Universities Council on Water Resources
Journal of Contemporary Water Research & Education
Issue 145, Pages 51-60, August 2010

Water, Sanitation, and Hygiene (WASH) Indicators: Measuring Hydrophilanthropic Quality

Faith R. Sternlieb[1] and Melinda Laituri[2]

[1]*Department of Geosciences, Colorado Water Institute, Colorado State University, Fort Collins, CO*
[2]*Department of Forest, Rangeland, and Watershed Stewardship, Colorado State University, Fort Collins, CO*

Abstract: The driving institutional mechanisms behind solutions for increasing access to water, sanitation and hygiene for the poor are driven by hydrophilanthropy, monies donated by non-government organizations to create solutions to problems caused by water poverty. Water poverty is the stress and/or scarcity of water resources (institutional, social, economic, political and/or physical constraints) that exceed an individual's basic needs for health, prosperity and a secure livelihood. Hydrophilanthropic organizations have emerged from the institutional landscape as water advocates and are responsible for contributing unequivocal resources towards ameliorating social, environmental, cultural and economic consequences resulting from water poverty, however, results from their contributions have been overlooked by policy makers. Questions for future research on the role of the hydro-philanthropic community include: what is the rationale for hydro-philanthropy to fund programs aimed at increasing access to water? And, does funding from hydrophilanthropy determine policy or does policy determine what is funded?
Keywords: *water poverty, Millennium Development Goals, environmental indicators*

The term 'philanthropy' comes from Ancient Greek words *phil + anthrōpos* which means *loving people* (Merriam-Webster Online Dictionary 2009) or in modern terms "1. a. love of mankind; the disposition or active effort to promote the happiness and well-being of others; practical benevolence, now esp. as expressed by the generous donation of money to good causes" (Oxford English Dictionary 2009b). For practical purposes, it is important to differentiate "philanthropy" from "foreign aid." Foreign aid in the context of this discussion is material help given by one country to another, such as economic assistance or material help given by a rich to a poor or "underdeveloped" country (Oxford English Dictionary 2009a).

At the global scale, foreign aid for low-income countries comes from a complex arrangement of lending agencies in high-income countries: multi- and bi-lateral organizations, intermediary groups within civil society at large (non-governmental organizations, foundations, private industry, etc.) and the state (Cling et al. 2002). Foreign aid monies are provided in the form of donations, loans, and more currently debt relief. Philanthropy is situated within the civil society classification. Hydrophilanthropy, therefore, is foreign aid for the specific purpose of alleviating water poverty.

Water poverty is the stress and/or scarcity of water[1] resources due to institutional, social, economic, political and/or physical constraints that limit an individual's basic needs for health, prosperity and a secure livelihood (Feitelson and Chenoweth 2002, Molle and Mollinga 2003, Sullivan and Meigh 2003, Vörösmarty et al. 2005, Komnenic et al. 2009). Although there are multiple dimensions of water poverty including: safe drinking water, domestic water, food security, economic production, and ecosystem services (Molle and Mollinga 2003), the focus of water poverty in this paper will be to concentrate on access to safe water and sanitation.[2]

According to the Millennium Project's Task

Force on Water and Sanitation the definition of 'access' is the ability to obtain sufficient quantities of water that are safe to drink and available for hygienic purposes (Sachs and McArthur 2005, World Health Organization/UNICEF 2006). Improved water technologies include: piped water into dwelling, plot or yard; public tap or standpipe; tubewell or borehole; protected dug well; protected spring; and rainwater collection (World Health Organization/UNICEF 2006, Billig and Swandle 1999). Improved water does not guarantee clean or safe drinking water but is nonetheless used to measure increased access. For example, in the case of Bangladesh, an increase in improved water sources led to one of the largest outbreaks of arsenic poisoning in history (Sullivan et al. 2003).

In order to appreciate the role hydro-philanthopy plays in achieving both Goal 1 (poverty alleviation) and Goal 7 (environmental sustainability) of the United Nations Millennium Development Goals, this paper will:

1. examine a recent history of poverty alleviation through foreign aid at global and national policy levels,
2. discuss environmental indicators and indicator frameworks with a specific emphasis on the Water Poverty Index,
3. identify hydrophilanthropy in the context of water, sanitation and hygiene (WASH) projects, and
4. consider the correlation between foreign aid, hydrophilanthropy, water poverty indicators and their implications on water policy.

Poverty, Foreign Aid, and Policy

In September of 1999 at the G7 Summit, the Bretton Woods Institutions presented the new poverty reduction strategic framework (Naudet 2003), responsible for the institutional landscape surrounding global poverty alleviation and more specifically, hydrophilanthropy. A transformation of the Heavily Indebted Poor Countries Initiative resulted in the Poverty Reduction Strategy Papers (PRSP) framework that emphasizes poverty reduction rather than economic structural adjustment with special attention to ownership, partnership, participation, and empowerment, donor coordination and accountability (Cling et al. 2002; Naudet 2003).

Launched in 2006 at the G8 Summit in Gleaneagles Scotland, the Multilateral Debt Relief Initiative aims to "provide additional support to Heavily Indebted Poor Countries to reach the Millennium Development Goals" (IDA/IMF 2009). As of 2006, debt relief under the Heavily Indebted Poor Countries Initiative is considered reduced debt if the economic indicators of debt burden are above Heavily Indebted Poor Countries thresholds and if other conditions are met: macroeconomic stability, implementation of structural and social reforms as well as the execution of at least one year under PRSP. Within the Multilateral Debt Relief Initiative framework, debt is cancelled dependent on the relief provided and based on the specific timeframe debt was incurred.

In 2000, the United Nations (UN) drafted the Millennium Development Goals that identified water for the poor as a focal point with the goal to reduce by half the proportion of the world's population lacking safe drinking water and basic sanitation by 2015. The major constraints that continue to limit the success of the water supply and sanitation goal are inadequate investment, ineffective governance, limited resources, gender disparities and water availability (Sachs and McArthur 2005; Fry et al. 2008). The Monterrey Consensus in March of 2002 was a response to PRSP calling for partnerships and donor coordination while recognizing the mounting pressure to achieve the Millennium Development Goals within the allotted timeframe (Cling et al. 2002).

At the national scale, foreign policy such as the Senator Paul Simon Water for the Poor Act of 2005 (P.L. 109-121 2005) aims to increase access to clean water and sanitation to poor populations in low-income countries. The U.S. Agency for International Development (USAID), the Millennium Challenge Corporation[3] and the Department of Defense are the three agencies that receive direct appropriations for development assistance (Sternlieb and Laituri 2009). USAID and Millennium Challenge Corporation are the primary agencies that implement activities in response to the Water for the Poor Act goals, receiving government funds from the U.S. State Department under the Bureau of Oceans and International Environmental and Scientific Affairs.

Table 1. Environmental indicator frameworks for measuring impacts on water resources.

Framework	Indicators	Source
Pressure-State Response model	State indicators: what is happening to the state of the environment? Pressure indicators: why is this happening? Response indicators: what are we doing about it?	OECD 1993, Hammond et al. 1995, OECD 2008
Environmental Sustainability Index	Inter and intra-national cross comparisons on environmental stress	Niemeijer 2002, Esty et al. 2005
Green GDP Index	Economic progress	Molle and Mollinga 2003, Gabrielsen and Bosch 2003
Genuine Progress Indicator	Wealth indicators	Molle and Mollinga 2003, Gabrielsen and Bosch 2003
Index of Sustainable Economic Welfare	Human welfare	Gabrielsen and Bosch 2003, Molle and Mollinga 2003
Human Development Index	Life expectancy, school enrollment, literacy, income	Molle and Mollinga 2003, Sullivan et al. 2003,
European Environmental Pressure Indices Project	Influence of human activities on the environment	Molle and Mollinga 2003
Sustainable Development Index	60 environmental pressure indicators (i.e. water pollution)	Molle and Mollinga 2003
World Water Development Reports	Annual report cards on global fresh water – 58 indicators	Muller 2009, Vorosmarty et al. 2005
Driving Forces Pressures State Impacts Responses framework	Social, economic, demographic and environmental indicators	Svardstad 2008, Jago-on 2009, Muller 2009, Gabrielsen and Bosch 2003
Sustainable Livelihoods Framework	Livelihood assets and capital	Lawrence et al. 2002, Sullivan and Meigh 2003, Sullivan et al. 2003

In fiscal year 2008 alone, USAID and Millennium Challenge Corporation under the Water for the Poor Act obligated a total of US $489.6 million and US $429.0 million, respectively, to safe drinking water, sanitation and hygiene projects (U.S. Department of State 2009).

Low-income countries have had to adapt their economies and political institutions to the new debt relief policies of multi- and bi lateral lending agencies, creating new philanthropic spaces. The cause of some of these changes is the lack of distinction between policies regarding foreign aid, debt relief, humanitarian aid, and loans for low-income countries.

Review of Environmental Indicators and Indicator Frameworks

One method to evaluate public and private water projects aimed at increasing access to clean water is through indicators. Indicators are monitoring tools that are developed by scientists and researchers to explain phenomena, reflect changes over time, inform policy, compare situations, and evaluate environmental performance and sustainability to achieve program goals (OECD 1993; Hammond et al. 1995; Billig and Swindale 1999, Niemeijer 2002; Shyamsundar 2002, Molle and Mollinga

2003; Sullivan et al. 2003; Esty et al 2005, Milman and Short 2008, OECD 2008). Some indicators are composites combining quantitative and qualitative elements, providing a way to establish the institutional and environmental determinants of water poverty. The following are examples of indicator frameworks (Table 1).

Social and institutional capacity indicators can measure inputs (i.e. spending on water and sanitation) and outputs (i.e. number of private tap connections), outcomes (i.e. time or distance to obtain water), as well as short-, mid- and long-term impacts (i.e. prevalence of diarrhea among children, morbidity, mortality, etc.) (Billig and Swindale 1999, Shyamsundar 2002, Esty et al. 2005). Indicators also have the potential to act as agents of change. For example, the Dutch implemented a policy based on the *Greenhouse Gas Index* summarizes the potential impact on climate warming from deforestation and fossil energy use (Hammond et al. 1995).

In a review of water and sustainability indicators (indicators that measure the ability to adapt to change while absorbing stresses), three studies stand out: Feitelson and Chenoweth (2002), Molle and Mollinga (2003) and Milman and Short (2008). All three articles identify critiques against basing policy on the results of indicator studies. Review of these findings reveals there are almost an equal number of critiques for and against the utility of indicators. Among many criticisms, indicators do not apply to spatial scales and are uni-dimensional, nor do they portray the disparities between social, institutional, cultural, economic and political impacts.

The focus on the identification of indicators tends to outweigh efforts to understand underlying processes, failing to identify regional and local conditions within the ecological landscape. The complexity of, "distinguishing conditions from stresses, determining causal relationships, and measuring the capacity of a system to respond" (Milman and Short 2008, 759) makes it difficult to establish sustainable indicators that can be adapted to changing systems. Despite persistence on indicator development, the UN World Water Development Reports disclose the consequences behind poor data availability: "data on almost every subject related to water issues is usually lacking, unreliable, incomplete or inconsistent" (Muller 2009: 298). This is particularly problematic because data (whether collected or derived) drives the selection of indicators.

Despite these criticisms, the scientific community continues to refine indicators and their applications because of their many contributions to ecosystem science and environmental policy-making. Indicator frameworks provide a systematic approach to collect and analyze data, identify gaps and guide new methods of data collection to better understand water poverty. UN-Water is currently addressing indicator challenges by creating a Task Force on Indicators, Monitoring and Reporting; at the same time, the World Water Assessment Programme has established the Expert Group on Indicators, Monitoring and Data/Metadata Bases (Muller 2009).

Designed by Statistics Canada in the mid 1970s, the Pressure-State-Response model was adopted and implemented by the Organization of Economic Development and Co-Operation (OECD)[4] (Hammond et al. 1995, Rapport and Singh 2006). According to the Pressure-State-Response framework, there are three types of indicators: *state* indicators address 'what is happening to the state of the environment,' *pressure* indicators consider 'why is it happening' and *response* indicators answer 'what are we doing about it' (OECD 1993, Hammond et al. 1995, OECD 2008). In 1991, OECD members approved the OECD Council Recommendation on Environmental Indicators and Information to further indicator development for the integration of environmental policies into the various sectors (i.e. forestry, agriculture, energy, etc.), measurement of environmental performance and environmental accounting and reporting on the state of the environment (OECD 1993).

OECD identified the following core environmental indicators: climate change, ozone layer, air quality, waste generation, fresh water quality, fresh water resources, forest resources, fish resources, energy resources, and biodiversity (OECD 1993, OECD 2008). Under the OECD Pressure-State-Response model, the key environmental indicators for fresh water are: pressure (the intensity of use of water resources), conditions (frequency, duration and extent of water shortages) and responses (water prices and user

charges for sewage treatment) (OECD 2008).

Although OECD does not claim to be a humanitarian organization intended for water and sanitation, their primary role is to facilitate policy in 30 member states, many of which are classified as high-income countries. There are several notable observations to make about the OECD framework. First, Pressure-State-Response only applies to member countries, none of which are included in the Heavily Indebted Poor Countries initiative. Second, the indicators are heavily reliant on data that may be easy to obtain for the member countries but not as readily available for low-income countries. Thirdly, the three criteria for indicator selection (policy relevance and utility for users, analytical soundness and measurability) are problematic.

While all three of these criteria might suit the 30 current OECD members, the indicators do not provide a basis for international comparisons for the majority of environmental conditions, pressures or responses. Finally, it is the responsibility of each of the 40 eligible Heavily Indebted Poor Countries to identify a monitoring and assessment plan in its national PRSP in order to receive debt relief. If each country develops their own set of indicators in order to meet policy demands, the data sets will be of minimal comparative value, impeding efforts to assess, measure, evaluate and analyze the state and health of the environment and progress towards the water and sanitation target for the Millennium Development Goals.

The Environmental Sustainability Index is a collaborative initiative between the World Economic Forum, Yale Center for Environmental Law and Policy, the Center for International Earth Science Information Network of Columbia University and the Joint Research Center of the European Commission (Niemeijer 2002; Esty et al. 2005). Similar to the objectives of the Pressure-State-Response framework, Environmental Sustainability Index aims to facilitate inter and intra-national cross comparisons on the state of the environment by measuring five components[5]: the environmental and human systems, impacts of environmental stress, human vulnerability to environmental change, social and institutional capacity and contribution to global stewardship (Niemeijer 2002, Esty et al. 2005, Fry et al. 2008). An innovative study conducted by Fry et al. (2008) estimates the impacts of global sanitation coverage by equating challenges of meeting sanitation targets outlined in the Millennium Development Goals to specific Environmental Sustainability Index indicators that measure results.

The Driving forces-Pressures-State-Impacts-Responses (DPSIR) framework, an extension of the Pressure-State-Response model, identifies *drivers* of social, economic, demographic and environmental indicators. Changes in lifestyle such as production and consumption patterns are responsible for exerting pressure on the environment, creating *impacts* that elicit social responses (Gabrielsen and Bosch 2003, Svardstad 2008, Jago-on et al. 2009). The DPSIR framework has been applied to integrated water management in order to assess the ecological status of European surface and ground water in a regional study of the Basque Country in Northern Spain (Borja et al. 2006). DPSIR has also been applied to sub-surface water systems in Asian cities to investigate the human/environment, cause/effect relationships between pollution, water treatment, waste water disposal and drainage, all of which impact water supply and sanitation (Jago-on et al. 2009). DPSIR has drawbacks similar to those of Pressure-State-Response in that there is little room to account for the non-human drivers of environmental change. Few case studies have been undertaken that apply DPSIR to rural WASH activities, research and development in low-income countries warranting further study in this area.[6]

Both national policy and foreign aid link 'access to safe water' to poverty identification (Billig and Swindale 1999, Shyamsundar 2002). USAID formulated a set of indicators that mirror those of the World Health Organization/ UNICEF Joint Monitoring Programme for Water Supply and Sanitation to track progress for the water and sanitation target of the Millennium Development Goals using 'access to safe water' as an environmental impact indicator (Billig and Swindale 1999, Shyamsundar 2002). For example, an indicator for water supply is the percentage of population with access to safe water; whereas a sanitation indicator is the percentage of the population using hygienic sanitation facilities (Billig and Swindale 1999, Shymansundar 2002).

Additional USAID impact indicators identified to monitor water and sanitation are: children under 36 months with diarrhea in the last two weeks, quantity of water used per capita per day, percentage of child caregivers and food preparers with appropriate hand washing behavior.

Water Poverty Index

Water poverty is the single most pressing natural resource problem that addresses the intersection of climate change, human prosperity and ecosystem functions. The Water Poverty Index is a composite index integrating different dimensions of physical, social, economic and environmental indicators (such as water stress and distribution) while isolating the specific challenges of water poverty: measures of access, water quality and variability, water for other productive purposes, capacity to manage water, environmental health, and questions of spatial scale (Lawrence et al. 2002, Sullivan et al. 2003: Cho et al. 2009). Its purpose is to measure household welfare against water availability, indicating the degree to which water scarcity impacts human populations (Lawrence et al. 2002). The Water Poverty Index is comprehensive in that it incorporates "access components and outputs of the World Health Organization/UNICEF Joint Monitoring Program, health and education data from the Human Development Index as well as environmental components equivalent to those in Environmental Sustainability Index for proxy indicators of ecosystems need for water" (Sullivan et al. 2003: 193). What sets Water Poverty Index apart from other indices is that it was developed out of a collaborative, participatory effort between physical and social scientists, water managers and practitioners, as well as other stakeholders.

Spatial scale is a key component of Water Poverty Index which recognizes the direct correlation between physical availability and geographical variation of water resources. A study conducted by Vörösmarty et al. (2005) develops geospatial indicators that cross reference human use (i.e. water for agriculture), need (i.e. food) and availability (i.e. drought-related stress). It was determined that reconciling differences in the spatial distribution of biogeophysical, socioeconomic and climate variability is critical to answering questions related to human health, water conflict and cooperation, food provisioning, water for ecosystems and natural hazards (Vörösmarty et al. 2005).

The Water Poverty Index stems from the Sustainable Livelihoods Framework, a model used by donor agencies to assess development effectiveness. Its purpose is to monitor development impacts in the form of natural, physical, financial, social and human assets (Lawrence et al. 2002, Sullivan and Meigh 2003, Sullivan et al. 2003). It is through the Water Poverty Index that hydrophilanthropy can make the greatest contribution to communities in low-income countries *and* to indicator development for WASH activities.

Hydrophilanthropy for WASH

The hydrophilanthropy community is a major stakeholder in the plight to resolve the global WASH crisis. Not only are hydro-philanthropists stakeholders, they are advocates and responsible for contributing resources towards ameliorating social, environmental, cultural and economic consequences resulting from water poverty. Global and national policies have initiated foreign aid as well as private, public and hydro-philanthropic investment in activities that increase physical access and education about water, sanitation and hygiene. Such policies have named WASH as one of the world's most urgent health issues (Prüss-Üstün et al. 2008).

Hydrophilanthropy is an important source of funds and resources for critical water projects, however, their contribution to environmental policy is often overlooked. For example, 2008 fiscal year expenditures of the Millennium Water Alliance including grants and partners match and cost share amounts totaled US $14,109,294 (pers. comm. Raphael Callejas). The Millennium Water Alliance is a consortium of humanitarian, faith-based, not-for-profit philanthropic organizations whose mission is to assist poor communities in low-income countries to gain access to safe water and sanitation (Millennium Water Asessment 2009). Millennium Water Alliance Member agencies include: Africare, CARE, Catholic Relief Services, Food for the Hungry, Lifewater International, Living Water International, Water for People,

Water.org and World Vision. Affiliate members are: Emmanuel International, Global Water, and Water Missions International. Development workers from philanthropic organizations work in local communities world-wide, improving access to water and sanitation, increasing local capacity through hygiene and sanitation education, transfer of appropriate technology and infrastructure enhancement. They have the necessary background and training to ground-truth indicators situating them neatly at the nexus between poverty, environment, and policy.

Observations and Conclusions

Progress has been made by the scientific community to identify, measure, and facilitate environmental sustainability at global, national and regional scales. Those efforts have advanced progressive policy-making through the appropriate institutional channels while attempting to balance environmental protection with human consumption. However, global policy must reflect the needs of individuals by verifying indicators at the local level. Until low-income countries overcome fundamental institutional limitations, there will be limited opportunity to compare and reassess these indicators. The ground-truthing of indicators will lead to sustainable *evidence-based policies* "that allow for effective investment," to determine priorities and develop solutions that can be managed and maintained locally (Montgomery and Elimelech 2007, Fry et al. 2008).

The hydrophilanthropic community has an advantage in that they are not accountable to policy initiatives. Oftentimes the reverse is true; hydrophilanthropy encourages new policy directives (i.e. the Senator Paul Simon Water for the Poor Act). Because of their role as humanitarians, they are in an ideal position to close critical information gaps in two ways: 1) by informing policy-makers and scientists of the local financial and institutional needs of people in low-income countries who are facing the results of water poverty and 2) by working with local communities to implement activities aimed at developing and monitoring indicators that are culturally and socially sensitive.

Debt forgiveness is one of three main principles within the new Poverty Reduction Strategy Papers framework that has indirectly impacted philanthropy, setting new priorities for foreign aid lending practices. At the Climate Change Conference of the Parties (COP15) in Copenhagen, low-income countries are in a position to demand foreign aid from multi- and bilateral lending organizations to cope and adapt to a changing climate reportedly caused by behavior and activities of high-income countries. Such demands are the result of effective communication on findings regarding climate change, largely through indicators that build a case for increased foreign aid to low-income countries. Because climate change is driven largely by hydrologic responses to anthropogenic activity, scientific evidence on climate change has inadvertently triggered new initiatives directed at relieving global water poverty. Water poverty greatly impacts three quarters of the world's population, representing the poorest groups, primarily women and children and the culturally marginalized. Poverty research and development have not been able to accomplish such a feat in over fifty years.

The stark contrast between the actions and definitions of hydrophilanthropy and foreign aid, as highlighted above, demonstrates very different intentions; philanthropy is based on compassion while foreign aid is largely obligation. This difference, under both theoretical and practical approaches, relays an important deliberation about how to measure hydrophilanthropic quality. At the heart of this deliberation is the question: what does philanthropy and foreign aid signify for the recipient?

Endnotes

1. For a review on the dimensions of water scarcity and a brief history on water scarcity indicators see Molle and Mollinga 2003 and Vörösmarty et al. 2005, respectively.
2. For further information on water poverty see the Oxford Centre for Water Research website at http://ocwr.ouce.ox.ac.uk/research/wmpg/Water Poverty Index/. Also see Komnenic et al. 2009 for analysis on the concepts of water poverty and their proposed definitions.
3. Millennium Challenge Corporation was established in 2003 by the U.S. Congress. The Millennium Challenge Corporation's mission is to reduce

global poverty through the promotion of sustainable economic growth (Sternlieb and Laituri 2009).

4. OECD is a forum of 30 democratic governments with the mission to address globalization as it impacts the economy, society and environment, by identifying key environmental indicators that are applicable to the goals and objectives of member countries (OECD 2008).
5. Each component is assigned three to six indicators compiling a total of 21 indicators (76 variables) that are considered "the fundamental building blocks" essential to attaining environmental sustainability (Esty et al. 2005).
6. See Borja et al. (2006) and Bidone and Lacerda (2003) for additional DPSIR applications and case studies regarding coastal waters.

Author Bios and Contact Information

Faith Sternlieb is a Research Associate at the Colorado Water Institute at Colorado State University (CSU) where she is working on initiating WASH activities in collaboration with water advocates from the academic, public, and private sectors. She is currently enrolled in a Ph.D. program at CSU in Geosciences with a specialty in Watershed Sciences and Policy. The title of her dissertation is *Mapping collaborative governance: The confluence of water institutions in the Mara River Basin*. She can be reached at: Colorado Water Institute, 1033 Campus Delivery, Colorado State University, Fort Collins, CO 80523-1033, faith.sternlieb@colostate.edu.

Melinda Laituri, Ph.D. is an Associate Professor at Colorado State University in the Forest, Rangeland, and Watershed Stewardship Department. She works with Native American tribes on water resource management strategies that utilize cultural and eco-physical data in research models. Other research work focuses on the role of the Internet and geospatial technologies of disaster management and cross-cultural environmental histories of river basin management. She can be reached at: Department of Forest, Rangeland and Watershed Stewardship, 1472 Campus Delivery, Colorado State University, Fort Collins, CO 80523-1472, melinda.laituri@colostate.edu.

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