

# **Argentina: A State-of-the-Environment Report**

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## **Geographic Background**

Argentina is located in the southern portion of South America and the name is derived from the Latin *Argentum*, which means “silver”, stemming from a concept that had been coined in a Venetian atlas of 1536 and later in a poem published in 1602 (Anonymous 2005). Argentina encompasses 2,766,889 km<sup>2</sup> (1,068,302 mi<sup>2</sup>), stretching about 3,330 km (2,070 mi) in length, which makes it the eighth largest country in the world and the second of South America. It is bordered by Bolivia to the north, Paraguay, Uruguay, and Brazil to the northwest, and Chile to the west (Figure 1).

Argentina is divided into six major regions: Mesopotamia, Chaco, Puna, Cuyo, Patagonia, and Pampas. Mesopotamia is located in the northeastern region and has a tropical climate with frequent rainfall. The Chaco region varies from scrub forests to jungles and has seasonal rainfall. Puna lies in the east and is characterized by a cold desert with sparse vegetation. Cuyo lies to the east of the Andes Mountains and is known for its wine industry. Patagonia is characterized by a dry and cold climate that is sparsely populated, however, remains an important area for agriculture, livestock, and tourism. Finally, the Pampas is an alluvial plain with a temperate climate and is home to the country's largest cities. Argentina's geography can not be characterized by a single form, but instead is composed of several distinct geographic areas allowing it to be biologically diverse (Lewis 2001).



**Figure 1:** Map of Argentina

Courtesy of CIA World Fact Book

<https://www.cia.gov/library/publications/the-world-factbook/geos/ar.html>

## **History of Environmental Issues**

Due to Argentina's diverse geography, its historical environmental issues originated from many different venues. Guaraní farmers, who were an indigenous group that migrated from Paraguay and southern Brazil, settled in the Mesopotamian region and made an existence by using "slash and burn" farming techniques, burning the land to clear for agriculture and then moving on after the soil was overused (Lewis 2001). This type of farming is not sustainable and creates major environmental problems, such as soil and wind erosion and reduction in species richness and diversity. After the first and second settlement of Argentina in 1536 by Pedro de Mendoza and in 1580 by Juan de Garay, respectively, further environmental issues related to agriculture and the increase of human population started to wear on the natural environment. During the 17<sup>th</sup> and 18<sup>th</sup> century, silver mining and cattle ranching flourished (Rock 1985) and still have an impact on the economy (see soil erosion and desertification). Then, in 1876, sheep (mainly in the Pampas and Patagonia) were introduced into Argentina, which exacerbated the current environmental degradation (Aagesen 2000). To boost the economy of Argentina after the unification in 1862, European investors poured substantial sums of money into major Argentina railways (Jones 1985). The construction of railways throughout Argentina in the late 19<sup>th</sup> and early 20<sup>th</sup> century allowed for the expansion of the wine and sugar trade along with immigration into the countryside (Lewis 1985).

In 1971, public concern about environmental issues commenced with endangered species when Argentina signed the Convention for the Conservation of the Vicuna and in 1981 when it ratified the Convention on International Trade in Endangered Species of

Wild Fauna and Flora (CITES)<sup>1</sup> (Aguilar 2002). Public involvement with environmental issues continued to grow after the return of democracy in the 1980's (Aguilar 2002).

Section 41 of Argentina's 1994 constitution<sup>2</sup> states:

*all inhabitants are entitled to the right to a healthy and balanced environment fit for human development in order that productive activities shall meet present needs without endangering those of future generations; and shall have the duty to preserve it. As a first priority, environmental damage shall bring about the obligation to repair it according to law. The authorities shall provide for the protection of this right, the rational use of natural resources, the preservation of the natural and cultural heritage and of the biological diversity, and shall also provide for environmental information and education. The Nation shall regulate the minimum protection standards, and the provinces those necessary to reinforce them, without altering their local jurisdictions. The entry into the national territory of present or potential dangerous wastes, and of radioactive ones, is forbidden.*

This law has further enabled the public to become involved in the environmental issues and policies. Thus, environmental reform can and hopefully will occur because it is in the hands of the people. Current environmental issues are reflected by effects of poverty

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<sup>1</sup> More information can be found at the website available at <http://www.cites.org/>

<sup>2</sup> An English version of the Argentina Constitution can be accessed at [http://pdpa.georgetown.edu/Constitutions/Argentina/argen94\\_e.html](http://pdpa.georgetown.edu/Constitutions/Argentina/argen94_e.html)

stricken people coupled with the lack of commercial and urban environmental safeguards limiting environmental degradation.

Societies created for the protection of the wildlife and conservation of natural resources dates back to the creation of Asociación Ornitológica del Plata (now called Aves Argentina<sup>3</sup>) in 1916. Other Non Government Organizations (NGO) were created in the 1940's such as Asociación Natura and Asociación de Amigos de los Parques Nacionales. However, the first NGO that became mainstream was the Fundación Vida Silvestre Argentina<sup>4</sup> created in 1977 (Aguilar 2002). Currently, NGO's are still growing in number and strength helping to protect wildlife and conserve the natural resources.

### **Human Population**

Although humans could have reached Argentina by boat as early as 15,000 B.P., they probably did not arrive until sometime after 13,000 B.P. by land (Dillehay 2000). Archaeological remains from between 10,000 and 11,600 B.P. show that hunting and gathering societies flourished on the grassland of Argentina (Dillehay 2000). At the time of the Spanish arrival, Native American populations in Argentina may have been as high as 750,000, though true estimates may only be half this much (Pyle 1976). Discrepancies in population estimation methods leave the actual population unknown; however, it is likely to be around this estimate. As the development of urban areas occurred, people moved from rural areas to cities. In 1949, the rural population was about 33% of the total population. By 1970, 79% of the total population lived in urban areas (Rock 1985), whereas 90% lived in urban areas in 2003 (Encyclopedia Britannica 2007a). The 2007 population of Argentina is over 40 million with a growth rate of 0.9% due to births and

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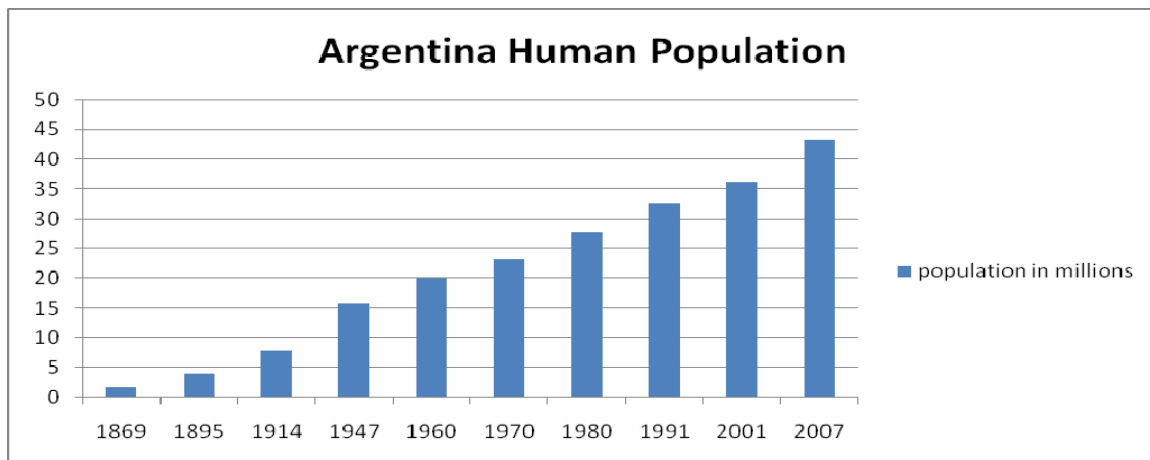
<sup>3</sup> More information can be found at the website available at <http://www.avesargentinas.org.ar>.

<sup>4</sup> More information can be found at the website available at <http://www.vidasilvestre.org.ar/>

an estimated population in 2025 of almost 46 million (US Census Bureau 2007).

Argentina has a human density of one person per 14 km<sup>2</sup> whereas both Brazil and Peru have a density of about one person per 21 km<sup>2</sup> (Encyclopedia Britannica 2007a, b, c)

Energy production and consumption are directly related to this population (Table 1).



**Figure 2:** Evolution of the total population according to the national censuses. Years 1869-2007.

Source: INDEC, <http://www.indec.mecon.ar/>

US Census Bureau, <http://www.census.gov/ipc/www/idb/country/arportal.html>

### **Biodiversity and Deforestation**

Although Argentina is only the 39<sup>th</sup> out of 53 countries rated for biological richness (CITES 2000), Argentina's habitat is diverse due to the mixture of geographic regions. Argentina's species richness tends to follow an east to west gradient with the east having the greatest diversity (Bucher 1982). As of 2004, the number of species and threatened species in Argentina for plants were: 9,372, and 42; mammals: 375 and 32; birds: 1,038 and 55; reptiles: 338 and 5; amphibians: 162 and 30; and fish: 102 and 12, respectively (UNEP 2005). In 2006, an additional 17 species were added to the 186

species already on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List (Table 6) whose purpose is to “draw the attention of the public and policy-makers to the urgency and scale of conservation problems, and to motivate the global community to try to reduce species extinction” (IUCN 2001)<sup>5</sup>. Species that are on the red list are categorized as critically endangered, endangered, or vulnerable (IUCN 2007). Argentina and its bordering countries have all experienced an increase in species on the IUCN red list since 2004 (Table 6), although Argentina has less species in all three categories: endangered, critically endangered, and vulnerable, than both Brazil and Peru (Table 5).

Both mammals and birds in Argentina’s grasslands have been exploited, such as the pampas deer (*Ozotoceros bezoarticus celer*), greater rhea (*Rhea Americana*), and “perdices” (*Rynchotus rufescens*, *Nothura* sp., *Eudromia elegans*) (Krapovickas and Di Giacomo 1998). Other bird species have been harmed from pesticide exposure. For example, Swainson’s hawks (*Buteo swainsoni*) were severely affected by pesticides; however, public outcry caused the pesticide to be banned, hopefully ensuring the hawks’ comeback (Krapovickas and Lyons 1997). Due to agricultural and urban development, the biodiversity is at risk. Independent of economic reasons, the ecological justification for biological diversity is that diversity is required for the persistence of ecological systems (Botkin and Talbot 1992). Therefore, Argentina needs to reach a balance between the economic rationale and ecological justification to protect the biological diversity.

Deforestation is occurring in Argentina similar to many other regions in the world. Forests only account for a small portion of Argentina’s land cover (Table 2). The

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<sup>5</sup> More information available at the website <http://www.iucn.org/>



two most extensive contiguous tropical dry forests in the world are located in South America, of which a portion of one is located in northern Argentina; thus, protection of these vast areas is a key priority of conservation (Miles et al. 2006). In the Chaco region of Argentina, the subtropical Chaco forest has been the most adversely affected resulting in about 1.2 million ha of lowland and mountain forests and woodland being cleared during a 30 year period in the late 20<sup>th</sup> century (Zak et al. 2004). Evidence to this is that only six patches remain that are larger than 400 ha with the largest being 1800 ha (Zak et al. 2004). Economic developments have had consequences on deforestation in the Paraná basin (Tucci and Clarke 1998). Fuel wood gathering has led to deforestation in the Andean plateau; however, commercial logging has not affected Latin America's tropical forests as severely as other regions of the world (Rowe et al. 1992). None the less, as other regions' forests are decimated, subsequent logging in the remaining forests is possibly inevitable. The current rate of agricultural expansion predominantly in Latin America and Sub-Saharan Africa could lead to a loss of about one third of the remaining tropical and temperate forests, savannas, and grasslands (Tillman et al. 2001).

### **National Parks**

The creation of the National Parks and Reserves known as Administración de Parques Nacionales (APN) started in 1903 with the donation of land by Dr. Francisco P. Moreno that was accepted by President Hipólito Irigoyen by decree of 1 February 1904 (Hopkins 1995). In 1934, the APN was officially established by the Argentine Congress (Boyle and Boyle 1990). Argentina's National Parks are extensive in the total size of area they encompass and continue to grow (Table 3; for specific characteristics of protected areas see Appendix 1). In addition to the National Parks, the APN also has

several additional National Monuments and Reserves<sup>6</sup>. Commercially important forest areas, which account for 40% of the total forests, become an important factor in policymaking for both conservation and induction into the park system (Hopkins 1995). The economic crisis of the late 20<sup>th</sup> century put an additional strain on the country's natural resources, thus resulting in difficulty of protecting the protected areas (IUCN 1992). The protection of land of various geographical and biological importances by the APN demonstrates the potential capabilities of countries to protect lands that they consider biologically significant to the future of world. However, the land protected as a percentage of total land area in Argentina is only about one-third that of Brazil, Peru, and South America and less than the percentage of the world (Table 2).

### **Soil Erosion and Desertification**

The main cause of soil erosion and desertification is the direct result of improper agricultural techniques that leave the soil bare or unprotected from the elements. South America's Chaco is the second largest biome in the world next to the Amazon (Abril and Bucher 2001). This biome is at risk due to overgrazing and soil degradation shifting the "wet forest" to a "desert" (Abril and Bucher 2001). Regions of the Patagonia are suffering the same outcomes from overgrazing, causing the land to have a reduction of plant cover and a depletion of soil organic horizon, fertility, and their capacity to absorb and retain water (Aagesen 2000). Soil in the Pampas is perhaps the most degraded with at least 1.3 million ha losing more than 20 tons/ha of soil each year (Krapovickas and Di Giacomo 1998). Furthermore, wind erosion is still common in the Pampas and water erosion was recognized as a major problem by the middle 20<sup>th</sup> century (Soriano et al.

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<sup>6</sup> More information can be found at the website available at <http://www.parquesnacionales.gov.ar/>

1992). A total of 11% of Argentina's area suffers from water erosion and 9% suffers from wind erosion (Chisari et al. 1996).

Agriculture and mining can enhance soil erosion and desertification by topsoil exposure and depletion of the aquifers. Livestock production is a major component of the economy with an estimated 50,768,000 cattle (more than the human population in the country) and 12,450,000 sheep in 2003 (Encyclopedia Britannica 2007a). Additionally, mining and quarrying produced approximately 133,917 kg of silver and 29,744 kg of gold in 2003 (Encyclopedia Britannica 2007a). Improper livestock production and mining augment the exploitation and depletion of natural resources.

A proposed Paraná-Paraguay waterway would improve the Paraná River conveyance decreasing the flood area, which may result in the Pantanal changing from a wetland to a drier savannah (Tucci and Clarke 1998). The Pantanal's wetland nature is determined by flood pulses that replenish nutrients, which if altered coupled with the present deforestation in the region would result in large-scale disruption of the ecosystem (Harris et al. 2005). Improper agricultural practices and urbanization have left their mark on the land permanently altering the soil and geography of the land. Sawers (2000) concluded that environmental degradation due to agriculture in the Argentine Interior has been caused by all society classes.

### **Air Pollution**

Argentina is a world leader in setting voluntary greenhouse gas targets leading to a consistent decline in emissions (Viglizzo et al. 2003, World Fact Book 2007).

Additionally, the incineration of household waste for heating in cities has been illegal for 15 years coupled with the fact that present agricultural techniques use fossil fuels more

efficiently has led to a further reduction in air pollution (Chisari et al. 1996; Viglizzo et al. 2003). Motor vehicles have a significant impact on air pollution, such that in Buenos Aires, the largest urban area, motor vehicles account for the majority of air pollution (Onursal and Gautam 1997). In 1999, motor vehicles accounted for the largest portion of CO<sub>2</sub> emission, almost one-third of the total (Table 4). Although Argentina emits air pollutants like any other country, they are taking great steps in reducing the emissions to counter environmental degradation. The three largest countries in South America only account for about 2% of the world total CO<sub>2</sub> emissions (Table 4).

### **Water Pollution**

Water pollution typically occurs due to dumping waste into water systems, improper landfill techniques, flooding of urban areas resulting in unexpected pollution, and agricultural practices. For example, the cities La Rioja and Catamarca have constraints on expansion of freshwater supplies forcing the residents to use whatever water they have available even if it is contaminated (Hardoy et al. 1992). The lack of piped water and sewage can exacerbate the water pollution problem by excessive contamination of water by excrement. For example, urban centers that have between 5,000 and 10,000 residents and urban centers between 200,000 and 500,000 residents have 90% and 60% of residents that lack connection to sewers, respectively (Hardoy et al. 1992). On the other hand, Argentina's slow growth rate of industrialization has restricted water pollution indirectly (Chisari et al. 1996).

Palaeolimnological records of Argentina show that recently there have been several short-term wet intervals (Piovano et al. 2002). These wet phases may attribute to even higher water pollution rates due to flooding of urban areas and degraded agricultural

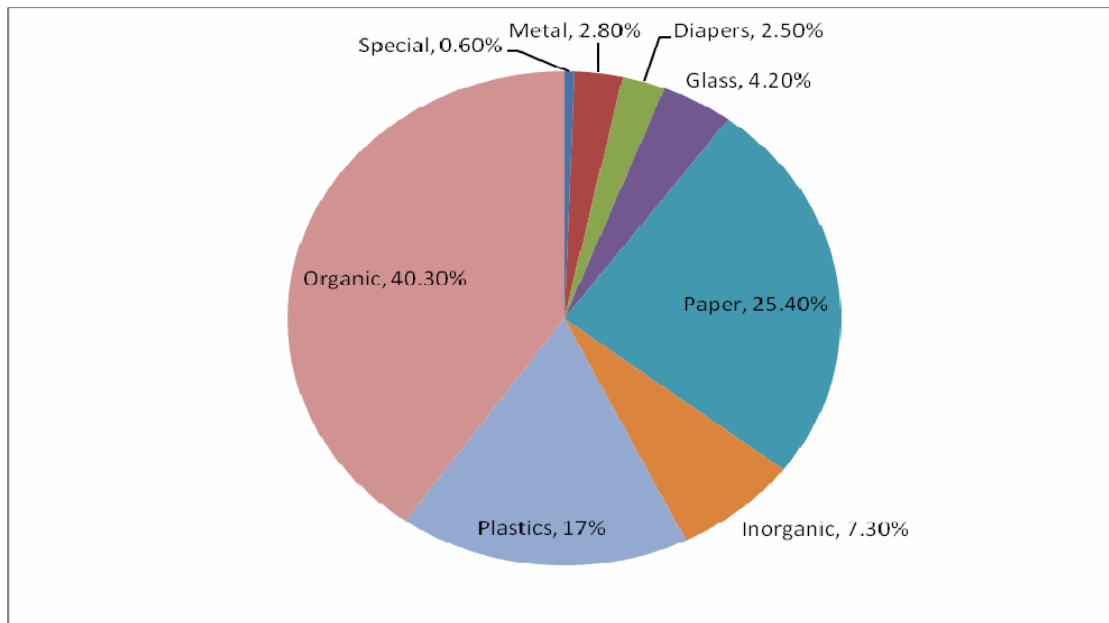
land. Recent flooding of the Paraná River has extended it over areas used for agriculture and some important cities likely resulting in agricultural and urban waste, such as sewage and solid waste, being introduced into the water table (Tucci and Clarke 1998). Highly toxic pesticides now banned that were used during the 1990's may have prolonged effects on the environment occurring in the water table due to flooding of agricultural land (Viglizzo et al. 2003). Water pollution continues to be a problem in Argentina much like other regions of the world due to population growth and agricultural practices.

In addition to Argentina's expansive land area and riverine systems, it also has a total of 8,397 km (5,206 mi) of marine coastline encompassing two marine provinces: Warm Temperate Southwestern Atlantic and Magellanic (Earthtrends 2003, Spalding et al. 2007). In 2001, the Global Environment Facility (GEF) proposed a project to strengthen Argentina's efforts to reduce pollution of the Patagonia marine environment and improve sustainable management of marine biodiversity by improving oil spill prevention, knowledge base about the Patagonia marine environment, and promoting regional knowledge for sustainable management of marine resources (World Bank 2001).

### **Solid Waste**

Solid waste is a major problem in Argentina's urban areas specifically because there are not suitable establishments to correctly dispose of it and determine what proportion of the waste is hazardous (World Bank 1995a, Chisari et al. 1996). Thus, waste, both solid and hazardous, is subsequently dumped into sewage drains, storm drains, and open air dumps (Chisari et al. 1996). Even though the inadequate solid waste disposal problem is understood, it is not being correctly monitored or combated (World Bank 1995b). A solution to fight this problem is to maximize recovery and recycling to

minimize the solid waste generated at the source (World Bank 1995a). The majority of solid waste in the greater Buenos Aires is organic and paper (Figure 3). Solid waste remains to be a problem in Argentina, especially in urban areas due to the incorrect disposal of solid waste and the widespread paucity of household sewage connection.



**Figure 3:** Buenos Aires Metropolitan Area urban solid waste composition characteristics

Source: Methane to Markets Partnership Landfill Subcommittee. 2006.

[http://www.methanetomarkets.org/resources/landfills/docs/argentina\\_lf\\_profile.pdf](http://www.methanetomarkets.org/resources/landfills/docs/argentina_lf_profile.pdf)

### **Hazardous and Radioactive Wastes**

Improper disposal of hazardous, radioactive or both types of wastes can have severe health and environmental consequences well into the future. It is hard to quantify the amount of hazardous waste since the proportion of it in solid waste is unknown (Chisari et al. 1996). The scarcity of specialized facilities to handle hazardous waste certainly creates opportunities for improper disposal of the waste even though it is illegal to dispose of these wastes in sewers or sanitary landfills (World Bank 1995b). Two functioning nuclear facilities, Atocha I and Embalse, exist in Argentina (Anonymous

2007). However, Section 41 of the constitution explicitly states that it's unlawful to cross Argentina's border with potentially dangerous or radioactive waste. Illegal dumping of hazardous and radioactive waste in open air dumps and pits certainly occurs to some degree throughout Argentina (World Bank 1995b).

### **Environmental-Health Related Issues**

Health issues directly related to environmental issues occur in Argentina mainly due to inadequate waste disposal and industrialization more so than from meager health care. Although Argentina has health problems typical of an industrial nation instead of a developing nation (World Bank 1995b), the deficiency in sewage treatment present there can lead to diseases such as typhoid, amebiasis, serigellosis, intestinal infections, viral hepatitis and bacterial sickness (Chisari et al. 1996). Overall, the citizens have decent housing and are well fed (World Bank 1995b). During the 1990's and early 2000's, contrary to the fact that Argentina has a sewage treatment problem leading to groundwater pollution, the leading mortality causes were heart and cardiovascular disease, cancer, and accidents, which are likely not a result of sewage contamination (World Bank 1995b, Encyclopedia Britannica 2007a).

### **Public Opinion and Education on Environmental Matters**

With the return of democracy and the subsequent 1994 constitution, the citizens were granted a new "platform" to become active in environmental issues and policymaking. The "platform" is supported by both Section 41 of the constitution coupled with the General Environmental Law (GEL), which requires public participation on environmental decision-making processes (Di Paola 2004). Non Governmental Organizations (NGO) date back to 1916 with the creation of the Asociación Ornitológica

del Plata (AOP) dedicated to the study and protection of birds (Aguilar 2002). However, public participation did not account for much input in environmental public policy before the 1980's. Between 1990 and 1994, public awareness of environmental issues in the news mainly focused on water pollution (Dasguta et al. 2000). Additionally, the number of firm-related news (i.e., specific companies) increased until 1993 and then decreased in 1994 (Dasguta et al. 2000).

One example of the public's present involvement with the environment can be seen in an experimental school building built in Mendoza. This school building had a reduction in all the environmentally negative effects measured except for photochemical ozone creation potential; however, when reevaluated this effect could be countered also (Arena and de Rosa 2003). Another example is the case of two species of the caiman (*Caiman latirostris*, *C. yacare*). Eggs are collected from wild nests and hatched in rearing facilities and then rereleased. In addition, payments to "guachos"(local people) provide an incentive not to kill adults but also to protect them, as well as the nesting areas (Larriera and Imhof 2006). It seems that Argentinean citizens are concerned about the environment and are taking great strides to minimize environmental degradation in both the rural and urban areas of their country.

### **Conclusion**

Argentina is a vast country with several different ecosystems that have varying degrees of environmental degradation. Typically, the environmental problems are twofold: rural and urban. Rural degradation is mostly a result of improper agricultural practices of livestock foraging and crop farming that leads to soil erosion and native plant species reduction. Extreme poverty is higher in rural areas than in urban areas, 40%



versus 30%, respectively (World Bank 2006). Ultimately, the outcome of rural poverty is the fact that before environmental protection, such as eco-friendly agricultural practices, can occur; poverty stricken people must first worry about the basic human needs to survive. This circumstance rather forces people that live in rural areas to degrade the environment in order to sustain themselves. This is contrary to the misconstrued common stereotype that “people that live off the land, protect the land.” In fact, Sawers (2000) “uncovered no evidence suggesting that any of the poor agriculturalists of the interior are environmental activists who defend the environment because they know their livelihood depends on it.”

Urban degradation in Argentina is typical of other areas; such that it comes down to the fact that too many people occur in too little of a place with not enough environmental safeguards in place to thwart pollution. Waste disposal issues seem to be the major pollution problem in the urban areas. This is because improper waste treatment ultimately contaminates the surface and ground water causing health problems. If the current reduction of air pollution is coupled with providing sewage connection and piped water to all the urban residents, then Argentina’s urban pollution would be controlled for the most part. In addition, Argentina produces more energy than it uses, whereas both Brazil and Peru have higher consumption than production (Table 1). Thus, environmental degradation can be minimized by limiting pollution during energy production. In conclusion, Argentina has environmental problems similar to the rest of the world due to population growth and the subsequent natural resources needed to maintain that population.

## **Acknowledgements**

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**Table 1:** Energy production and consumption of Argentina compared to Brazil, Peru, South America and the World.

<b>Energy Use</b>	<b>Argentina</b>	<b>Brazil</b>	<b>Peru</b>	<b>South America</b>	<b>World</b>
<b>Energy Production and Consumption</b>					
Total Energy production (in thousand metric tons) 2000	81,221	142,078	9,477	577,464	10,077,984
Total Energy Consumption (in thousand metric tons) 2000	63,182	179,701	13,101	383,514	9,702,786
<b>Energy Consumption by Sector, 1999 (in thousand metric tons)</b>					
Industry	13,993	64,317	3,141	114,332	2,140,474
Transportation	14,153	48,112	3,407	96,231	1,755,505
Agriculture	2,623	7,500	502	13,232	166,287
Commercial & public services	3,144	7,753	400	15,693	511,555
Residential	9,246	20,407	4,995	52,172	1,845,475
Non-energy Uses	845	4,113	154	9,446	333,981
Total Final Energy Consumption	44,003	152,203	12,598	301,106	6,753,276

Adapted from Earthtrends 2006, <http://earthtrends.wri.org/>

**Table 2:** Environmental parameters of Argentina compared to Brazil, Peru, South America, and the World.

<b>Environmental Parameter</b>	<b>Argetina</b>	<b>Brazil</b>	<b>Peru</b>	<b>South America</b>	<b>World</b>
<b>Agriculture</b>					
Total Cropland (thousands ha) (1999)	27,200	65,200	4,210	116,131	1,501,452
Annual Fertilizer Use (thousands m ton) (1999)	823	5,856	248	8,612	141,360
Pesticide Use kg/ha (1994-1996)	1,266	836	N/A	N/A	N/A
<b>Biodiversity</b>					
Total Area Protected (in thousands of ha)	17,435	153,299	21,609	375,207	1,457,674
Area as Percent of Total Land (2003)	6.30%	18%	16.7%	21.10%	10.80%
Fisheries production metric tons (capture in 2000)	890,725	510,580	10,624,696	17,552,234	84,411,066
<b>Forest Resources</b>					
Total forest area (2000) (thousands of ha)	34,648	543,905	65,215	885,618	3,869,455
Forests as a Percent of Total Land Area in 2000	12%	64%	51%	50%	29%
<b>Water Resources</b>					
Surface Water produced internally in cubic km (2001)	276	5,418	1,616	12,198	N/A
Ground Water Recharge in cubic km (2001)	128	1,874	303	3,693	N/A
Per capita Internal renewable water resources, 2001 (cubic meters)	7,274	31,012	60,929	34,428	N/A

Adapted from Earthtrends 2006, <http://earthtrends.wri.org/>

**Table 3:** National Parks in Argentina with the date

established and the area in hectares.

<b>Name</b>	<b>Date Established</b>	<b>Area (Hectares)</b>
Nahuel Huapi*	1922	758,000
Iguazú	1934	55,500
Los Glaciares	1937	600,000
Perito Moreno*	1937	115,000
Los Alerces	1937	263,000
Lanin	1937	379,000
Lago Puelo	1971	27,674
Laguna Blanca	1940	11,250
El Rey	1948	44,162
Río Pilcomayo	1951	47,000
Chaco	1954	15,000
Tierra del Fuego	1960	63,000
El Palmar*	1966	8,500
Formosa	1968	10,000
Los Arrayanes*	1971	1,753
Baritú	1974	72,439
Lihue Calel	1977	9,901
Calilegua	1979	76,306
Laguna de los Pozuelos	1981	16,245
Los Cardones	1986	76,000
Sierra de las Quijadas	1991	150,000
Predelta	1992	2,458
Campo de los Alisos	1995	10,000
Quebrada del Condorito	1996	150,000
Talampaya	1997	215,000
Copo	1998	114,250
San Guillermo	1998	150,000
El Leoncito	2002	76,000
Monte León	2004	61,700

\*Protected and named Patrimonio Nacional

Adapted from Boyle and Boyle 1990 and APN 2007

**Table 4:** Argentina pollution emissions compared to Brazil, Peru, South America and the World.

<b>Pollutant Emissions</b>	<b>Argentina</b>	<b>Brazil</b>	<b>Peru</b>	<b>South America</b>	<b>World</b>
<b>Carbon Dioxide (CO2) Emissions</b>					
Total emissions 1998 (in million metric tons of CO2)	136,914	299,556	27,854	801,222	24,215,376
Emissions as a percent of global CO2 production	0.6%	1.2%	0.1%	3.3%	N/A
<b>CO2 Emissions by Sector, 1999 (in million metric tons of CO2)</b>					
Public electricity, heat production, and auto producers	29	27	3	106	8,693
Other Energy Industries	14	19	2	79	1,205
Manufacturing Industries and Construction	20	87	7	183	4,337
Transportation	41	123	9	258	5,505
Residential	17	17	3	52	1,802
Other Sectors	14	27	3	64	5,640
Total Emissions All Sectors	137	300	27	742	27,180
<b>Non-CO2 Air Pollution, thousand metric tons</b>					
Sulfur dioxide emissions, 1995	331	2,050	723	7,062	141,875
Nitrogen oxide emissions, 1995	610	3,870	290	6,722	99,271
Carbon monoxide emissions, 1995	4,421	61,710	3,649	100,454	852,415

Adapted from Earthtrends 2006, <http://earthtrends.wri.org/>

**Table 5:** Argentina, Brazil, and Peru IUCN Red List Species Categories for 2006.

Category	Argentina			Brazil			Peru		
	Fauna	Flora	Total species	Fauna	Flora	Total species	Fauna	Flora	Total species
Extinct	1	0	1	6	5	11	1	1	2
Extinct in the wild	3	0	3	3	0	3	0	0	0
Critically Endangered	13	1	14	57	46	103	36	9	45
Endangered	42	10	52	79	117	196	75	15	90
Vulnerable	104	33	137	203	219	422	137	252	389
Near Threatened	123	13	136	220	66	286	149	38	187
Data Deficient	66	13	79	332	37	369	178	19	197
Least Concern	1248	13	1269	2433	86	2519	2165	40	2205
<b>TOTAL</b>	<b>1600</b>	<b>91</b>	<b>1691</b>	<b>3331</b>	<b>577</b>	<b>3908</b>	<b>2741</b>	<b>374</b>	<b>3115</b>

Adapted from IUCN, <http://iucn.org/themes/ssc/redlist.htm>

**Table 6:** Number of Species on the IUCN Red List in 2004 and 2006 in Argentina and its bordering countries.

Taxonomic Group	Argentina		Bolivia		Brazil		Chile		Paraguay		Uruguay	
	Red List 2004	Red List 2006	Red List 2004	Red List 2006	Red List 2004	Red List 2006	Red List 2004	Red List 2006	Red List 2004	Red List 2006	Red List 2004	Red List 2006
Mammals	32	32	26	24	74	73	22	22	11	9	6	7
Aves	55	57	30	32	120	124	32	35	27	29	24	26
Reptiles	5	5	2	3	22	22	0	1	2	2	3	3
Amphibians	30	33	21	23	24	28	20	21	0	2	4	4
Fish	12	22	0	0	42	58	9	12	0	0	11	22
Mollusc	0	0	0	0	21	21	0	0	0	0	0	0
Other												
Invertebrates	10	10	1	1	13	13	0	2	0	0	1	1
Plants	42	44	70	71	381	382	40	39	10	12	1	1
Total species	186	203	150	154	697	721	123	132	50	54	50	64

Adapted from IUCN, <http://www.sur.iucn.org>



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**Appendix 1:** Areas protected by the Administración de Parques Nacionales (National Parks Administration)

Natural region	Name	Province	Area in hectares	Year of creation	Characteristics
<i>Puna steppes</i>	Laguna de los Pozuelos Natural Monument	Jujuy	16,000	1979	<p>Located in the Puna region, it protects the pond's eco-system. It is particularly relevant as a habitat for a great number of water birds, and for this reason it was included in the Ramsar Convention "List of Internationally Important Wetlands." The Pozuelos Pond hosts 36 species of water birds; the most outstanding among them are three species of flamingos, two of which are exclusively Andean—the "parina grande" or "andina" and the "parina chica." The landscape is almost treeless with the exception of certain small "queñoa" woods; it is mostly a shrubby steppe with predominant "tolares." Among the animals living in these surroundings one can find the "vicuña" —a South American camelid well adapted to the adverse climate conditions—, the puma (South American panther), the red fox, the royal skunk and the "tuco-tuco" rodent. These vast plains are inhabited by running birds such as the "suri," also called "ñandú [South American ostrich] petiso" (pony ñandú), and the small "inambú of the sierras."</p>
<i>Monte (wilderness), Puna steppes, and Yungas (subtropical mountain rain forests)</i>	Los Cardones National Park	Salta	65,000	1996	<p>From its inception, this National Park emphasized the need to shelter a representative sector of the main Andean biomasses in northwestern Argentina: the Puna, a northernmost area of the sierra Monte (wilderness), an exclusive natural region of Argentina. Species in clear danger of extinction, such as the camelids vicuña and "taruca" (or northern huemul) find refuge in this park.</p>

					<p>The "cardones," tall trees growing on all the mountainsides, are the Park's appropriate symbol. Their edible juicy fruit provides water and food for animals and even human residents in the high mountain in times of drought. Its wood is used in making roof beams, doors and windows as well as furniture and toys.</p> <p>The geological structure is rich in limestone deposits containing well preserved fossil remains of fish and dinosaurs.</p>
High Andes, Puna, and sierra Monte (wilderness) and bulges	San Guillermo National Park	San Juan	170,000	1998	<p>The critical survival of the vicuña stirred up much concern. While the vicuña prefers the plains, another wild camelid, the guanaco, inhabits both the relatively fertile lowlands and the rocky mountainsides. Until the area became protected, both species were actively hunted, especially the vicuña for the fineness of its smooth hair. These two camelids share their habitat with the mountain suri, the Andean condor, the "moorish" eagle, the puma and the red fox. There are also exclusive species such as two colored lizards—the "chelco" and the "piche"-tail. The vegetation adapts its shapes to the extremely dry conditions and the high altitudes. Small plants with big colorful flowers are also to be seen.</p> <p>It should also be mentioned that native cultural remains were found in the area, showing that the pre-Hispanic populations made particular use of the aboriginal wild camelids.</p>
<i>Yungas</i> (subtropical mountain rain forests)	Baritú National Park	Salta	72,439	1974	<p>These National Parks protect the yungas (subtropical mountain jungles or rain forests), also known as "nuboselvas" (cloud forests), because of the clouds that cover the mountainsides during much of the year.</p>
<i>Chaco Seco</i> (dry Chaco)	Calilegua	Jujuy	76,306	1979	<p>Access is made difficult by the irregular relief, which on the other hand provides</p>



	National Park					shelter to species threatened by extinction.
	El Rey National Park	Salta	44,162	1948		Huge specimens of cedar, "timboes" and walnut trees grow on the foothills, as well as forests of mountain pine trees (alders).
	Campo de los Alisos (alder field) National Park	Tucumán	10,661	1996		A highly diversified fauna is distributed along the different vegetation strata according to the altitude.  There are in the entire area important and valuable archaeological remains.
Chaco Húmedo (humid Chaco)	Río Pilcomayo National Park	Formosa	47,000	1951		These parks and the strict natural reserve protect a representative swampy area  of the Eastern (or Humid) Chaco. Due to the varied types of climate and soil, there exist different plant communities, such as the "Selva de ribera" (river forest) and the "Monte fuerte" (tough wilderness). Both these types host huge specimens
	Chaco National Park	Chaco	14,981	1954		of both white and red "quebrachos" as well as beautiful "lapachos." Growing to lesser heights there are smaller trees—carobs ("algarrobos"), "guayabíes" and "palos borrachos." This almost impenetrable forest is inhabited by animals such
	Colonia Benítez Restricted Natural Reserve	Chaco	10	1990		as the "guazuncho" (small roebuck), "pecaríes", howling monkeys, pumas, and birds such as the "charata and the "ipacahá." The "aguará-guazú", the ñandú
Corrientes Province marshes	Parque Nacional Mburucuyá	Corrientes	17,729	2001		and the "chuña" live in the lowlands. They all have long legs enabling them to move easily through the tall grasses and the flooded fields. White storks, herons, pink spatolas and ducks, as well as two alligator species ( black and spotted) thrive in the Mburucuyá marshes. The fish in these waters, like the "tamboatá"

or cascarudo (crusty, shelly), have adapted to survive through drought periods by breathing air directly and jumping from one puddle to another propelled by their pectoral fins.

<i>Chaco Seco</i> (dry Chaco)	Formosa Natural Reserve	Formosa	9,005	1968	Located in the southwest of the Province of Formosa, it hosts a highly varied vegetation, with open forests of both white and red "quebrachos", "mistol", guaiacum and other fine woods.
	Copo National Park	Santiago del Estero	114,250	2000	On the ridges along the banks of the Teuco and Teuquito rivers there are many specimens of "palo amarillo," white carob, blackberry, "palo bolilla" and others. In flooded areas, "palo bobo," "palo flojo," "chañar," "vinal" and "guaraminá" can be found. The existing wildlife includes pumas, "carpinchos" (South American hedgehogs), "antas" (native roebucks), "aguará-popé," "pecaríes," anteaters, "tamanduaís" (honey-eating "bears"). The almost extinct "tatú carreta" (giant armadillo) and "yaguareté" (small jaguar) are also found here. Among the birds, can be seen "bandurrias," pink spatulas, "chajás," white and purple herons, as well as a great variety of numerous other smaller birds.
Paraná basin rain forests	Iguazú National Park	Misiones	67,620	1934	The high humidity and temperatures of this region provide ideal conditions for the development of a great variety of wild vegetation, estimated in as many as 2000 different species of different shapes and adaptations—creepers, herbaceous,
	San Antonio Restricted Natural Reserve	Misiones	600	1990	shrubby, vines, epiphytic, climbing, supporting, arboreous, or emergent, that occupy all the existing space from the ground to the top of the highest trees.

There is also a varied and abundant wildlife hosting about 448 species of birds, 80 mammalian species, and similar numbers of fish, batrachian and reptile species.

In January, 1542, Álvar Núñez Cabeza de Vaca, second governor of the River Plate, came upon the astounding waterfalls of the Iguazú River (Cataratas del Río Iguazú). He named them "Saltos de Santa María" (Saint Mary's Falls), but they were later given the original Indian name Iguazú, meaning "great water" in the Guaraní language.

The San Antonio reserve preserves remainders of the scarce Paraná pine (*Araucaria*) forests and of the wildlife native to this particular environment.

<i>Espinal</i> (thornbush country)	El Palmar National Park	Entre Ríos	8,500	1966	This National Park was created in the Province of Entre Ríos to preserve the last remainders of the formerly abundant forests of yatay ( <i>Syagrus yatay</i> ) and of a native palm tree ( <i>Butia yatay</i> ) that underwent the destruction of its sprouts by cattle until its outright elimination by the clearing of land for agricultural purposes.
Paraná river delta and islands	Diamante or Pre- Delta National Park		2,458	1991	These areas preserve different natural environments in a great number of small islands. The riverside forest consists of medium-sized trees, such as "sauces criollos" (native willows), "curupíes," "river alders" and "ceibos." In the underbrush, all types of shrubs are intricately tangled with vines and other climbing plants, while ferns and cactus cover the tree branches. Scrublands with rushes,
	Otamendi Restricted Natural Reserve	Buenos Aires	3,000	1990	bullrushes and "pajas bravas" prevail in the wetlands and flooded areas. The water surfaces are profusely covered with floating and submerged plants.

					<p>A wide range of bird fauna and land animals includes "gallaretas" as well as ducks and swans, "pavas del monte" and a variety of small birds, along with otters, "carpinchos" and swamp deer.</p>
High Andes, Monte, Puna	El Leoncito National Park	San Juan	74,000	1994	<p>This National Park protects the region by avoiding possible erosion and polluting effects, thus preserving the atmospheric qualities of this place that make it one of the world's best sites for astronomical observations. Two observatories have been built here—El Leoncito Observatory (CASLEO), open to authorized researchers and fitted with a highly complex telescope, 2552 meters above sea level, and the Dr. Carlos U. Cesco Astronomical Observatory, inaugurated on March 31, 1965, when the "Movimientos Propios Australes" program was initiated with the purpose of photographing the 958 divisions of the Southern Hemisphere sky.</p> <p>Within El Leoncito National Park there are also paleontological deposits and archaeological evidence, such as cave paintings and stretches of the famous "Camino del Inca" (road of the Inca)" from pre-Hispanic times.</p>
Plains and plateaus Monte, Chaco Seco	Sierras de las Quijadas National Park	San Luis	150,000	1991	<p>The area is located in the unique Argentine eco-geographical region known as the Monte (wilderness), distinguished by its droughtiness and hot climate.</p> <p>Its typical vegetation is of the xerophilous shrubby steppe type. "Jarillares," "zampales," as well as open woods of "chañares" and "quebrachos," grow in this dry climate. Herbivorous animals, like the "guanaco" and the "mara," and carnivorous, like the skunks, ferrets, foxes and pumas, are the foremost</p>
Plains and plateaus Monte,	Lihué Calel	La Pampa	10,939	1977	<p>mammalians found among the local wildlife. Birds such as the "gallito copetón"</p>

(wilderness)	National Park				and the "martineta" can also be found. In order to avoid high temperatures, many of these species live in caves or have adopted nocturnal habits. The northern part of these territories were originally inhabited by the Huarpe indians, while the rest was home to the Pampa and Mapuche peoples, the latter in Lihué Calel, where the tribe of the famous chief Namuncurá used to live.
Sierra Monte (wilderness) and bulges	Talampaya National Park	La Rioja	215,000	1997	With remarkable shapes due to thousands of years of erosion that form canyons with high vertical walls (like the ones in the Talampaya river or in Los Cajones), it occupies the low mountains of the western region of the Province of La Rioja. Sandy formations and strange rocky silhouettes dot the area known as the "Ciudad Perdida" (Lost City). In the red high walls nest numerous birds of prey, such as the Andean condor, the small eagle and the so-called "pilgrim falcon," as well as the "chinchillón" rodent. Talampaya is a fossil site of world importance due to the abundance of remains. One of the oldest dinosaurs on earth was found among the remarkable specimens discovered in this site—the "Lagosuchos talampayensis," that lived some 250 million years ago. Under open skies, on walls and huge rocks, a great number of anthropomorphous and zoomorphous engravings, as well as geometric abstract figures can be admired, in harmony between nature and culture, being one of the most relevant sites of aboriginal rupestrian art in Argentina.
<i>Chaco Seco</i>	Quebrada del Condorito National Park	Córdoba	37,000	1996	On its eastern part, this area protects the nesting of the condor by preserving the highland pastures surrounding "tabaquillo" forests. The peaks of the Sierras

					Grandes range in Córdoba constitute a protective habitat for condors. They also provide much of the fresh water used in neighboring towns and in the provincial capital itself.
Semi-arid Patagonian steppe	Laguna Blanca National Park	Neuquén	11,251	1940	Located in the Patagonian steppe, in the southern third of the country, we find cold and dry climates, with strong western winds. Vegetation consists of thorny shrubs and grass bushes. "Laguna Blanca" (White pond) is the place of greatest
	Bosques Petrificados (petrified forests) Natural Monument	Santa Cruz	61,228	1954	concentration of black-necked swans, while the "Bosques Petrificados" Natural Monument preserves the most important site of fossil araucaria trees in the entire country.
Steppe and Atlantic coast	Monte León National Park	Santa Cruz	60,800	2002	In completion process. It is the only National Park in Argentina having an ocean coastline with numerous sea wildlife colonies.
Atlantic coast	Ballena Franca Austral (southern franca whale) Natural Monument	Argentine Epicontinental Sea		1984	Each year, in winter and spring, a great number of whales arrive in the San Matías, San José and Nuevo gulfs and in Caleta Valdés. In order to protect them from extinction, particularly considering that they breed and calve in these waters, the area has been declared a natural monument. Mature female whales return at 3-year intervals, whereas adult male whales are generally seen every year. The

total world population of these whales (*Balena franca*) is estimated at about 5000 specimens, a large percentage of which have been seen in Argentine territorial waters, this being the single largest concentration of this type of whales in the world. They come to mate, breed and spend time with their broods before migrating to the southern seas.

Patagonian forests	Lanín National Park	Neuquén	412,003	1937	These national parks preserve specimens of subantarctic woods that cover a narrow strip along the Southern Andes. The most typical tree species are the "pehuén," in central-western Neuquén Province (Lanín Natural Park), the "arrayán," the cypress and the "colihue" (Nahuel Huapi National Park). Having a special micro-climate, the Lago Puelo National Park grows unique vegetation species, such as the "avellano" (hazelnut), the "tique" and the "ulmo." In a small area with abundant rainfall thrives the Valdivian forest, with remarkable trees such as the "maniú" and the "alerce" (Nahuel Huapi and Los Arrayanes National Parks). In the coldest regions, Santa Cruz Province (Perito Moreno National Park) and Tierra del Fuego (Tierra del Fuego National Park), there are abundant woods of "guindo," "canelo," "ñire" and "lenga." The numerous lakes in these national parks are of glacier origin. Los Glaciares National Park is covered by a great ice blanket from which numerous and spectacular glaciers flow majestically downhill, such as the Upsala, the Viedma, the Electric, the Tower, etc. Species
	Los Arrayanes National Park	Neuquén	1,840	1974	
	Nahuel Huapi National Park	Neuquén and Río Negro	710,160	1934	
	Lago Puelo National Park	Chubut	23,700	1937	
	Los Alerces National Park	Chubut	263,000	1937	
	Perito Moreno National Park (1)	Santa Cruz	115,000	1937	
	Los Glaciares National Park	Santa Cruz	717,800	1937	
	Tierra del Fuego	Tierra del Fuego	63,000	1960	

National  
Park

threatened by extinction, such as two native deer –the huemul and the pudu–, and the "huillín," an autochthonous otter, can be found among the protected wildlife species in these reserves.

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Note: Handling categories of the National System of Natural Areas are protected under the jurisdiction of the Administración de Parques Nacionales (National Parks Administration). National Parks: areas to be maintained in their natural condition, which are representative protected areas of an adjacent national park or as independent preservation areas. Within them the construction, services and development of human settlements are approved and executed insofar as they are compatible with preservation. Natural Monuments: regions, objects, living species of animals or plants of aesthetic interest or of historical/scientific value deserving absolute protection; hence, the only activities allowed are duly authorized informative and scientific visits. Restricted Natural Reserve: areas where direct human interference is reduced to a minimum, in order to guarantee the natural development of animals and plants, as well as other ecological processes. Natural Reserve: this category preserves unique natural treasures which can be investigated and visited. No tourist constructions are allowed within them except those for the attention and safety of visitors. Natural reserves receive the same treatment as natural monuments and have the same importance. (1) This National Park is also included in the natural region of the Patagonian steppe.

Source: Prepared by the INDEC on data submitted by the Administración de Parques Nacionales (Federal Law N° 22 351)

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