-1.11
46	Niger	0.25	95	Sri Lanka	-0.09	144	Denmark	-1.12
47	Burkina Faso	0.24	96	Benin	-0.10	145	South Korea	-1.35
48	Bhutan	0.23	97	Canada	-0.11	146	Iceland	-1.89
49	Madagascar	0.23	98	United Kingdom	-0.15			

Indicator: Environmental Health

1	Sweden	0.95	50	Peru	0.55	99	El Salvador	-0.36
2	Austria	0.95	51	Macedonia	0.54	100	Cameroon	-0.38
3	Czech Rep.	0.95	52	Mexico	0.53	101	North Korea	-0.41
4	Germany	0.95	53	Costa Rica	0.52	102	Mongolia	-0.41
5	Norway	0.94	54	Taiwan	0.51	103	Kenya	-0.42
6	Finland	0.94	55	Ukraine	0.49	104	Kyrgyzstan	-0.44
7	Canada	0.94	56	Bulgaria	0.47	105	Senegal	-0.45
8	Iceland	0.94	57	Bosnia & Herze.	0.46	106	Benin	-0.46
9	Japan	0.94	58	Turkey	0.45	107	Madagascar	-0.46
10	Spain	0.94	59	United Arab Em.	0.44	108	Bhutan	-0.47
11	Croatia	0.93	60	Ecuador	0.44	109	Pakistan	-0.53
12	Slovakia	0.93	61	Georgia	0.42	110	Uganda	-0.56
13	Hungary	0.93	62	Moldova	0.41	111	Sudan	-0.57
14	Netherlands	0.93	63	Indonesia	0.37	112	Haiti	-0.65
15	Lithuania	0.92	64	Viet Nam	0.34	113	Zimbabwe	-0.67
16	Poland	0.92	65	Venezuela	0.33	114	Togo	-0.67
17	United States	0.92	66	Albania	0.32	115	Côte d'Ivoire	-0.69
18	Israel	0.92	67	Armenia	0.29	116	Gambia	-0.74
19	Denmark	0.90	68	Namibia	0.27	117	Tanzania	-0.75
20	New Zealand	0.88	69	Russia	0.26	118	Philippines	-0.77
21	Cuba	0.88	70	Paraguay	0.25	119	Zambia	-0.79
22	Italy	0.86	71	Jordan	0.22	120	Guinea	-0.83
23	Slovenia	0.85	72	Tunisia	0.19	121	Iraq	-0.90
24	Uruguay	0.85	73	Morocco	0.18	122	Rwanda	-0.94
25	Romania	0.85	74	Honduras	0.17	123	Burkina Faso	-0.95
26	Argentina	0.85	75	Lebanon	0.11	124	Nigeria	-0.95
27	Belgium	0.85	76	South Africa	0.09	125	Uzbekistan	-0.98
28	France	0.84	77	Iran	0.08	126	Guinea-Bissau	-1.02
29	Chile	0.84	78	Bangladesh	0.08	127	Central Afr. Rep.	-1.05
30	South Korea	0.82	79	Nicaragua	0.08	128	Congo	-1.08
31	Ireland	0.81	80	India	0.08	129	Ethiopia	-1.10
32	Greece	0.81	81	Kuwait	0.08	130	Yemen	-1.15
33	Portugal	0.81	82	Syria	0.03	131	Azerbaijan	-1.17
34	Switzerland	0.79	83	Libya	0.02	132	Sierra Leone	-1.29
35	United Kingdom	0.78	84	Botswana	0.01	133	Mali	-1.30
36	Estonia	0.74	85	Nepal	0.01	134	Chad	-1.32
37	Latvia	0.74	86	Guatemala	0.01	135	Mauritania	-1.35
38	Sri Lanka	0.74	87	Dominican Rep.	0.00	136	Malawi	-1.36
39	Australia	0.72	88	Myanmar	-0.03	137	Burundi	-1.39
40	Malaysia	0.68	89	Ghana	-0.07	138	Mozambique	-1.45
41	Thailand	0.66	90	Kazakhstan	-0.09	139	Liberia	-1.50
42	Jamaica	0.66	91	Oman	-0.17	140	Niger	-1.53
43	Colombia	0.61	92	P. N. Guinea	-0.18	141	Guyana	-1.53
44	Trinidad & Tobago	0.60	93	Saudi Arabia	-0.23	142	Angola	-1.75
45	China	0.60	94	Gabon	-0.25	143	Dem. Rep. Congo	-1.84
46	Serbia & Monten.	0.59	95	Cambodia	-0.27	144	Egypt	-1.84
47	Panama	0.59	96	Bolivia	-0.32	145	Tajikistan	-2.17
48	Brazil	0.56	97	Algeria	-0.33	146	Turkmenistan	-2.64
49	Belarus	0.56	98	Laos	-0.35			

Indicator: Basic Human Sustenance

1	Poland	1.00	50	Taiwan	0.59	99	Romania	-0.21
2	Slovenia	1.00	51	Jordan	0.56	100	Azerbaijan	-0.29
3	Hungary	0.97	52	Saudi Arabia	0.56	101	Gambia	-0.34
4	Sweden	0.97	53	Jamaica	0.52	102	Viet Nam	-0.34
5	Austria	0.97	54	Serbia & Monten.	0.52	103	Iraq	-0.36
6	Germany	0.97	55	Bulgaria	0.51	104	Nigeria	-0.37
7	Norway	0.97	56	Croatia	0.50	105	Sri Lanka	-0.39
8	Finland	0.97	57	Tunisia	0.49	106	Benin	-0.39
9	Canada	0.97	58	Ecuador	0.48	107	Nicaragua	-0.42
10	Iceland	0.97	59	Algeria	0.45	108	Georgia	-0.47
11	Japan	0.97	60	Gabon	0.42	109	Senegal	-0.52
12	Netherlands	0.97	61	Brazil	0.41	110	Mauritania	-0.54
13	United States	0.97	62	Cuba	0.41	111	Sudan	-0.64
14	Israel	0.97	63	Moldova	0.40	112	Zimbabwe	-0.68
15	Denmark	0.97	64	Trinidad & Tobago	0.38	113	Bangladesh	-0.69
16	France	0.97	65	Colombia	0.37	114	Armenia	-0.79
17	Ireland	0.97	66	Macedonia	0.30	115	Uganda	-0.82
18	Greece	0.97	67	Syria	0.29	116	Cameroon	-0.87
19	Switzerland	0.97	68	Oman	0.28	117	Yemen	-0.88
20	United Kingdom	0.97	69	Namibia	0.22	118	Burkina Faso	-0.90
21	Australia	0.97	70	Morocco	0.22	119	Malawi	-0.94
22	Spain	0.96	71	Myanmar	0.22	120	Rwanda	-1.02
23	Lithuania	0.94	72	Libya	0.21	121	Central Afr. Rep.	-1.05
24	United Arab Em.	0.94	73	Indonesia	0.20	122	Bhutan	-1.06
25	Portugal	0.92	74	South Africa	0.18	123	Tanzania	-1.08
26	Czech Rep.	0.91	75	Pakistan	0.13	124	Mali	-1.10
27	Belarus	0.91	76	Peru	0.13	125	Guinea-Bissau	-1.13
28	Lebanon	0.91	77	Paraguay	0.12	126	Togo	-1.14
29	New Zealand	0.90	78	Botswana	0.12	127	Kenya	-1.20
30	Estonia	0.87	79	Kyrgyzstan	0.11	128	Mongolia	-1.23
31	Belgium	0.87	80	Honduras	0.10	129	Guinea	-1.24
32	Malaysia	0.86	81	Guyana	0.09	130	Laos	-1.28
33	Uruguay	0.85	82	Guatemala	0.09	131	Haiti	-1.32
34	Egypt	0.85	83	Côte d'Ivoire	0.09	132	Liberia	-1.36
35	Slovakia	0.84	84	El Salvador	0.06	133	Congo	-1.44
36	Kuwait	0.84	85	Ghana	0.04	134	P. N. Guinea	-1.54
37	Ukraine	0.82	86	Dominican Rep.	0.03	135	Niger	-1.56
38	Italy	0.80	87	Nepal	0.03	136	Madagascar	-1.65
39	Albania	0.79	88	China	0.02	137	Burundi	-1.74
40	Latvia	0.78	89	Thailand	-0.01	138	Sierra Leone	-1.74
41	South Korea	0.77	90	Turkmenistan	-0.03	139	Zambia	-1.80
42	Russia	0.76	91	Venezuela	-0.03	140	Chad	-1.83
43	Chile	0.73	92	India	-0.04	141	Angola	-1.91
44	Costa Rica	0.73	93	North Korea	-0.05	142	Cambodia	-1.96
45	Turkey	0.71	94	Panama	-0.05	143	Ethiopia	-2.08
46	Bosnia & Herze.	0.70	95	Kazakhstan	-0.07	144	Mozambique	-2.25
47	Argentina	0.69	96	Bolivia	-0.10	145	Tajikistan	-2.33
48	Iran	0.65	97	Philippines	-0.10	146	Dem. Rep. Congo	-2.66
49	Mexico	0.59	98	Uzbekistan	-0.11			

Indicator: Reducing Environment-Related Natural Disaster Vulnerability

1	Finland	0.77	50	Senegal	0.46	99	United Kingdom	-0.10
2	Saudi Arabia	0.77	51	Guinea-Bissau	0.46	100	Yemen	-0.12
3	Bulgaria	0.77	52	Malawi	0.45	101	Indonesia	-0.13
4	Slovenia	0.77	53	Algeria	0.45	102	Peru	-0.15
5	Croatia	0.77	54	Turkey	0.45	103	Malaysia	-0.16
6	Oman	0.76	55	Panama	0.45	104	Zimbabwe	-0.17
7	Bosnia & Herze.	0.76	56	Ghana	0.43	105	Switzerland	-0.18
8	Belarus	0.75	57	Norway	0.42	106	Chad	-0.18
9	Congo	0.75	58	Nigeria	0.41	107	Mexico	-0.22
10	Mongolia	0.74	59	Libya	0.40	108	China	-0.23
11	Uzbekistan	0.74	60	Belgium	0.40	109	Sri Lanka	-0.24
12	Central Afr. Rep.	0.72	61	Ireland	0.40	110	Iran	-0.28
13	Canada	0.72	62	Zambia	0.39	111	Laos	-0.28
14	Mali	0.71	63	Namibia	0.39	112	Myanmar	-0.30
15	Cameroon	0.71	64	Macedonia	0.39	113	Kenya	-0.31
16	Trinidad & Tobago	0.71	65	Côte d'Ivoire	0.36	114	Mauritania	-0.36
17	Iceland	0.70	66	Australia	0.36	115	Lebanon	-0.36
18	Czech Rep.	0.69	67	Tajikistan	0.35	116	Jordan	-0.36
19	Kyrgyzstan	0.69	68	Italy	0.35	117	India	-0.37
20	Ukraine	0.69	69	United Arab Em.	0.34	118	Rwanda	-0.40
21	Togo	0.68	70	Israel	0.34	119	Dominican Rep.	-0.45
22	Burkina Faso	0.67	71	Botswana	0.33	120	Pakistan	-0.48
23	Albania	0.66	72	Burundi	0.33	121	Thailand	-0.49
24	Russia	0.64	73	Liberia	0.33	122	Bhutan	-0.53
25	Turkmenistan	0.64	74	Slovakia	0.32	123	Colombia	-0.53
26	Uruguay	0.62	75	New Zealand	0.31	124	Cambodia	-0.55
27	Hungary	0.60	76	Sierra Leone	0.30	125	Costa Rica	-0.57
28	Austria	0.60	77	Niger	0.30	126	Jamaica	-0.61
29	Dem. Rep. Congo	0.60	78	Germany	0.29	127	Madagascar	-0.65
30	Kazakhstan	0.60	79	Romania	0.27	128	Japan	-0.80
31	Armenia	0.56	80	Egypt	0.25	129	Nepal	-0.83
32	Azerbaijan	0.55	81	Iraq	0.25	130	Haiti	-0.84
33	Kuwait	0.54	82	Spain	0.24	131	Venezuela	-0.99
34	Poland	0.53	83	Moldova	0.22	132	Chile	-1.00
35	Guinea	0.51	84	Syria	0.22	133	El Salvador	-1.04
36	Serbia & Monten.	0.51	85	P. N. Guinea	0.21	134	South Korea	-1.11
37	Greece	0.50	86	Portugal	0.21	135	Viet Nam	-1.24
38	Benin	0.50	87	Cuba	0.18	136	Ecuador	-1.45
39	Tanzania	0.49	88	Tunisia	0.14	137	Philippines	-1.64
40	Georgia	0.49	89	Angola	0.11	138	Guatemala	-1.72
41	France	0.46	90	South Africa	0.06	139	Ethiopia	-1.87
42	Sweden	0.46	91	Bolivia	0.04	140	Bangladesh	-1.92
43	Netherlands	0.46	92	Argentina	0.03	141	Sudan	-2.14
44	Denmark	0.46	93	Gambia	0.03	142	Honduras	-2.14
45	Lithuania	0.46	94	United States	0.00	143	North Korea	-2.41
46	Estonia	0.46	95	Morocco	0.00	144	Mozambique	-2.49
47	Latvia	0.46	96	Paraguay	-0.03	145	Nicaragua	-2.97
48	Gabon	0.46	97	Brazil	-0.06	146	Taiwan	-3.19
49	Guyana	0.46	98	Uganda	-0.07			

Indicator: Environmental Governance

1	Iceland	1.65	50	Dominican Rep.	0.07	99	Russia	-0.40
2	Netherlands	1.62	51	Nicaragua	0.06	100	Central Afr. Rep.	-0.40
3	Denmark	1.59	52	Bolivia	0.05	101	Cambodia	-0.40
4	Germany	1.57	53	Thailand	0.04	102	P. N. Guinea	-0.41
5	Austria	1.54	54	Brazil	0.02	103	Gambia	-0.43
6	Finland	1.40	55	Colombia	0.02	104	Ethiopia	-0.44
7	Switzerland	1.39	56	El Salvador	0.01	105	Mozambique	-0.45
8	United Kingdom	1.37	57	Senegal	0.01	106	Georgia	-0.45
9	Sweden	1.26	58	Ecuador	0.01	107	Côte d'Ivoire	-0.46
10	Norway	1.26	59	Honduras	0.00	108	Niger	-0.47
11	Belgium	1.23	60	Tanzania	-0.01	109	Bangladesh	-0.52
12	New Zealand	1.15	61	Guatemala	-0.02	110	Indonesia	-0.52
13	Spain	1.08	62	Romania	-0.06	111	Cuba	-0.52
14	Ireland	1.06	63	Bhutan	-0.07	112	Egypt	-0.54
15	France	1.00	64	Guinea-Bissau	-0.07	113	Pakistan	-0.54
16	Japan	0.99	65	Trinidad & Tobago	-0.09	114	Congo	-0.55
17	Australia	0.97	66	India	-0.10	115	China	-0.58
18	Costa Rica	0.92	67	Ghana	-0.10	116	Syria	-0.63
19	Portugal	0.86	68	Tunisia	-0.11	117	Guinea	-0.64
20	Botswana	0.84	69	Peru	-0.11	118	Togo	-0.69
21	Hungary	0.81	70	Benin	-0.11	119	Algeria	-0.69
22	United States	0.80	71	Nepal	-0.12	120	Kyrgyzstan	-0.69
23	Estonia	0.78	72	Madagascar	-0.13	121	Cameroon	-0.69
24	Canada	0.78	73	Philippines	-0.15	122	Rwanda	-0.70
25	Slovakia	0.76	74	United Arab Em.	-0.15	123	Iran	-0.72
26	South Korea	0.76	75	Kuwait	-0.17	124	Belarus	-0.72
27	Czech Rep.	0.76	76	Mexico	-0.17	125	Kazakhstan	-0.73
28	Italy	0.74	77	Lebanon	-0.17	126	Sierra Leone	-0.74
29	Poland	0.67	78	Oman	-0.18	127	Viet Nam	-0.75
30	Greece	0.60	79	Moldova	-0.20	128	Chad	-0.76
31	Slovenia	0.60	80	Uganda	-0.22	129	Azerbaijan	-0.80
32	Lithuania	0.58	81	Malawi	-0.22	130	Bosnia and Herze.	-0.81
33	Taiwan	0.56	82	Morocco	-0.24	131	Laos	-0.81
34	Israel	0.56	83	Mali	-0.26	132	Burundi	-0.86
35	Chile	0.48	84	Burkina Faso	-0.27	133	Yemen	-0.86
36	Latvia	0.48	85	Venezuela	-0.27	134	Dem. Rep. Congo	-0.87
37	Uruguay	0.40	86	Guyana	-0.28	135	Tajikistan	-0.88
38	Panama	0.38	87	Serbia & Montenegro	-0.28	136	Nigeria	-0.89
39	Croatia	0.34	88	Saudi Arabia	-0.28	137	Angola	-0.96
40	Bulgaria	0.34	89	Albania	-0.32	138	Haiti	-1.00
41	South Africa	0.31	90	Argentina	-0.34	139	Uzbekistan	-1.00
42	Jordan	0.27	91	Ukraine	-0.34	140	Liberia	-1.04
43	Sri Lanka	0.26	92	Paraguay	-0.34	141	Libya	-1.05
44	Jamaica	0.26	93	Gabon	-0.35	142	Sudan	-1.10
45	Mongolia	0.26	94	Mauritania	-0.35	143	Myanmar	-1.19
46	Turkey	0.21	95	Macedonia	-0.35	144	North Korea	-1.29
47	Malaysia	0.19	96	Kenya	-0.37	145	Turkmenistan	-1.35
48	Namibia	0.14	97	Zimbabwe	-0.37	146	Iraq	-1.52
49	Zambia	0.13	98	Armenia	-0.38			

Indicator: Eco-Efficiency

1	Dem. Rep. Congo	1.92	50	Nicaragua	0.20	99	Egypt	-0.26
2	Bhutan	1.89	51	Ecuador	0.19	100	Guyana	-0.27
3	Laos	1.80	52	Argentina	0.18	101	Algeria	-0.28
4	Mozambique	1.73	53	Benin	0.15	102	Hungary	-0.31
5	Uganda	1.38	54	Chad	0.13	103	Mauritania	-0.32
6	Uruguay	1.37	55	Croatia	0.13	104	Poland	-0.33
7	Zambia	1.26	56	Angola	0.12	105	Netherlands	-0.33
8	Malawi	1.20	57	Zimbabwe	0.11	106	Romania	-0.33
9	Ghana	1.19	58	Bolivia	0.11	107	United States	-0.34
10	Costa Rica	1.18	59	Gambia	0.09	108	Tajikistan	-0.37
11	Cameroon	1.13	60	Denmark	0.09	109	Australia	-0.39
12	Mali	1.10	61	Bangladesh	0.09	110	Czech Rep.	-0.41
13	Paraguay	1.04	62	Niger	0.08	111	Syria	-0.42
14	Norway	1.02	63	Italy	0.05	112	Yemen	-0.42
15	Tanzania	0.93	64	Portugal	0.05	113	Belgium	-0.42
16	Iceland	0.90	65	Togo	0.04	114	Malaysia	-0.43
17	Ethiopia	0.90	66	Finland	0.03	115	Lithuania	-0.44
18	Nepal	0.87	67	Pakistan	0.03	116	South Africa	-0.45
19	Albania	0.79	68	Latvia	0.02	117	Slovakia	-0.46
20	Myanmar	0.76	69	Turkey	0.02	118	Jordan	-0.49
21	El Salvador	0.75	70	India	0.00	119	South Korea	-0.49
22	Peru	0.74	71	Morocco	-0.02	120	Estonia	-0.50
23	Brazil	0.67	72	Liberia	-0.02	121	Oman	-0.52
24	Colombia	0.66	73	Ireland	-0.04	122	Kyrgyzstan	-0.52
25	Guinea	0.66	74	Botswana	-0.04	123	Lebanon	-0.56
26	Philippines	0.59	75	Dominican Rep.	-0.05	124	Taiwan	-0.56
27	Switzerland	0.56	76	Slovenia	-0.06	125	Iraq	-0.64
28	Kenya	0.55	77	Senegal	-0.07	126	Serbia & Monten.	-0.66
29	Namibia	0.54	78	Macedonia	-0.09	127	Armenia	-0.66
30	Madagascar	0.54	79	Spain	-0.09	128	Iran	-0.66
31	Burundi	0.54	80	Japan	-0.10	129	Venezuela	-0.72
32	Central Afr. Rep.	0.51	81	China	-0.11	130	Jamaica	-0.73
33	Viet Nam	0.51	82	France	-0.11	131	Bulgaria	-0.74
34	Gabon	0.50	83	Canada	-0.11	132	North Korea	-0.83
35	P. N. Guinea	0.49	84	Cuba	-0.13	133	Libya	-1.04
36	Sri Lanka	0.45	85	Tunisia	-0.13	134	Saudi Arabia	-1.05
37	Rwanda	0.43	86	Germany	-0.13	135	Mongolia	-1.15
38	Congo	0.42	87	Indonesia	-0.14	136	Russia	-1.19
39	Guatemala	0.41	88	Sierra Leone	-0.14	137	Belarus	-1.22
40	Austria	0.40	89	Guinea-Bissau	-0.14	138	Kazakhstan	-1.30
41	New Zealand	0.40	90	Bosnia & Herze.	-0.15	139	Azerbaijan	-1.30
42	Honduras	0.40	91	Mexico	-0.15	140	Kuwait	-1.50
43	Sweden	0.39	92	Georgia	-0.15	141	Turkmenistan	-1.51
44	Côte d'Ivoire	0.37	93	Nigeria	-0.16	142	Moldova	-1.52
45	Haiti	0.34	94	United Kingdom	-0.18	143	Ukraine	-1.62
46	Chile	0.31	95	Greece	-0.19	144	Uzbekistan	-1.97
47	Sudan	0.26	96	Thailand	-0.21	145	Trinidad & Tobago	-2.04
48	Cambodia	0.25	97	Israel	-0.21	146	United Arab Em.	-2.04
49	Burkina Faso	0.23	98	Panama	-0.25			

Indicator: Private Sector Responsiveness

1	Finland	2.12	50	Philippines	0.07	99	Serbia & Monten.	-0.62
2	Switzerland	2.05	51	Portugal	0.06	100	Panama	-0.62
3	Japan	2.04	52	Mexico	0.05	101	Macedonia	-0.62
4	Sweden	1.71	53	Ghana	-0.01	102	Laos	-0.62
5	Netherlands	1.70	54	Namibia	-0.02	103	Dominican Rep.	-0.62
6	United Kingdom	1.60	55	Egypt	-0.05	104	Albania	-0.65
7	Germany	1.48	56	Indonesia	-0.05	105	Niger	-0.65
8	Norway	1.38	57	Viet Nam	-0.05	106	Kyrgyzstan	-0.66
9	Denmark	1.37	58	Greece	-0.06	107	Algeria	-0.66
10	Spain	1.26	59	Zambia	-0.08	108	Mauritania	-0.67
11	Argentina	1.23	60	Tanzania	-0.12	109	Iraq	-0.67
12	France	0.93	61	Kuwait	-0.14	110	Burkina Faso	-0.67
13	Australia	0.92	62	Gambia	-0.16	111	Pakistan	-0.67
14	Czech Rep.	0.88	63	Botswana	-0.16	112	Sudan	-0.68
15	Slovakia	0.87	64	Jamaica	-0.18	113	Mozambique	-0.69
16	Slovenia	0.87	65	Oman	-0.22	114	Guinea	-0.70
17	Canada	0.84	66	Romania	-0.25	115	Togo	-0.70
18	South Korea	0.76	67	Trinidad & Tobago	-0.26	116	Guinea-Bissau	-0.71
19	Italy	0.71	68	China	-0.29	117	Madagascar	-0.72
20	Hungary	0.70	69	Lebanon	-0.30	118	North Korea	-0.73
21	Taiwan	0.66	70	Nigeria	-0.30	119	Yemen	-0.74
22	United States	0.65	71	Uganda	-0.30	120	Gabon	-0.76
23	Malaysia	0.65	72	Zimbabwe	-0.31	121	Mongolia	-0.77
24	United Arab Em.	0.64	73	Saudi Arabia	-0.32	122	Uzbekistan	-0.78
25	Thailand	0.63	74	Syria	-0.32	123	Ethiopia	-0.78
26	Estonia	0.59	75	Guyana	-0.32	124	Venezuela	-0.78
27	Austria	0.58	76	Ecuador	-0.35	125	Bangladesh	-0.78
28	South Africa	0.58	77	Sri Lanka	-0.36	126	Moldova	-0.79
29	Uruguay	0.51	78	Senegal	-0.37	127	Ukraine	-0.80
30	Colombia	0.50	79	Cambodia	-0.41	128	Burundi	-0.80
31	Brazil	0.50	80	Cameroon	-0.42	129	Côte d'Ivoire	-0.82
32	India	0.50	81	Iran	-0.43	130	Tajikistan	-0.83
33	Belgium	0.41	82	Kenya	-0.46	131	Bolivia	-0.83
34	New Zealand	0.41	83	Azerbaijan	-0.46	132	Guatemala	-0.84
35	Poland	0.37	84	Benin	-0.50	133	Congo	-0.85
36	Iceland	0.36	85	Mali	-0.51	134	Honduras	-0.85
37	Tunisia	0.31	86	Cuba	-0.52	135	Russia	-0.86
38	Lithuania	0.31	87	Bulgaria	-0.53	136	Chad	-0.88
39	Ireland	0.30	88	Kazakhstan	-0.53	137	P. N. Guinea	-0.89
40	Israel	0.27	89	Belarus	-0.54	138	El Salvador	-0.89
41	Turkey	0.25	90	Libya	-0.54	139	Liberia	-0.91
42	Chile	0.25	91	Armenia	-0.55	140	Sierra Leone	-0.92
43	Costa Rica	0.21	92	Myanmar	-0.55	141	Dem. Rep. Congo	-0.97
44	Peru	0.16	93	Nepal	-0.55	142	Turkmenistan	-1.00
45	Malawi	0.15	94	Bosnia & Herze.	-0.57	143	Haiti	-1.06
46	Latvia	0.13	95	Bhutan	-0.59	144	Nicaragua	-1.07
47	Morocco	0.11	96	Rwanda	-0.60	145	Paraguay	-1.08
48	Jordan	0.11	97	Central Afr. Rep.	-0.60	146	Angola	-1.08
49	Croatia	0.10	98	Georgia	-0.61			

Indicator: Science and Technology

1	Sweden	2.15	50	Kazakhstan	0.18	99	Honduras	-0.37
2	United States	2.00	51	Panama	0.17	100	Oman	-0.37
3	Finland	1.98	52	Romania	0.17	101	Iran	-0.40
4	Japan	1.93	53	Kuwait	0.13	102	Gabon	-0.40
5	Norway	1.79	54	Malaysia	0.12	103	Nicaragua	-0.44
6	South Korea	1.64	55	Serbia & Monten.	0.10	104	Myanmar	-0.48
7	Iceland	1.55	56	Costa Rica	0.10	105	Mauritania	-0.55
8	Denmark	1.55	57	Thailand	0.08	106	Bangladesh	-0.58
9	Taiwan	1.54	58	Venezuela	0.08	107	Kenya	-0.59
10	Canada	1.48	59	Philippines	0.05	108	Cameroon	-0.61
11	Australia	1.44	60	Uzbekistan	0.04	109	Cambodia	-0.63
12	Switzerland	1.38	61	Macedonia	0.04	110	Tanzania	-0.63
13	New Zealand	1.33	62	Bolivia	0.04	111	Nigeria	-0.64
14	Belgium	1.33	63	Jamaica	0.04	112	Zimbabwe	-0.64
15	United Kingdom	1.32	64	Armenia	0.03	113	Togo	-0.65
16	Germany	1.30	65	Bosnia & Herze.	0.02	114	Madagascar	-0.66
17	Netherlands	1.28	66	Kyrgyzstan	0.01	115	Laos	-0.67
18	France	1.20	67	Mexico	0.01	116	Rwanda	-0.67
19	Slovenia	1.16	68	Brazil	-0.01	117	Malawi	-0.68
20	Russia	1.16	69	Colombia	-0.02	118	Benin	-0.71
21	Austria	1.12	70	Tunisia	-0.03	119	Mozambique	-0.71
22	Israel	1.07	71	Peru	-0.04	120	Pakistan	-0.74
23	Spain	1.05	72	Guyana	-0.05	121	Senegal	-0.74
24	Ireland	0.99	73	Azerbaijan	-0.07	122	Ghana	-0.75
25	Estonia	0.94	74	South Africa	-0.08	123	Gambia	-0.78
26	Greece	0.85	75	Ecuador	-0.10	124	P. N. Guinea	-0.81
27	Poland	0.78	76	Dominican Rep.	-0.11	125	Yemen	-0.87
28	Portugal	0.78	77	Cuba	-0.12	126	Zambia	-0.89
29	Italy	0.70	78	China	-0.14	127	Haiti	-1.03
30	Latvia	0.69	79	Trinidad & Tobago	-0.17	128	Sierra Leone	-1.04
31	Lithuania	0.69	80	Botswana	-0.18	129	Guinea-Bissau	-1.07
32	Ukraine	0.57	81	Moldova	-0.18	130	Ethiopia	-1.12
33	Hungary	0.55	82	El Salvador	-0.20	131	Burundi	-1.13
34	United Arab Em.	0.55	83	Albania	-0.20	132	Uganda	-1.15
35	Belarus	0.51	84	Namibia	-0.21	133	Angola	-1.16
36	Argentina	0.51	85	Turkey	-0.22	134	Congo	-1.17
37	Czech Rep.	0.50	86	Indonesia	-0.23	135	Chad	-1.18
38	Lebanon	0.46	87	Sri Lanka	-0.24	136	Côte d'Ivoire	-1.19
39	Bulgaria	0.42	88	Paraguay	-0.25	137	Guinea	-1.21
40	Slovakia	0.41	89	Algeria	-0.27	138	Nepal	-1.33
41	Croatia	0.37	90	Syria	-0.27	139	Bhutan	-1.34
42	Libya	0.36	91	India	-0.28	140	Central Afr. Rep.	-1.38
43	Jordan	0.35	92	Iraq	-0.29	141	Dem. Rep. Congo	-1.38
44	Chile	0.28	93	Saudi Arabia	-0.30	142	Mali	-1.39
45	Egypt	0.27	94	Morocco	-0.30	143	Sudan	-1.41
46	Uruguay	0.25	95	Turkmenistan	-0.31	144	Liberia	-1.42
47	Georgia	0.22	96	Viet Nam	-0.32	145	Niger	-1.47
48	Mongolia	0.22	97	Tajikistan	-0.34	146	Burkina Faso	-1.47
49	North Korea	0.19	98	Guatemala	-0.34			

Indicator: Participation in International Collaborative Efforts

1	Germany	1.74	50	Turkey	0.36	99	Taiwan	-0.30
2	Finland	1.55	51	New Zealand	0.34	100	Gambia	-0.34
3	Sweden	1.52	52	Paraguay	0.33	101	Hungary	-0.34
4	Netherlands	1.51	53	Israel	0.32	102	Jamaica	-0.35
5	Japan	1.43	54	Greece	0.31	103	P. N. Guinea	-0.44
6	Denmark	1.37	55	Austria	0.28	104	Cambodia	-0.44
7	United Kingdom	1.22	56	Namibia	0.25	105	Albania	-0.45
8	Norway	1.19	57	Cameroon	0.23	106	Dominican Rep.	-0.48
9	Ecuador	1.11	58	Bangladesh	0.23	107	Guinea-Bissau	-0.50
10	Egypt	1.04	59	Australia	0.20	108	Algeria	-0.51
11	Switzerland	1.01	60	Malawi	0.20	109	Bhutan	-0.53
12	Tunisia	1.00	61	South Africa	0.20	110	Burundi	-0.56
13	Portugal	0.98	62	Indonesia	0.15	111	Zambia	-0.56
14	France	0.98	63	Russia	0.11	112	Gabon	-0.57
15	Bolivia	0.89	64	Czech Rep.	0.09	113	Kuwait	-0.58
16	Philippines	0.88	65	Mongolia	0.08	114	Botswana	-0.60
17	Belgium	0.85	66	Bulgaria	0.06	115	Oman	-0.61
18	Mexico	0.83	67	Slovenia	0.06	116	Guyana	-0.61
19	Thailand	0.82	68	Viet Nam	0.05	117	Bosnia & Herze.	-0.63
20	Malaysia	0.80	69	Uruguay	0.04	118	Congo	-0.63
21	Costa Rica	0.76	70	South Korea	0.01	119	Latvia	-0.64
22	Brazil	0.76	71	Poland	-0.01	120	Rwanda	-0.66
23	Tanzania	0.74	72	Iceland	-0.04	121	Sudan	-0.68
24	Peru	0.73	73	Sri Lanka	-0.04	122	Kazakhstan	-0.68
25	Mali	0.73	74	Nigeria	-0.05	123	Yemen	-0.70
26	Jordan	0.69	75	Venezuela	-0.05	124	Central Afr. Rep.	-0.70
27	Chile	0.68	76	El Salvador	-0.06	125	Moldova	-0.72
28	Ireland	0.68	77	Nepal	-0.07	126	Dem. Rep. Congo	-0.72
29	Morocco	0.67	78	Syria	-0.11	127	Estonia	-0.73
30	India	0.67	79	Croatia	-0.12	128	Laos	-0.78
31	Guatemala	0.65	80	Azerbaijan	-0.13	129	Uzbekistan	-0.81
32	Canada	0.61	81	Iran	-0.16	130	Libya	-0.81
33	Italy	0.58	82	Lebanon	-0.17	131	Ukraine	-0.83
34	Panama	0.58	83	Guinea	-0.18	132	Angola	-0.88
35	Kenya	0.57	84	Ethiopia	-0.18	133	Macedonia	-0.88
36	United States	0.57	85	Honduras	-0.18	134	United Arab Em.	-0.91
37	Senegal	0.55	86	Georgia	-0.21	135	Serbia & Monten.	-0.91
38	Spain	0.54	87	Mauritania	-0.21	136	Liberia	-0.91
39	Nicaragua	0.54	88	Togo	-0.21	137	Haiti	-0.93
40	China	0.52	89	Zimbabwe	-0.22	138	Sierra Leone	-0.98
41	Côte d'Ivoire	0.50	90	Niger	-0.23	139	Belarus	-1.05
42	Ghana	0.48	91	Trinidad & Tobago	-0.24	140	Saudi Arabia	-1.31
43	Uganda	0.47	92	Romania	-0.25	141	Myanmar	-1.37
44	Argentina	0.45	93	Slovakia	-0.26	142	Kyrgyzstan	-1.43
45	Colombia	0.42	94	Chad	-0.27	143	North Korea	-1.46
46	Cuba	0.41	95	Lithuania	-0.28	144	Turkmenistan	-1.49
47	Benin	0.37	96	Mozambique	-0.28	145	Tajikistan	-1.52
48	Burkina Faso	0.37	97	Pakistan	-0.29	146	Iraq	-1.69
49	Madagascar	0.36	98	Armenia	-0.29			

Indicator: Greenhouse Gas Emissions

1	Chad	1.97	50	Angola	0.31	99	South Korea	-0.38
2	Cambodia	1.97	51	Colombia	0.25	100	Tajikistan	-0.42
3	Mali	1.82	52	Togo	0.24	101	Mauritania	-0.42
4	Uganda	1.75	53	Japan	0.24	102	Mexico	-0.42
5	Laos	1.75	54	Austria	0.23	103	Dominican Rep.	-0.42
6	Central Afr. Rep.	1.66	55	Iceland	0.21	104	Egypt	-0.46
7	Burundi	1.65	56	Albania	0.21	105	Lebanon	-0.46
8	Myanmar	1.60	57	Denmark	0.20	106	Lithuania	-0.51
9	Rwanda	1.52	58	Philippines	0.15	107	Canada	-0.52
10	Mozambique	1.44	59	Honduras	0.14	108	Hungary	-0.55
11	Burkina Faso	1.36	60	Botswana	0.11	109	United States	-0.56
12	Malawi	1.30	61	Panama	0.09	110	Algeria	-0.56
13	Guinea	1.28	62	Norway	0.09	111	Guyana	-0.57
14	Dem. Rep. Congo	1.20	63	Yemen	0.09	112	Malaysia	-0.60
15	Niger	1.05	64	Argentina	0.09	113	Jordan	-0.62
16	Zambia	1.00	65	Morocco	0.05	114	Australia	-0.64
17	Haiti	0.96	66	Netherlands	0.04	115	China	-0.68
18	Ethiopia	0.96	67	Germany	0.03	116	Oman	-0.69
19	Sudan	0.93	68	Tunisia	0.01	117	Jamaica	-0.71
20	Madagascar	0.93	69	Italy	0.01	118	Iraq	-0.74
21	Nepal	0.91	70	Gabon	0.00	119	Slovakia	-0.76
22	Tanzania	0.91	71	Spain	-0.03	120	Moldova	-0.82
23	Liberia	0.88	72	Nicaragua	-0.04	121	Venezuela	-0.84
24	Sierra Leone	0.85	73	Pakistan	-0.04	122	Macedonia	-0.84
25	Gambia	0.85	74	Portugal	-0.06	123	South Africa	-0.86
26	Bangladesh	0.81	75	Belgium	-0.07	124	United Arab Em.	-0.87
27	Benin	0.73	76	Taiwan	-0.07	125	Libya	-0.89
28	Paraguay	0.69	77	Finland	-0.09	126	Romania	-0.91
29	P. N. Guinea	0.68	78	Indonesia	-0.13	127	Serbia & Monten.	-0.92
30	Uruguay	0.66	79	United Kingdom	-0.14	128	Poland	-0.94
31	Bhutan	0.61	80	New Zealand	-0.15	129	Iran	-0.95
32	Ghana	0.59	81	Chile	-0.16	130	Bosnia & Herze.	-0.98
33	Switzerland	0.57	82	Ireland	-0.17	131	Syria	-1.04
34	Cameroon	0.55	83	Bolivia	-0.18	132	Belarus	-1.05
35	Guinea-Bissau	0.54	84	Viet Nam	-0.19	133	Czech Rep.	-1.07
36	Namibia	0.52	85	Cuba	-0.20	134	Bulgaria	-1.10
37	Costa Rica	0.52	86	Ecuador	-0.23	135	Kuwait	-1.11
38	Sri Lanka	0.51	87	Georgia	-0.26	136	Saudi Arabia	-1.20
39	Sweden	0.50	88	Latvia	-0.26	137	Russia	-1.25
40	Senegal	0.49	89	Armenia	-0.29	138	Estonia	-1.27
41	Kenya	0.45	90	Slovenia	-0.30	139	Mongolia	-1.28
42	Guatemala	0.43	91	Croatia	-0.31	140	Uzbekistan	-1.30
43	Peru	0.42	92	Kyrgyzstan	-0.31	141	Azerbaijan	-1.31
44	Congo	0.41	93	Zimbabwe	-0.31	142	Kazakhstan	-1.41
45	Brazil	0.40	94	Turkey	-0.31	143	Ukraine	-1.49
46	Nigeria	0.36	95	Israel	-0.31	144	Trinidad & Tobago	-1.53
47	France	0.35	96	Thailand	-0.35	145	Turkmenistan	-1.55
48	El Salvador	0.32	97	Greece	-0.36	146	North Korea	-1.59
49	Côte d'Ivoire	0.31	98	India	-0.37			

Indicator: Reducing Transboundary Environmental Pressures

1	Madagascar	2.13	50	Côte d'Ivoire	0.42	99	Taiwan	-0.28
2	Central Afr. Rep.	1.98	51	Lithuania	0.42	100	Serbia & Monten.	-0.29
3	Gambia	1.73	52	Lebanon	0.40	101	Iraq	-0.33
4	Niger	1.62	53	Dem. Rep. Congo	0.40	102	Croatia	-0.34
5	Senegal	1.58	54	Georgia	0.39	103	Colombia	-0.39
6	Rwanda	1.50	55	Cuba	0.35	104	Slovakia	-0.41
7	Armenia	1.37	56	Switzerland	0.34	105	Bolivia	-0.42
8	Pakistan	1.36	57	Laos	0.34	106	Belgium	-0.44
9	Israel	1.29	58	Denmark	0.33	107	Portugal	-0.44
10	Uruguay	1.18	59	Jordan	0.30	108	Kuwait	-0.47
11	Bangladesh	1.16	60	Austria	0.30	109	Cameroon	-0.48
12	Guinea	1.13	61	Philippines	0.29	110	Ukraine	-0.48
13	El Salvador	1.12	62	Haiti	0.29	111	Slovenia	-0.50
14	Azerbaijan	1.08	63	Netherlands	0.27	112	Botswana	-0.52
15	Moldova	1.01	64	Malawi	0.25	113	Germany	-0.58
16	Nigeria	0.96	65	Guinea-Bissau	0.25	114	P. N. Guinea	-0.61
17	Guyana	0.95	66	Morocco	0.24	115	Tanzania	-0.61
18	Sri Lanka	0.94	67	Belarus	0.21	116	Hungary	-0.64
19	Jamaica	0.93	68	Uzbekistan	0.16	117	Kenya	-0.67
20	India	0.92	69	Burkina Faso	0.15	118	Czech Rep.	-0.68
21	Cambodia	0.91	70	Syria	0.14	119	Romania	-0.68
22	Togo	0.88	71	Argentina	0.11	120	Bulgaria	-0.73
23	Burundi	0.87	72	Brazil	0.09	121	Russia	-0.80
24	Mali	0.85	73	Mauritania	0.07	122	Italy	-0.81
25	Albania	0.84	74	Mozambique	0.06	123	Guatemala	-0.81
26	Paraguay	0.79	75	Sweden	0.06	124	Greece	-0.83
27	Liberia	0.76	76	Costa Rica	0.04	125	Libya	-0.88
28	Chad	0.76	77	Yemen	0.04	126	United States	-0.89
29	Honduras	0.74	78	Latvia	0.03	127	France	-0.93
30	Bhutan	0.74	79	Kazakhstan	0.02	128	Venezuela	-0.97
31	Nepal	0.71	80	North Korea	0.02	129	Australia	-1.12
32	Kyrgyzstan	0.70	81	Nicaragua	-0.01	130	Algeria	-1.33
33	Japan	0.67	82	Chile	-0.01	131	Mexico	-1.37
34	Iceland	0.66	83	Norway	-0.04	132	New Zealand	-1.39
35	Sierra Leone	0.65	84	Zambia	-0.04	133	Namibia	-1.46
36	South Korea	0.64	85	Congo	-0.05	134	China	-1.50
37	Peru	0.64	86	Finland	-0.05	135	Ecuador	-1.52
38	Indonesia	0.63	87	Turkmenistan	-0.05	136	Iran	-1.53
39	Benin	0.60	88	Bosnia & Herze.	-0.08	137	Trinidad & Tobago	-1.55
40	Thailand	0.60	89	United Arab Em.	-0.10	138	Saudi Arabia	-1.57
41	Myanmar	0.54	90	Gabon	-0.10	139	United Kingdom	-1.71
42	Uganda	0.51	91	Dominican Rep.	-0.13	140	Oman	-1.87
43	Macedonia	0.51	92	Panama	-0.14	141	Spain	-1.91
44	Viet Nam	0.50	93	Tunisia	-0.19	142	Turkey	-2.05
45	Ireland	0.49	94	Ethiopia	-0.24	143	Poland	-2.25
46	Malaysia	0.49	95	South Africa	-0.24	144	Canada	-2.47
47	Ghana	0.49	96	Egypt	-0.24	145	Sudan	-2.87
48	Mongolia	0.47	97	Angola	-0.26	146	Zimbabwe	-2.87
49	Tajikistan	0.43	98	Estonia	-0.27			

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Benchmarking National Environmental Stewardship

Appendix E ESI Values in Small States

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Appendix E – ESI Values in Small States

Five small states meet all but the size inclusion criteria for the ESI. As we discuss below, their size makes their environmental challenges fundamentally different from the rest of the countries in the index. We cannot impute missing values for these countries because including them with larger countries would generate inaccurate results. Therefore, we rely solely on available data. Nevertheless, individual scores can provide a starting point for small countries to benchmark their performance against each other as well as to use their indicator scores as a policy tool.

The architecture of the ESI, in which all indicator scores are calculated in relative terms and then averaged to generate the composite scores, presumes that the countries are fundamentally comparable. It also assumes that the significance of a very low or a very high score for any one variable is comparable across countries, and that it relates directly to practical concerns for environmental sustainability in each country.

For very small states this assumption is violated for several variables and indicators. This is especially true for the landscape and biodiversity related measures. The status of endangered species, for example, is problematic as a relative indicator. Many very small states are islands, which have different biodiversity constraints than other countries. For example, the 5,000 square kilometer cutoff for inclusion in the ESI is considered by

the World Conservation Union (IUCN) to be the minimum habitat range for a species to avoid being on the Red List of threatened species.

In addition, the ESI architecture assumes that an environmentally sustainable country is one which generates the bulk of the most valuable environmental services – such as clean air, plentiful water, arable land, biodiversity, and so on – from internal resources. Yet for countries that are extremely small this assumption makes little sense. A country such as Singapore, for example, must rely on its neighbors for some environmental resources. Similarly, the ESI assumes that a sustainable country sets aside a significant portion of its land as protected wilderness. Yet in very small countries the relevance of this metric differs from that of other ESI countries and is not comparable.

Many indicators, however, are equally relevant in small and large countries. Air and Water Quality, the vulnerability measures, and most of the capacity measures easily translate to the small country context. Because many of the data sets in the ESI that are relevant for countries of any size are not available and cannot be plausibly imputed (see Table E.1), we only report available component scores for small countries excluded from the ESI. Comparisons to larger countries should be undertaken with caution for the reasons given above.

Table E.1: Small States ESI Scores (based on available data – no imputations generated)

Country Name	ESI Score	SYSTEM	STRESS	VULNERABILITY	CAPACITY	GLOBAL
Mauritius	56.69	91.87	81.63	15.03	48.32	51.76
Luxembourg	49.56	40.93	13.95	34.06	57.85	85.46
Malta	47.13	40.93	76.93	13.15	49.85	50.94
Singapore	41.84	59.66	49.21	13.15	55.14	13.11
Barbados	..*	85.04	85.82	..	44.79	20.11

* We cannot calculate an ESI score for Barbados due to the lack of complete indicators in the vulnerability component.

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Appendix F Comparing the ESI with Other Sustainability Indicators

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Appendix F – Comparison of the ESI to Other Sustainability Indicators

ESI v. Ecological Footprint Index

The Ecological Footprint Index converts a country’s total resource consumption into the equivalent of hectares of biologically productive land, and then divides this by population to obtain a final value of hectares per capita. Like the ESI, it is measured on the national level, but the two indices differ considerably in their methodology and scope. Given that the Footprint Index is included in the ESI’s Reducing Waste and Consumption Pressures indicator, we expect to find a relationship between the two indices.

The correlation between the ESI and the Ecological Footprint explains approximately 15% of the variation in the ESI. The correlation between the two indices is negative, meaning that large footprints tend to coincide

with high ESI values. Since both indices measure certain aspects of sustainability, it may be surprising that high ESI scores are related to resource consumption.

One explanation for the inverse correlation is that the ESI covers a wider range of sustainability issues than the Ecological Footprint including Environmental Systems, and Socio-institutional Capacity indicators, as well as measures of International Environmental Collaboration and Stewardship. High levels of resource consumption are clearly not sustainable over the long-term. However, countries with small footprints are not necessarily sustainable either. If their footprints are small because of a lack of economic activity and pervasive poverty, their situation cannot be

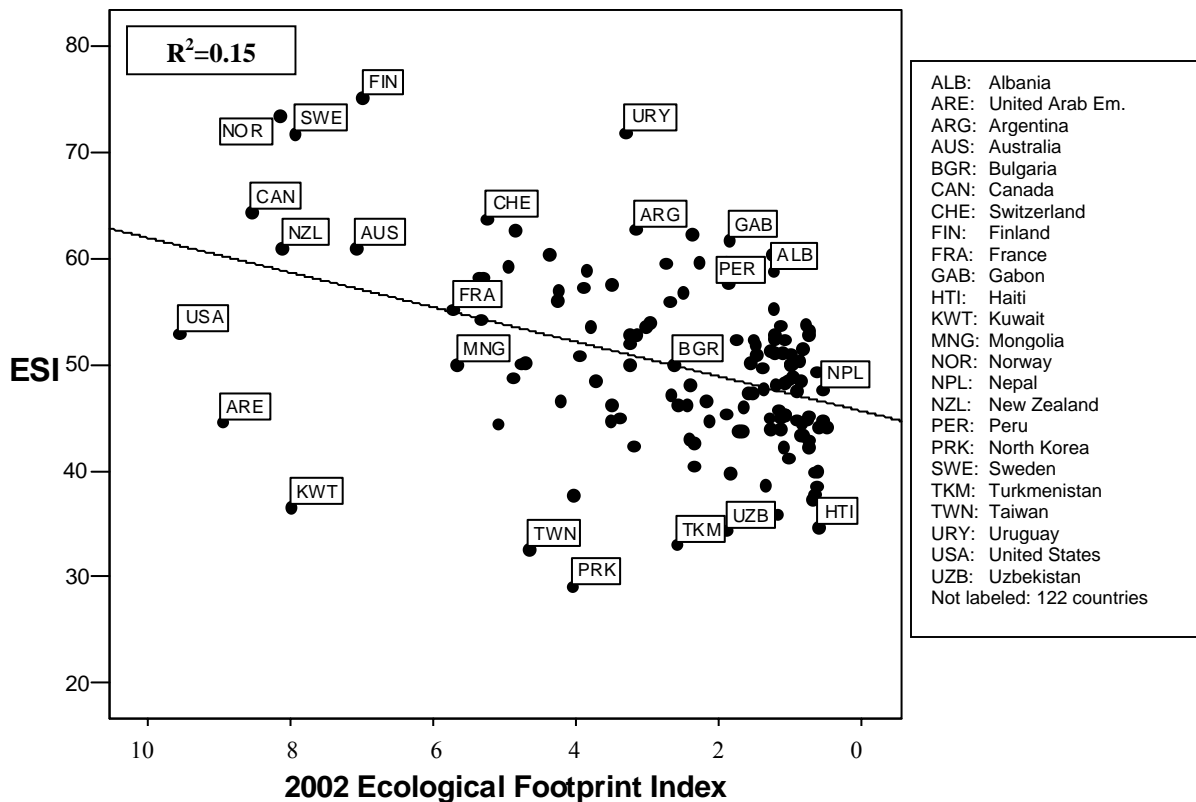


Figure F.1: Regression of 2005 ESI on 2000 Ecological Footprint Index

Note: The direction of the Ecological Footprint has been reversed so that high values on both axes correspond to higher sustainability

held out as a policy aspiration. Rich countries with larger footprints tend to have lower human vulnerability and higher capacity values, meaning that they are better equipped to deal with environmental pollution and the resulting health, ecological, and economic impacts. Countries with both large footprints and high capacity can therefore invest in reducing pollution stresses, and address but not negate, their high natural resource consumption rates.

Environmental Vulnerability Index

Environmental vulnerability includes susceptibility to natural hazards, sea-level rise, natural resource depletion, fragile ecosystems, and geographical isolation. Although low vulnerability is not completely parallel with sustainability, high environmental vulnerability creates a variety of impediments to sustainable development.

The South Pacific Applied Geoscience Commission (SOPAC), in collaboration with the United Nations Environment Programme (UNEP) and others, has developed an Environmental Vulnerability Index (EVI) to measure vulnerability. The Index aims to provide a sense of the environmental conditions that predispose a country to internal and external shocks that adversely impact its physical entities (people, buildings, ecosystems), economy, and wellbeing.

A weak relationship was found between the ESI and the EVI, and no significant trend could be detected. Based on different conceptual foundations, the EVI and ESI clearly gauge different aspects of environmental sustainability. High environmental vulnerability reduces a country’s capacity to address other issues such as reducing environmental stresses and improving natural resource use efficiency. These issues are included in the ESI but are not at the heart of the EVI.

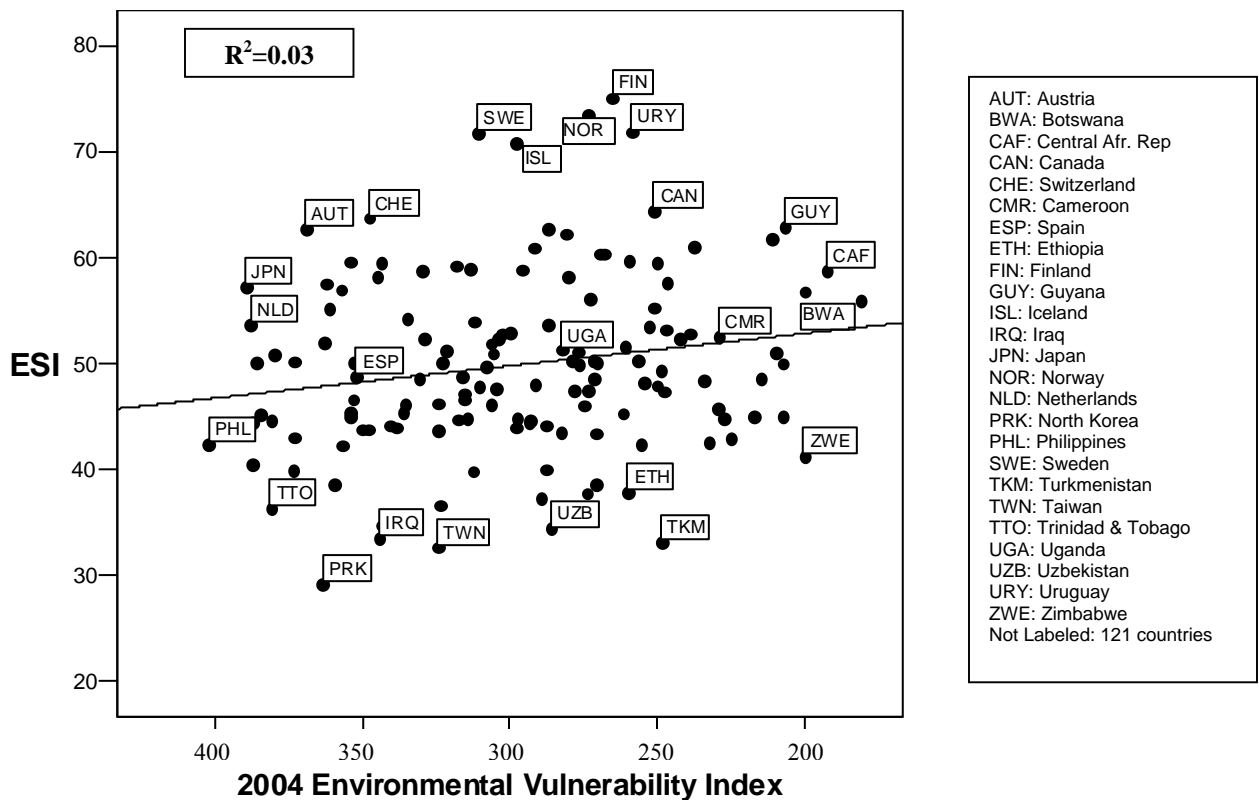


Figure F.2: Regression of 2005 ESI on 2003 Environmental Vulnerability Index

Note: Direction of the EVI has been reversed so that high values on both axes correspond to higher sustainability

Table F.1: Correlations Between 2005 ESI Components and Other Indices

		Ecological Footprint per capita	2004 Environmental Vulnerability Index
ESI		0.4 ***	-0.18 *
Components	Environmental Systems	0.22 *	-0.65 ***
	Reducing Environmental Stresses	-0.46 ***	-0.52 ***
	Reducing Human Vulnerability	0.65 ***	0.37 ***
	Social and Institutional Capacity	0.62 ***	0.34 ***
	Global Stewardship	-0.29 ***	-0.04
Indicators	Air Quality	0.56 ***	0.09
	Biodiversity	-0.20 *	-0.50 ***
	Land	-0.16	-0.73 ***
	Water Quality	0.49 ***	-0.18 *
	Water Quantity	0.01	-0.43 ***
	Reducing Air Pollution	-0.61 ***	-0.58 ***
	Reducing Ecosystem Stresses	0.07	-0.23 ***
	Reducing Population Growth	0.48 ***	0.43 ***
	Reducing Waste & Consumption Pressures	-0.62 ***	0.00
	Reducing Water Stress	-0.38 ***	-0.63 ***
	Natural Resource Management	-0.35 ***	-0.39 ***
	Environmental Health	0.56 ***	0.48 ***
	Basic Human Sustenance	0.63 ***	0.49 *
	Reducing Environment-Related Natural Disaster Vulnerability	0.22 ***	-0.18 *
	Environmental Governance	0.62 ***	0.32 ***
	Eco-Efficiency	-0.31 ***	-0.21 **
	Private Sector Responsiveness	0.63 ***	0.40 ***
	Science and Technology	0.80 ***	0.43 ***
	Participation in International Collaborative Efforts	0.28 ***	0.30 ***
	Greenhouse Gas Emissions	-0.40 ***	-0.29 ***
Reducing Transboundary Environmental Pressures	-0.35 ***	-0.05	

* statistically significant at 0.05 level ** statistically significant at 0.01 level *** statistically significant at <0.01 level

Note: High ESI scores correspond to higher environmental sustainability, but Ecological Footprint and EVI scores correspond to high resource consumption and vulnerability, respectively.

Table F.1 shows how and why the ESI and comparative indices diverge. The Ecological Footprint, for example, is a measure primarily of environmental pressure, especially consumption pressure, with no overt effort to balance pressure measures with systems, impact or capacity measures. Therefore the Footprint has a strong correlation with the ESI Waste and Consumption indicator. Interestingly, its highest positive correlation is with the Science and Technology indicator, which reflects the fact that developed countries with high per capita incomes tend to have strong scientific and technological sectors as well as high resource use intensities.

The Environmental Vulnerability Index is an index of states and pressures, as shown in the systematically high correlation with the ESI Systems and Stress indicators. The lower correlation levels with the ESI human impact, capacity, and global stewardship measures reflect the different scopes and purposes of these indices.

Millennium Development Goal 7

In September 2000, 189 nations adopted the United Nations Millennium Declaration, committing themselves to a series of “Millennium Development Goals” to alleviate poverty

and promote sustainable development. The United Nations Secretariat and its specialized agencies and programs, as well as representatives of IMF, the World Bank, and OECD have defined 8 goals, 18 targets and 48 indicators to measure progress towards the Millennium Development goals. Among the eight goals, Goal 7 is to ensure environmental sustainability.

Goal 7 includes three targets and eight indicators but for two of them, sufficient data are currently not available. The indicators included in this analysis are: Proportion of land area covered by forest (FAO), Ratio of area protected to maintain biological diversity to surface area (UNEP-WCMC), Energy use (kg oil equivalent) per \$1 GDP (PPP) (IEA, World Bank), Carbon dioxide emissions per capita (UNFCCC, UNSD), Consumption of ozone-depleting CFCs (ODP tons) (UNEP-Ozone Secretariat), Proportion of population with sustainable access to an improved water source, and Proportion of population with access to improved sanitation.

In an experimental analysis, we attempt to create an index based on the six available MDG Goal 7 indicators. We can then compare the performance of countries on both the MDG Goal 7 index and the ESI in order to identify interesting similarities or differences between the two measures.

To create the MDG Goal 7 index, we first apply principal component analysis and use the resulting principal components and factor loadings to transform the original data into a single index. The initial PCA suggests keeping three principal components (see Table F.2).

The first principal component is most highly correlated with Carbon dioxide emissions per capita, Proportion of the population with sustainable access to an improved water source, and the Proportion of population with access to improved sanitation. The second component correlates with Protected area ratio to surface area, while the third is most highly correlated with the Proportion of land area covered by forest.

For the final index, we calculate the principal component scores for the selected principal components and add these values together for every country. We then regress the ESI on the new MDG Goal 7 index. The result is a strong positive correlation between the two indices, as shown in Figure F.3. Nearly 30% of the ESI variation is explained by the MDG Goal 7 index. However, we note that the MDG Goal 7 index could only be calculated for 56 countries due to missing data, and the interpretation of the strong relationship is therefore restricted to this set of countries. The list of countries is shown in Table F.3.

Table F.2: Variance explained by the principal components

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.2	31.7	31.9	2.2	31.7	31.7
2	1.3	18.9	50.6	1.3	18.9	50.6
3	1.2	16.9	67.5	1.2	16.9	67.5
4	0.9	12.9	80.4			
5	0.6	9.2	89.6			
6	0.4	5.6	95.2			
7	0.3	4.8	100			

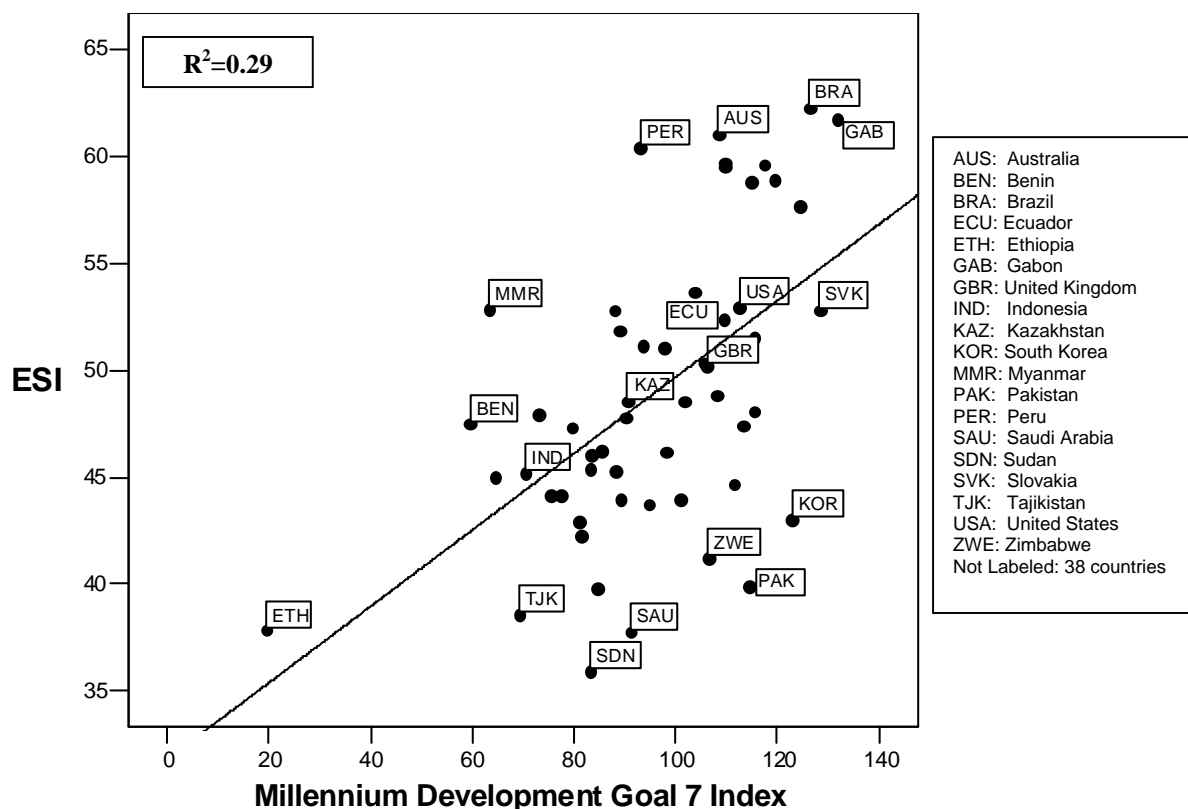


Figure F.3: Regression of 2005 ESI on Millennium Development Goal 7 Index

Table F.3 Countries included in the MDG Goal 7 Index

#	Country	#	Country	#	Country
1	Angola	20	Gabon	39	Pakistan
2	Albania	21	United Kingdom	40	Panama
3	Australia	22	Georgia	41	Peru
4	Azerbaijan	23	Ghana	42	Paraguay
5	Benin	24	Guatemala	43	Romania
6	Bangladesh	25	Honduras	44	Saudi Arabia
7	Bolivia	26	Indonesia	45	Sudan
8	Brazil	27	India	46	Senegal
9	Chile	28	Iran	47	Slovakia
10	Côte d'Ivoire	29	Jamaica	48	Tajikistan
11	Cameroon	30	Jordan	49	Tunisia
12	Dem. Rep. Congo	31	Kazakhstan	50	Tanzania
13	Colombia	32	Kenya	51	United States
14	Costa Rica	33	South Korea	52	Venezuela
15	Dominican Rep.	34	Sri Lanka	53	Viet Nam
16	Algeria	35	Mexico	54	South Africa
17	Ecuador	36	Myanmar	55	Zambia
18	Egypt	37	Niger	56	Zimbabwe
19	Ethiopia	38	Oman		

Figure F.3 suggests that countries with similar scores on the MDG Goal 7 index, experience a range of environmental conditions. For example, while Brazil and South Korea both have high MDG scores, Brazil performs much better on the ESI. South Korea, Saudi Arabia and other countries have relatively high MDG index values because they succeed in providing the basic human services measured by MDG Goal 7 index. However, these countries fail to perform well on several of the dimensions covered by the ESI, including Environmental Systems and Reducing Environmental Stresses.

Developing countries such as Pakistan and Zimbabwe have low CO₂ emissions, and CFC consumption, which contribute to high MDG Goal 7 index scores, but also have low Capacity and high Human Vulnerability scores, which reduce their ESI values. The results suggest that measuring basic human needs such as water supply and sanitation, combined with a narrow set of proxies for sustainable resource as done in MGD 7, is not sufficient to track the broader set of environmental sustainability issues that are measured by the ESI.

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Benchmarking National Environmental Stewardship

Appendix G An Ideal Set of ESI Indicators

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Appendix G – An Ideal Set of ESI Indicators

Ideally, a measure of environmental sustainability would encompass a range of issues broad enough to permit a complete appraisal of each country's environmental state. In this Appendix, we briefly review what we think a complete ESI would include, and discuss the constraints that prevent us from achieving such an ideal.

Systems

An ideal set of systems measures would span both natural and managed environmental systems, and cover the full range of terrestrial, atmospheric, and aquatic systems. In particular, such a set of indicators would include the following:

- Cultivated systems, including measures of soil fertility and soil moisture, pest management practices, genetic diversity, and crop yields. Only crop yields are actually available, and in the absence of measurements of the agricultural practices underlying them, they are not suitable as a sustainability measure.
- Managed forests, including measures of the quality of forests (genetic stock, tree circumference, resistance to pests and disease, and so on) and the nature of forestry practices. These measures are not available on a comparable basis across countries.
- Fisheries, including measures of the size, health, and age structure of the relevant population stocks as well as the management practices applied. This area has very little comparable information available.
- Water quantity, including measures of the availability of surface freshwater as well as groundwater. In many countries freshwater volumes can be estimated reasonably well, though there is unevenness in how this is carried out. Paradoxically, the number of stream gauges is declining even as human intervention in the hydrosphere is increasing. Groundwater availability is also very poorly measured.
- Water quality, including measures of eutrophication, turbidity, dissolved oxygen, and other critical indicators. There are two main deficiencies of the available measures in this regard. First, very few countries report water quality data to an international body. Second, it is difficult to make the available measures comparable because of natural variation in baseline levels of these measures. Some river basins are naturally turbid; others are not. A high turbidity level in the first kind of river is not a sign of low sustainability, while it is such a sign in the second.
- Air quality, including measures of pollutants such as sulfur dioxide, nitrogen oxides, particulates, volatile organic compounds (VOCs), and ozone. Few countries collect these measures in a comparable way, and those that do, report data for only a handful of urban areas. Tragically, one of the most serious and widespread forms of air pollution, concentration of indoor particulates from solid fuel combustion in the home, is not measured at all except in isolated, ad hoc efforts or through proxies.
- Landscape, including measures of urbanization, deforestation, agricultural conversion, and other anthropogenic alterations of the land. Of these, deforestation has received the most effort, and there are rough measures of the others.
- Biodiversity, including measures of both genetic and organismic diversity as well as of preservation of critical habitat and fragmentation of ecosystems. There are virtually no accepted measures of these phenomena that are comparable across nations.

- Sensitive ecosystems, including measures of coastal, mountain and dryland ecosystem health. These ecosystems are either under high stress or experience high vulnerability, and they would best be measured using indicators tailored to their special circumstances. However, no systematic, comparable measures have been collected.

Stresses

Within the Stresses component, we would like to be able to measure the full range of pressures on environmental systems including:

- Air pollution emissions, including emissions of the criteria air pollutants sulfur dioxide, nitrogen oxides, and volatile organic compounds (VOC). Many countries measure such emissions, and estimates are widely available.
- Water pollution, including measures of eutrophying and toxic chemicals released into watersheds, and untreated sewage. There are few comparable measures of such pollution, although there are proxies.
- Water consumption, including measures of surface and groundwater withdrawals in comparison to their recharge rates. There are reasonable estimates of surface water consumption, though groundwater use is unevenly measured, especially in comparison to recharge rates.
- Stresses on ecosystem functioning, including measures of anthropogenic disturbances to aquatic, terrestrial, and marine ecosystems. There are few comparable measures that fall into this category, though Europe has developed an effective system to measure the extent of acidification of land and aquatic ecosystems, and there are global efforts to quantify deforestation. There are no similar efforts to quantify disturbances to the hydrosphere or the coastal and marine environments
- Waste and consumption, including measures of solid waste generation, land-fill volume, hazardous waste generation, unsafe disposal of waste, and natural re-

source consumption relative to carrying capacities broadly conceived. There are no adequate, comparable measures of these issues, although the work undertaken by those producing the Ecological Footprint Index (Wackernagel and colleagues) has made it possible to quantify natural resource consumption much more effectively than before.

- Releases of toxins, carcinogens, endocrine disruptors and other known or potentially hazardous chemicals. There are no international programs to collect such information on a comparable basis, with the exception of a few targets of international regulation such as persistent organic pollutants (POPs).
- Soil degradation, including measures of salinization, nutrient depletion, and desertification. There are no national comparable measures of this phenomenon that are considered reliable by soil experts.
- Population, including measures of fertility and total growth. This is well measured.

Human Vulnerability

Within the Human Vulnerability component, we would like to measure the following:

- Food security, including measures of caloric intake, malnutrition, and susceptibility to famine or other shortfalls in food availability. People who are malnourished are more susceptible to pollution harms as well as more vulnerable to resource mismanagement.
- Environmental health, including measures of morbidity and mortality stemming from waterborne vectors, such as intestinal infectious diseases; from poor air quality, such as respiratory diseases; and from exposure to toxins and mutagens, such as some cancers. In practice our ability to create such measures is severely limited. The World Health Organizations' path-breaking work on the environmental burden of disease was not able to quantify such outcomes at a national level, but only within large global regions.

- Susceptibility to environmentally-related natural disasters, such as floods, droughts, landslides and hurricanes. In the past it has been hard to create comparable metrics on this dimension, but the situation has improved due to intense international work in recent years.
- Economic security, including measures of environmentally-induced poverty traps and economic losses from broad environmental change. There are no comparable data on this dimension of human vulnerability, although recent breakthroughs in the methodologies associated with environmental accounting hold promise for improvements in the future.
- commitment to environmental stewardship, and capacity for environment-related innovation. The private sector is central to overcoming pollution control and natural resource management challenges, therefore measures of these would be of great value.
- Eco-Efficiency. While absolute levels of pollution and energy use matter, one key gauge of a society's environmental trajectory is its resource productivity as measured by energy use/GDP and other metrics of resources conserved per unit of economic output.

Social and Institutional Capacity

Within the Social and Institutional Capacity component, the ideal indicators are as follows:

- Environmental governance, including measures of the effectiveness of the environmental regulatory apparatus, the flexibility and innovativeness of the regulatory regime, the strictness of enforcement of environmental laws as well as the extent of endemic problems such as corruption or deviation from rule of law, the use of best practices concerning monitoring, assessment, and implementation, the extent of public participation in environmental decision-making, and the availability of environmental information. In practice there are few good measures specific to the environment, though there are some more generic governance measures that are relevant.
- Science and Technology, including measures of the level of environmental knowledge among the public, the capacity of a society to respond to technical challenges, and the ability of a society to innovate and generate less-environmentally harmful products and production processes over time.
- Private Sector Responsiveness to Environmental Challenges, including measures of private sector compliance with laws,
- *Global Stewardship*
Within the Global Stewardship component, the ideal indicators are as follows:
 - Greenhouse Gas Emissions. Because climate change is such an important global environmental issue, measuring the degree to which countries are contributing to the problem is vital within this category. Indeed, it is important to track emissions both as a function of economic scale (measuring efficiency) and population (measuring absolute impacts).
 - Participation in international collaboration. There are hundreds of international environmental agreements, and ideally we would be able to construct a measure that fairly evaluates the participation of countries across a number of agreements. However, in practice this is difficult to accomplish as the number of agreements varies considerably across world regions and some countries have fewer opportunities to participate based solely on their location. In addition, the easiest things to measure (signature and ratification rates; compliance with reporting requirements; and so on) are seldom the most important. More meaningful measures would include adjustments of policies to achieve international goals; implementation of monitoring and research programs to further international efforts; and other substantive actions.

- Transboundary environmental pressures. Pollutants can flow across borders, and in some cases constitute a significant portion of total pollution within a receiving country. Such transboundary spillovers can be an important source of air pollution, water pollution, and hazardous chemicals. In addition, upstream countries are capable of withdrawing water in sufficient quantities to seriously deplete available water in downstream countries. A country can also significantly diminish the ability of migratory species to survive through alteration of habitat or other pressures. In practice, very few of these transboundary pressures are measured. Flows of air pollution in Europe are extremely well monitored. Acid rain spillovers in Asia have been modeled by the World Bank, but these data are an exception.
- Environmental impacts of trade, investment and consumption flows. In addition to generating direct environmental harm outside their borders, countries can potentially exert profound indirect effects through their international economic activities. These are some of the least understood or measured impacts. Although the economic flows are monitored

quite closely, their environmental impacts are not. The task is made more complicated because most economic flows have both positive and negative effects, and because the effects are seldom uniform across different locations. Monitoring efforts that link specific environmental outcomes in one location to the economic flows originating in another could produce large improvements in this area. All of the available proxies are admittedly crude.

Conclusion

Conceptually, environmental sustainability involves a wide range of issues, many of which are hard to quantify accurately and appropriately using available data sources. In general, metrics tend to be closely linked to human activities or human impacts. The pollution measures, capacity measures, and human welfare measures, for example, tend to be more accurate and easily available than the others. The ecosystem measures tend to be the least covered, with entire broad categories remaining chiefly a blank slate almost twenty years after the Brundtland Report.

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Appendix H Critiques and Responses

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Appendix H – Critiques and Responses

Earlier versions of the ESI received widespread media attention, favorable reviews in the academic literature (see Appendix I) and positive reception by many countries. As with any novel approach to a complex set of issues, it has also been subject to criticism. In this Appendix, we discuss the core critiques of the previous ESI releases that are especially pertinent to the 2005 edition.

Critique:

The ESI underemphasizes certain critical aspects of environmental sustainability, such as climate change, and the equal weighting of the ESI is arbitrary and/or inappropriate.

Response:

The ESI refrains from placing high weights on a small number of factors because we think the environmental sustainability agenda is appropriately broad, and we wish our index to be faithful to that agenda. It would be irresponsible to try to reduce a measurement of environmental responsibility to a small handful of metrics. The word “environment” refers to a wide range of issues including air and water pollution, waste management, toxic exposures, as well as range of natural resource management issues. We recognize that the equal weighting across the 21 indicators of the ESI is somewhat arbitrary. However, as discussed in Appendix A, neither expert evaluation nor statistical analysis produced divergent weights. We therefore do not see any viable alternative to equal weighting. And we note that virtually all efforts to aggregate indicators of this sort end up assigning equal weights.

Putting special emphasis on climate would suit the political agendas of some countries and some environmental NGOs. But it would not reflect the balance of environmental issues that countries across the world must address. Issues related to climate change are found in seven ESI variables, driving, in part, five different indicators. We think this is a bal-

anced and appropriate level of focus on climate change.

Critique:

It is difficult to determine the implicit weights behind different areas of policy interest, such as climate change or biodiversity.

Response:

This critique is similar to the one above. As mentioned in Chapter 2, the ESI is based upon an unweighted average of the 21 indicators. This means that individual variable weights vary in their contribution to the overall ESI score in proportion to the number of variables in a given indicator – from a 2% contribution to the ESI score for indicators with only two variables to a 0.3% contribution for the Environmental Governance indicator with 12 variables. Given that all variables are conceptually related to the indicator in which they are placed (and indeed many variables represent different ways of measuring the same thing), we do not feel the implicit weights are a problem. Yet, we also recognize the value of having a fuller picture of the implicit weights of different issues of concern – such as air quality or biodiversity conservation. Thus, as a partial response to this critique, we offer here a table of the implicit weights of different policy realms included in the ESI based on an aggregation of the implicit weight of individual variables.

Table H.1: Relative Weights Given to Environmental Sectoral Issues

Policy realms	Percent weight
Human Health Related	34.9
Water Related	18.3
Climate Change Related	17.3
Land Related	16.6
Air Pollution Related	11.9
Biodiversity Related	10.5
Energy Related	9.8
Toxics/Waste Related	4.9

(Issue areas overlap so percents do not add up to 100)

This is an approximate estimate of the relative weight apportioned to different issues based on a coding of variables by issue. Generic governance or science and technology variables were generally not attributed to any sector. Human health has a high weight in part because of the many variables that are relevant to human health and wellbeing.

Critique:

Environmental sustainability cannot be summarized in a single index. The index combines too many disparate elements in one thus rendering it meaningless.

Response:

There has been an undue focus on the aggregate ESI scores, which we consider to be indicative and not definitive. The rankings are only indicative of a country's relative place on a sustainability ladder built from the ESI variables and indicators. We have always sought to emphasize the indicators, and we have provided country profiles that clearly compare each country's performance relative to its income peer group for each of the 21 indicators. That said, if a country is performing well on all or most of the 21 indicators, it will yield a higher ESI score, reflecting its high performance on the component parts.

Critique:

Many countries that score highly on the ESI, such as the Nordic countries, have per capita levels of natural resource use beyond what the biosphere can sustain indefinitely (Wackernagel 2001).

Response:

While there may be an element of truth in this critique, we would argue just as strongly that a country with very low levels of consumption yet with high levels of under-five mortality due to poor air and water quality, lax environmental regulations, corruption and absence of civil and political liberties, is also environmentally unsustainable. There is a general predisposition in the environmental community (particularly in the developed world) to view environmental outcomes that are harmful to human health as somehow less important

that aggregate consumption impacts on the global commons. The fact remains that if the local atmosphere and water bodies are heavily polluted, a country can hardly be deemed to be on the path to environmental sustainability. As noted above, the environmental literature ranges across many issues – and the ESI tries to capture this full range of policy challenges.

Environmental policymakers are furthermore expected to address a broad array of pollution control and natural resource management issues. An ESI that focused solely on resource depletion rates would be much less useful in this context. Finally, resource depletion projections are notoriously unreliable and inattentive to the dynamic world in which we live.

Critique:

Other indicators such as the Ecological Footprint do a better job of measuring what really matters – the impact of human resource consumption on the environment and the ability of human activity to be sustained in the biosphere.

Response:

We support all indicator initiatives, and expect that the policy community will naturally migrate to those they find most useful. We see a value in measuring consumption or natural resources. Indeed, we include the Ecological Footprint as a measure of consumption pressure within the ESI. But we are convinced that reducing environmental sustainability to a uni-dimensional measure of the hectares of biologically productive land needed to support an economy is inadequate. Sustainability is inescapably a multi-faceted concept that must encompass a range of ecological and environmental public health values.

Critique:

The ESI downplays or ignores transboundary or spillover effects of northern country's unsustainable consumption. It is designed to make dirty countries look clean (Morse and Fraser forthcoming).

Response:

The ESI has always included measures that assess a country's transboundary impacts. In 2001, we included an indicator on "protecting international commons" that included measures such as current CO₂ emissions, historical cumulative CO₂ emissions, CFC consumption and the ecological footprint deficit. In 2002 we created a separate greenhouse gas emissions indicator and retained an indicator for transboundary environmental pressures, but added variables that measured SO₂ exports and impacts on marine fisheries. In this ESI, we have added a variable to account for another dimension of cross-border effects on the environment – the import of polluting goods and raw materials as percentage of total imports of goods and services (or conversely, the export of polluting industries to other countries). It is true that the ESI puts greater weight on a country's efforts to enhance sustainability within its own borders, but it can hardly be said that we have ignored transboundary impacts.

Critique:

The ESI gives undue weight to intentions versus actual performance.

Response:

We acknowledge that active participation in multilateral environmental agreements or funding mechanisms is no substitute for on-the-ground environmental protection. In fact, in 2002 we produced an Environmental Performance Index that, for 22 OECD nations with richer environmental data, ranked countries according to performance and recent trends on air and water quality, protection of land resources, and climate change. Nevertheless, it is our perception that intentions do matter, and that becoming a party and providing regular reports to environmental conventions is a reflection of a government's commitment to address important issues such as biodiversity loss and climate change.

Critique:

The ESI has been criticized for the lack of a causal model linked to an observable outcome.

Response:

Environmental sustainability is defined as the ability to maintain valued environmental assets over the next several decades and to manage problems that emerge from changing environmental conditions. Because the concept includes the future as well as the past and the present, we are hampered in creating a causal model linked to observable outcomes. In addition, environmental sustainability encompasses too many issues and is too broad in scope to permit a realistic causal model.

Economic growth models, in contrast, focus on a fairly narrow measure of economic output, such as changes in Gross Domestic Product (GDP). It is the extremely narrow formulation of the outcome that permits such inputs to be aggregated with precision. While similar precision cannot be achieved in the realm of environmental sustainability, it does not negate the need for attention to the range of issues in pollution control and natural resource management. The ESI and its underlying indicators offer a valid if approximate gauge of the diverse and growing environmental stewardship concerns.

Critique:

Measuring relative performance is meaningless if all countries are essentially on unsustainable trajectories.

Response:

It is true that no country appears to be on a truly sustainable path. But relative performance is nevertheless an important thing to measure. The Ecosystem Wellbeing Index sought to create absolute performance benchmarks, yet the benchmarks were largely arbitrary and had slim empirical underpinnings. Policy context is what matters to policy makers. Seeing what others have achieved is critical to understanding what is possible. Determining the leaders is essential if one is to identify "best practices." Decades of production of the Human Development Index show that developing country leaders genuinely care about their ranking. Laggards are powerfully motivated by their poor rankings (Esty 2002). Our interactions with a number of countries

show that some are making efforts to improve performance on ESI indicators in an effort to raise overall ESI scores. We see no evidence that policy makers are making the same effort to reduce their country's ecological footprints or increase their wellbeing indices.

Critique:

The ESI has an inherently “northern” bias. It favors developed countries by including too many measures of capacity and favoring technological innovation over indigenous or local knowledge.

Response:

The ESI attempts to measure in a balanced way both the environmental challenges of

development and those of underdevelopment. The ESI team has consistently sought the views and welcomed the critiques of southern colleagues as well as those who claim to represent the global South. Furthermore, if the ESI does have such a bias, it is certainly not evident in developing country performance, since 11 of the top 20 countries in the 2002 ESI were developing or transitional economies. The reality is that many measures that one might wish to include are simply not available. There are no internationally comparative data sets that measure indigenous knowledge.

References

Esty, Daniel C. (2002). “Why Measurement Matters.” *Environmental Performance Measurement: The Global 2001-2002 Report* (D.C. Esty and P. Cornelius, ed.). New York: Oxford University Press.

Morse, Stephen and Evan D.G. Fraser (In Press). “Making ‘dirty’ nations look clean? The nation state and the problem of selecting and weighting indices as tools for measuring progress towards sustainability.” *Geoforum*. In Press, Corrected Proof, Available online 21 January 2005.

Wackernagel, Mathis. 2001. Shortcomings of the Environmental Sustainability Index. Personal Communication.

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Appendix I Published Citations to the Environmental Sustainability Index

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Appendix I – Published Citations to the ESI

- Anderson, Terry L. and Lea-Rachel Kosnik (2002). "Symposium on Bjorn Lomborg's *The Skeptical Environmentalist: Sustainable Skepticism And Sustainable Development*." *Case Western Reserve Law Review* 53: 439.
- Bartelmus, Peter (2003). "Dematerialization and Capital Maintenance: Two Sides of the Sustainability Coin." *Ecological Economics* 46(1): 61-81.
- Birdsall, Nancy and Michael Clemens (2003). *From Promise to Performance: How Rich Countries Can Help Poor Countries Help Themselves*. Washington, D.C., Center for Global Development.
- Bobrow, David B. and Mark A. Boyer (2001). "Public Opinion and International Policy Choices: Global Commitments for Japan and Its Peers?" *Japanese Journal of Political Science* 2(1): 67-95.
- Carter, Peter (2000). "World Watch: Living Green and the Bottom Line." *Mother Earth News* (180): 14.
- Costanza, Robert and Stephen Farber (2002). "Introduction to the Special Issue on the Dynamics and Value of Ecosystem Services: Integrating Economic and Ecological Perspectives." *Ecological Economics* 41(3): 367-373.
- Cutter, Susan L. (2003). "The Vulnerability of Science and the Science of Vulnerability." *Annals of the Association of American Geographers* 93(1): 1-12.
- Dasgupta, Melissa (2004). "The Access Initiative: Promoting Sustainable Development Through Good Governance." *Sustainable Development Law and Policy* IV(1): 31-37.
- de Sherbinin, Alexander (2000). "Population, Development, and Human Security: A Micro-level Perspective." *Aviso: An Information Bulletin on Global Environmental Change and Human Security* (7): 9-15.
- Dernbach, John C. (2002). "Symposium On Bjorn Lomborg's *The Skeptical Environmentalist: Sustainable Versus Unsustainable Propositions*." *Case Western Reserve Law Review* 53: 449.
- Dernbach, John C. (2002). "Targets, Timetables and Effective Implementing Mechanisms: Necessary Building Blocks for Sustainable Development." *William and Mary Environmental Law and Policy Review* 27: 79.
- Ebert, Udo and Heinz Welsch (2004). "Meaningful Environmental Indices: a Social Choice Approach." *Journal of Environmental Economics and Management* 47(2): 270-283.
- Ecologist* (2001). "Keeping Score." *Ecologist* 31(3): 44.
- Ecologist* (2002). "Rich Countries' Environments No Cleaner Than Poor." *Ecologist* 32(5): 10.
- Economist* (2001). "Finance and Economics: Green and Growing." *Economist* 358: 74-77.
- Esty, Daniel C. (2001). "Toward Data-Driven Environmentalism: The Environmental Sustainability Index." *Environmental Law Reporter* 31(5): 10603-10613.
- Esty, Daniel C. (2002). "Why Measurement Matters." *Environmental Performance Measurement: The Global 2001-2002 Report* (D. C. Esty and P. Cornelius, ed.). New York: Oxford University Press.

- Esty, Daniel C. (2004). Environmental Protection in the Information Age. *New York University Law Review* 79: 115.
- Esty, Daniel C. and Michael E. Porter (2005, forthcoming). "National Environmental Performance: an Empirical Analysis of Policy Results and Determinants." *Journal of Environmental Development Economics*.
- Feitelson, Eran and Jonathan Chenoweth (2002). "Water Poverty: Towards a Meaningful Indicator." *Water Policy* 4(3): 263-281.
- Fraser, Evan D. G., Warren Mabee, et al. (2003). "Mutual Vulnerability, Mutual Dependence: The Reflexive Relation Between Human Society and the Environment." *Global Environmental Change* 13(2): 137-144.
- Fredriksson, Per G. and Daniel L. Millimet (2004). "Electoral Rules and Environmental Policy." *Economics Letters* 84(2): 237-244.
- Globerman, Steven and Daniel Shapiro (2002). "Global Foreign Direct Investment Flows: The Role of Governance Infrastructure." *World Development* 30(11): 1899-1919.
- Gowrie, Marissa N., "Environmental Vulnerability Index for the Island of Tobago, West Indies." *Conservation Ecology* [online] 7(2): 11-27.
- Hanson, Arthur J. (2003). "Measuring Progress Towards Sustainable Development." *Ocean & Coastal Management* 46(3-4): 381-390.
- Harrison, Chris (2004). "Peer Review, Politics and Pluralism." *Environmental Science and Policy* 7(5): 357-368.
- Harvard Environmental Law Review, Booknote on Richard L. Revesz, Philippe Sands, Richard B. Stewart, and Alison Aubry ed. (2001). *Environmental Law, The Economy, and Sustainable Development*. 25: 601.
- Hayward, Steven F. (2003). "A Sensible Environmentalism." *The Public Interest* (151): 62-76.
- Hecht, Joy E. (2003). "Sustainability Indicators on the Web." *Environment* 45(1): 3.
- Honkasalo, Antero (2001). "Eco-efficiency and Integrated Product Policy: Lessons from Finland." *Corporate Environmental Strategy* 8(2): 109-117.
- Hughey, Ken F. D., Ross Cullen, et al. (2004). "Application of the Pressure-State-Response Framework to Perceptions Reporting of the State of the New Zealand Environment." *Journal of Environmental Management* 70(1): 85-93.
- Hunold, Christian and John S. Dryzek (2002). "Green Political Theory and the State: Context is Everything." *Global Environmental Politics* 2(3): 17-39.
- Hur, Tak, Ik Kim, et al. (2004). "Measurement of Green Productivity and Its Improvement." *Journal of Cleaner Production* 12(7): 673-683.
- Isaksson, Raine and Rickard Garvare (2003). "Measuring Sustainable Development Using Process Models." *Managerial Auditing Journal* 18(8): 649-656.
- Jalal, Kazi F. and Peter P. Rogers (2002). "Measuring Environmental Performance in Asia." *Ecological Indicators* 2(1-2): 39-59.
- Karkkainen, Bradley C. (2003). The Pragmatic Ecologist: Environmental Protection as a JurisDynamic Experience: Adaptive Ecosystem Management and Regulatory Penalty Defaults: Toward A Bounded Pragmatism. *Minnesota Law Review* 97: 943.

- Khanna, Neha (2000). "Measuring Environmental Quality: an Index of Pollution." *Ecological Economics* 35(2): 191-202.
- Klee, Robert J. (2004). Enabling Environmental Sustainability in the United States: The Case for a Comprehensive Material Flow Inventory. *Stanford Environmental Law Journal* 23: 131.
- Krajnc, Damjan and Peter Glavic,(2005). "A Model for Integrated Assessment of Sustainable Development." *Resources, Conservation and Recycling* 43(2): 189-208.
- Leon, Cuautitemoc and Marina Robles (2002). "Developing a Cadre of Professionals With a Global Environmental Perspective." *Ocean & Coastal Management* 45(9-10): 633-648.
- Levy, Mark A. (2001). "Corruption and the 2001 Environmental Sustainability Index." *Global Corruption Report 2001*. R. Hodess. Berlin, Germany, Transparency International: 300-302.
- Lindenberg, Marc (2002). "Measuring Household Livelihood Security at the Family and Community Level in the Developing World." *World Development* 30(2): 301-318.
- Massam, Bryan H. (2002). "Quality of Life: Public Planning and Private Living." *Progress in Planning* 58(3): 141-227.
- Mol, Arthur P. J. (2002). "Ecological Modernization and the Global Economy." *Global Environmental Politics* 2(2): 92-115.
- Morse, Stephen (2003). "Greening the United Nations' Human Development Index?" *Sustainable Development* 11(4): 183-198.
- Neumayer, Eric (2002). "Do Democracies Exhibit Stronger International Environmental Commitment? A Cross-Country Analysis." *Journal of Peace Research* 39(2): 139-164.
- Nielson, Daniel L. and Micahel J. Tierney (2003). "Delegation to International Organizations: Agency Theory and World Bank Environmental Reform." *International Organization* 57(2): 241-276.
- Niemeijer, Daniel (2002). "Developing Indicators for Environmental Policy: Data-Driven and Theory-Driven Approaches Examined By Example." *Environmental Science & Policy* 5(2): 91-103.
- Parris, Thomas M. (2000). "Tracking Down State of the Environment Reports." *Environment* 42(3): 3.
- Parris, Thomas M. (2003). "Toward a Sustainability Transition--The International Consensus." *Environment* 45(1): 12.
- Parris, Thomas M. and Robert W. Kates (2003). "Characterizing and Measuring Sustainable Development." *Annual Review Environmental Resources* 28(13): 1-28.
- Robinson, Nicholas A. (2002). Befogged Vision: International Environmental Governance a Decade After Rio. *William and Mary Environmental Law and Policy Review* 27: 299.
- Ronchi, Edo, Alberto Federico, et al. (2002). "A System Oriented Integrated Indicator for Sustainable Development in Italy." *Ecological Indicators* 2(1-2): 197-210.
- Running, Steven W., Ramakrishna R. Nemani, et al. (2004). "A Continuous Satellite-Derived Measure of Global Terrestrial Primary Production." *BioScience* 54(6): 547-560.
- Salzman, James, Barton H. J. Thompson, et al. (2001). Protecting Ecosystem Services: Science, Economics, and Law. *Stanford Environmental Law Journal* 20: 309.

- Scarth, Linda L. (2002). "Reference on the Web." *The Booklist* 98(11): 963.
- Schaefer, Brett D. and Aaron Schavey (2002). *America's International Development Agenda. Background*. Washington, D.C., Heritage Foundation.
- Smith, A. Keith. and K. Cole (2002). "Reducing CAL/EPA's Environment Footprint." Quality Congress. ASQ's. Annual Quality Congress Proceedings: 301.
- Sullivan, Caroline (2002). "Calculating a Water Poverty Index." *World Development* 30(7): 1195-1210.
- Sutton, Paul C. (2003). "An Empirical Environmental Sustainability Index Derived Solely from Nighttime Satellite Imagery and Ecosystem Service Valuation." *Population and Environment* 24(4): 293-311.
- Sutton, Paul C. and Robert Costanza (2002). "Global estimates of Market and Non-Market Values Derived from Nighttime Satellite Imagery, Land Cover, and Ecosystem Service Valuation." *Ecological Economics* 41(3): 509-527.
- Welsch, Heinz (2002). "Preferences Over Prosperity and Pollution: Environmental Valuation Based on Happiness Surveys." *Kyklos* 55(4): 473-494.