Water Funds Business Case:

Conservation as a Source of Competitive Advantage

- The Business Imperative
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LATIN AMERICAN WATER FUNDS PARTNERSHIP
The Nature Conservancy Protecting nature. Preserving life.
FUNDACIÓN FEMSA
IDB Water and Sanitation Initiative
gef
natural capital PROJECT

Companies Already Investing in Latin American Water Funds

Anheuser-Busch Inbev

ASOCAÑA

Brasilia Water Supply Company

Backus (SabMiller Perú)

Bavaria Brewery (SabMiller Bogotá)

Caterpillar Foundation

Dow Chemical Foundation

Empresas Publicas de Medellin (EPM)

FEMSA Foundation

Johnson &Johnson

Kimberly-Clark

National Brewery (SabMiller Ecuador)

PROCAÑA

Quito Electric Company

Tesalia Springs

"For sugar mills, water is vital. The main motivation for the Sugar Association to participate in the Water Fund has been to unify efforts with various sectors to protect water and achieve long term sustainability."

Claudia Calero, ***Director of Environment, ASOCAÑA***

"One of the most strategic private partners for this fund has been SABMiller, who have a conservation goal that matches that of the Fund. They have supported this initiative with seed funds which have been essential to the consolidation of the Fund."

Andres Lizarazo, Technical Secretariate of the Bogotá Water Fund

"We believe in the Quito Water Fund as an excellent conservation strategy and although its impact can be seen only in the long term, we are confident that it will be positive."

Raúl Cubillo, ***Director of Planning, Quito Electric Company***

"Just as we know that these mechanisms produce results both in the medium and long term, we believe that achieving them requires the active participation of many actors, including the private sector."

Fernando Jaramillo*, Vice President, Bavaria*

"For the FEMSA Foundation, being part of the Latin American Water Fund Platform signifies the ability to generate permanent benefits and contribute to environmental conservation in the region. We found in the Water Fund Platform a system of coordination and continuous investment that really addresses the environment, the economy and society. We believe that we can only achieve sustainability and the ability to continue our work and growth through a balance of these three dimensions."

Vidal Garza Cantu, Director of FEMSA Foundation

Introduction

At the inaugural meeting of the Latin America Conservation Council in November 2011, its members committed to a multi-year goal of using nature to secure clean water supplies for 25 of Latin America's most at-risk cities. One of the five strategies chosen to reach this goal was to develop and show business cases that can clearly demonstrate the social and economic benefits of investing in nature, or as we also say, green infrastructure, which provides essential services for the development and well-being of human societies.

This publication was developed under this context. Based on the information generated by the Latin America Water Funds Partnership, an initiative of The Nature Conservancy, FEMSA Foundation, Inter-American Development Bank and Global Environmental Facility, we gathered results related to the development and implementation of Water Funds in several Latin American cities to provide solid examples of why investing in nature benefits both people and economies.

We are also very proud to produce this work under the strong collaboration that the Latin America Water Funds Partnership has with the Natural Capital Project, a joint collaboration between Stanford University, University of Minnesota, The Nature Conservancy and the World Wildlife Fund. This initiative works to develop and provide practical ecosystem services concepts and tools, apply these tools in select areas around the world, and engage influential leaders to advance change in policy and practice.

We hope the approach of this publication reinforces the case as to why investment in nature really matters for the corporate sector. There are other studies being produced as part of the implementation of Water Funds across Latin America and our intention is to continue to share their outcomes.

We hope that you will enjoy the reading,

Fernando Veiga
Water Security Manager
Latin America Region
The Nature Conservancy

Aurelio Ramos
Director of Conservation
Latin America Region
The Nature Conservancy

The Business Imperative

Businesses rely on and impact water

Water is used in the production of essentially every product in the global economy.

Water is a key ingredient in nearly every product. It is used for cleaning, rinsing, and cooling in industrial processes and power generation. It serves as a conduit for waste and transportation. Water quality impacts the real estate market, commercial fishing operations, and the recreation sector. In so many ways, water impacts and is impacted upon by business.

Most of the fresh water used by industry is provided by groundwater, rainfall and snowfall that eventually collect in rivers, lakes and reservoirs that can be used for recreation and tapped for consumption. Watersheds help to regulate water quality for drinking, agriculture, and industrial use by naturally filtering sediments and pollutants. Watersheds regulate surface and groundwater flows in beneficial ways, helping to reduce the impacts of flooding and landslides that can cause catastrophic damage to farms, business facilities, and private property. And critically, watersheds increase minimum water flows during the dry season, ensuring that this critical input does not dry up and halt production for a significant portion of the year.

It is clear that watersheds and the services they provide represent one of the most valuable forms of 'natural capital'. This term extends from the economic notion of capital, and refers to the ecosystems, biodiversity, and natural resources that underpin economies, societies, and individual well-being. ***The fate of global business is inexorably tied to the fate of the world's fresh water supply.***

Water is getting scarce and unpredictable

Climate change is expected to alter the timing, magnitude, and duration of rainfall and extreme weather events across the globe.

Despite the array of services watersheds provide they are being degraded by land conversion and pollution around the world. Because the benefits of watersheds are often provided for free, businesses tend to take them for granted until water supplies become stressed or disappear. Social, demographic, and economic trends suggest dramatically increasing demand-side stress on water resources, concomitant with detrimental land use changes in watershed ecosystems. Scientists predict that, if we continue on our current trajectory, two-thirds of the world's population will face water shortages by 2025. Water stress will be amplified by increasing uncertainty and variability on the supply side. Climate change is expected to alter the timing, magnitude, and duration of rainfall and extreme weather events across the globe. These changes could turn arid and semi-arid regions into deserts, while exposing wetter regions to dramatic increases in flooding from higher rainfall, typhoons, and hurricanes.

No company is safe from these risks. As water sources are degraded or lost altogether, companies could experience supply chain disruptions, be forced to introduce costly alternatives to traditional inputs and face new regulatory and legal risks. Few will escape pressure from stakeholders (including regulators and investors) to be accountable for their contribution to the problems.

Changes in water supply and demand generate several categories of business risk and benefit

The combination of water scarcity and unpredictability poses a variety of risks and benefits to companies. Many companies are not fully aware of the extent of their dependence and impact on water resources and the ecosystems that provide them. Furthermore, those firms that do conduct analyses of their reliance on water tend to focus only on mitigating risks without recognizing the potential business opportunities associated with protecting natural capital. According to the World Resources Institute, these oversights may cause companies to be caught unprepared or miss new sources of revenue associated with ecosystem change. The following list, although not exhaustive, provides a good starting point for considering both risks and benefits to companies of proactive watershed management policies:

Operational

· Realize cost savings associated with green infrastructure (i.e. natural capital) over gray infrastructure

· Minimize costs associated with dredging, water treatment, and equipment malfunction due to water contamination or siltation from upstream sources

· Boost revenue by increasing water input supply and quality

· Avoid costly supply chain and operational disruptions caused by water scarcity or floods

· Mitigate threats to facilities and workers in downstream areas vulnerable to flooding and contaminated water

· Decrease insurance premiums thanks to the flood and storm surge protection afforded by ecosystems

Regulatory and legal

· Avoid fines, suspensions, lawsuits or other liabilities due to over-exploitation or contamination of natural systems

· Improve relationships with local communities and host governments to shape a favorable policy environment

· Offset impacts to vulnerable ecosystems and species to expedite permitting while complying with compensatory mitigation laws

Reputational

· Differentiate from competitors by showing commitment to sustainability and green infrastructure

· Avoid being target of activist campaigns for degrading pristine ecosystems

· Draw and retain top talent by showing a commitment to social and environmental sustainability

Financing

· Reduce risks such as banks implementing more rigorous lending requirements for corporate loans

· Take advantage of opportunities such as banks offering more favorable loan terms to companies supplying products and services that improve resource-use efficiency or restore degraded ecosystems

· Attract investors and lenders concerned with environmental performance and exposure

Market and product

· Avoid customers switching to other suppliers that offer products with lower ecosystem impacts

· Capitalize on emerging environmental market opportunities

· Create additional revenue streams from eco-certified products and emerging “natural capital” markets

Why Green Infrastructure Over Gray?

As water systems change, businesses will be increasingly exposed to risks

They will have a choice to make about how to respond to these growing risks: Should they invest in built solutions or natural ones? The financial value of natural capital becomes particularly apparent when the costs of protecting an ecosystem for improved water quality or flood control are compared to investments in new or improved gray infrastructure, such as purification plants and flood control structures. In many cases, companies are finding that investments in natural capital or "green infrastructure", in the form of wetlands, forests, grasslands, and coastal habitats perform many of the same tasks as gray infrastructure often better and more cost effectively.

For large water users such as water companies in cities, this is an advantage that is reflected in avoided costs: water of higher quality implies a reduction in treatment costs for the supply of cities. These water treatment costs can represent huge amounts of money well beyond the conservation investments necessary to maintain watershed ecosystems in good condition and can perform the same functions to improve quality. Instead of covering cost of filters annually, energy for sediment removal, water purification chemicals or new treatment plants (gray infrastructure) it can be more efficient and beneficial to invest in watershed conservation (green infrastructure).

In 1997, the New York City, faced with declining water quality, was confronted with the decision of whether to invest in a new water-treatment and sewerage facility at a cost of $6 billion to build and another $250 million annually to maintain, or to pay to preserve the Catskills watershed at the price of $1.5 billion. This would equate to just over a dime invested in ecological preservation for every dollar that would have been spent on the plant (Appleton, 2000). ***The money is paid to farmers, landowners and businesses that abide by restrictions designed to protect the watershed with the city only needing to buy 8 percent of the land outright to preserve water quality and quantity.***

The watershed agreement boosted the upstate economy, with money pouring in at a rate of $100 million a year. It provided employment, invested in local businesses and promoted ecotourism. The City pays local contractors to install septic systems, upgrade wastewater treatment plants and set up storm-water-protection measures. Locals were given jobs with the city and New York State Department of Environmental Conservation. Farmers receive reimbursements for building fences and bridges that herd their livestock away from waterways. Landowners get paid to keep forests undeveloped.

Recent estimates by the Environmental Protection Agency suggest that the United States will have to spend $140 billion over the next 20 years to maintain minimum required standards for drinking water quality. Given this situation, it makes sense that 140 U.S. cities have considered the costs and benefits of using an approach similar to New York's. Cases studies from Oregon, Maine, and Washington have shown that every $1 invested in watershed protection has saved anywhere from $7.50 to nearly $200 in costs for new filtration and water treatment facilities (Reid 1997).

Examples abound of green infrastructure being chosen over gray

The U.S. Army Corps of Engineers, for example, bought 8,500 acres of wetlands along Massachusetts' Charles River for flood control. The land cost $10 million, a tenth of the $100 million the Corps estimated it would take to build the dam and levee originally proposed. Similarly, to fight floods in Napa, California, county officials spent $250 million to reconnect the Napa River to its historical floodplains, allowing the river to meander as it once did. The cost was a fraction of the estimated $1.6 billion that would have been needed to repair flood damage over the next century without the project. Within a year, notes Stanford Professor Gretchen Daily, flood insurance rates in the ***county dropped 20 percent and real estate prices rose 20 percent, thanks to the flood protection now promised by nature.***

The private sector is also catching on to the benefits of green infrastructure. MillerCoors has been working with The Nature Conservancy to develop watershed conservation strategies to protect both their water and barley inputs. So far, projects have included: fencing and planting native vegetation along streams to prevent damage and contamination by livestock and agriculture; coordinating robust ecosystem services monitoring programs with landowners and stakeholders; and ongoing work on a groundwater/ surface water model. They are also developing a water footprinting tool that maps dependencies and related risks associated with water across the supply chain. Improvements made on a model barley farm in the Silver Creek Valley in Idaho, which was designed to showcase best conservation practices, have increased yields and saved almost 4.7 million hectoliters of water, representing about 9% of the farm's annual water use. The farm is also expected to reduce energy use by an estimated 10-20%.

Another company with water as a key ingredient in its products, The Coca-Cola Company, has committed to a system-wide corporate standard for water resource sustainability at all of its more than 900 bottling plants around the world. Each plant will be required to evaluate water risks and vulnerabilities using the company's innovative water footprint assessment tool, and to implement a source water protection plan. To date, Coca-Cola has implemented almost 400 community-watershed projects in 94 countries, replenishing 35 percent of production volume, with a goal of 100 percent by 2020.

The Dow Chemical Company has also partnered with The Nature Conservancy to begin putting a value on ecosystem services such as clean water provision from nature, which the company uses to inform business decisions. Based on this calculus, Dow realized that restoring a 110-acre wetland for tertiary wastewater treatment at its Seadrift, Texas facility was a more cost-effective strategy for meeting its regulatory requirements than a traditional treatment plant. The cost of the wetland restoration was $1.4 million, while the gray infrastructure equivalent would have cost over $40 million.

Why Green Infrastructure Over Gray?

Companies Actively Participating in Green Infrastructure Initiatives for Water Resources

Company	Industry	Commitment Name	Ecosystem Focus	Approach
Alcoa	Mining	Using Natural Systems for Sustainable Water Management	Watersheds	Natural Infrastructure Investments
CH2MHILL	Infrastructure	Engaging Clients to Improve Water Stewardship with Green Infrastructure	Watersheds	Natural Infrastructure Investments
The Coca-Cola Company	Food & Beverage	Engaging Bottlers in Sustaining Global Water Systems	Freshwater	Natural Infrastructure Investment and Resource Optimization
The Dow Chemical Company	Chemicals	Determining the Business Value of Ecosystem Services in Brazil	Freshwater	Assessment and Valuation of Ecosystem Services
EKO Asset Management	Finance	NatLab The Natural Infrastructure Innovative Financing Lab	Freshwater, Watersheds	Strategic Conservation/ Restoration
FEMSA	Food & Beverage	Latin American Water Funds Partnership	Freshwater, Watersheds	Strategic Conservation/ Restoration

Water Funds as Green Infrastructure: How do they work?

Despite the fact that the majority of the world's population depend on forested watersheds to supply their water, investment in the conservation of water sources remains insufficient (Reid 2001). It is estimated that 13% of the world's land area is needed to protect water supplies for the current global population and this percentage will only increase with population growth. Despite the critical importance of protecting water sources, public sector agencies are failing to invest adequately. Government coffers are low across the globe due to depressed economies and ineffective tax systems.

The private sector can no longer wait for governments to act

With the uncertainty surrounding future water benefits and risks, companies can assume an additional measure of control by investing in the protection of their own water supply. The potential cost savings of green over gray infrastructure coupled with the insurance of low-cost delivery of high quality water and protection from flood risks could provide a critical source of competitive advantage in the long run. Some investors and companies have already begun to embrace this new imperative, joining forces with the public sector to develop new tools and financial mechanisms for protecting watersheds while also improving their production of water and capacity to buffer against poor water quality, floods and storm surges.

Water Funds are one of the most promising mechanisms to emerge from this collaboration of the public and private sectors. Water Funds are, in essence, a trust fund capitalized by downstream water users who pool their money to finance upstream land management that ensures a clean (ie. sediment and pollutant-free) water supply that is available year-round, which also can help shield the community and industrial facilities from flooding. In some funds, the contributions are voluntary, while in others, funds come from legally required contributions. The trust fund is governed by the stakeholders who pay into it (Goldman 2012). Ultimately, the mechanism provides a long-term, transparent source of funding administered by a multi-institutional decision-making body that decides how to most efficiently allocate the fund's revenue under competing demands (Goldman 2010). In Brazil the mechanism is slightly different from those of the trust water funds model. In this case, under the Water Producer Program, the funds use an annual distribution model where fees or other sources of funding are collected and distributed each year rather than going into a trust.

Each Water Fund has its own location-dependent objectives and goals but in general they invest in conserving watersheds to improve or maintain water-related benefits and regulate water-related risks (Goldman 2012). Interest from the trust, additional investments from water users or from other external donors, and a portion of the trust itself may be used to pay for watershed management projects. In some cases, such as water funds in Colombia and Ecuador, a portion of the trust's principal creates a reserve fund. This reserve is used to cover some operational costs, pay for some transaction costs associated with conservation agreements with communities that live in the watersheds when other payments are not available, and to manage risk.

Water Funds invest in a variety of strategies in the watershed to ensure that the fund meets its objectives. For example, The Nature Conservancy-affiliated funds' strategies include ***improved farm and pasture management practices, fencing of river and headwater areas, community education, alternative livelihood development, direct payments for ecosystem services, and protection and restoration of native forests, wetlands, and grasslands.***

The Nature Conservancy, the Inter-American Bank, GEF and FEMSA have established the Latin American Water Funds Partnership to create 32 Water Funds by 2016. Part of the success of this model is the variety of stakeholders that have been involved to date. Municipal water companies in Latin America have been among the first to realize the business case for water fund investment.

Water of higher quality implies huge treatment cost savings. Water bottling companies, beer companies, and agricultural cooperatives (primarily sugar cane farmers) have invested to ensure a consistent flow of water year-round, boosting production and yields particularly in the dry season. Hydropower plants have been another early adopter seeking to extend costly turbine life by reducing siltation and sedimentation of reservoirs. Cities and companies with facilities or resources in flood plains have also joined in Water Funds for flood regulation benefits.

The business case for Water Fund investment is clearer for some companies than others, but all businesses have a stake in protecting water sources.

Stepwise Process for Companies Considering and Making Water Fund Investments

- Understand the status of and stress on the watershed(s) and its relationship with the broader region.
- Assess your company's impacts and dependencies on watershed ecosystems
- Identify priority water-related benefits and risks—those most relevant to business performance
- Research and evaluate conditions and trends in the priority ecosystem services, as well as the drivers of these trends
- Select the scope within which to establish or participate in a water fund (e.g. a specific product, facility, market, landholdings, major customer, supplier, etc.)
- Initiate or join the water fund and contribute to joint priority setting and strategy assessment for managing risks and opportunities
- Support fund in design of strategic conservation and restoration investments, using Resource Investment Optimization System - RIOS and other tools to design the best possible investments
- Invest on the capitalization needs and/or conservation activities previewed by the water fund
- Monitor outcomes to ensure efficient return on investment

Cases

Valle del Cauca, Colombia
Agua por la Vida y Sostenibilidad

Setting

Cauca Valley is Colombia's largest sugarcane producing region. Irrigation demands, combined with the needs of a growing population, of around 1.2 million living in five cities, have led to increased water scarcity in the region. As in many other Andean regions, use of the upper watersheds for cattle grazing and small plot farming has led to altered water supplies, increased erosion and landslides, diminishing water quality and new challenges for irrigation.

Investors

ASOCAÑA
Corporación Autónoma regional del Valle del Cauca (CVC)
ECOPETROL
FEMSA Foundation
11 Grassroots organizations
PROCAÑA
PAVCO Pipelines
The Nature Conservancy
Sab Miller Bavaria
The United Nations Children's Fund (UNICEF)
United States Agency for International Development (USAID)
Vallenpaz

Population and sectors served

1.2 million residents in five cities
Sugar cane growers association
Sugar mill industry association
Conservation organizations
Municipal water organizations
Hydropower sector

Budget
$16 million in 10 years

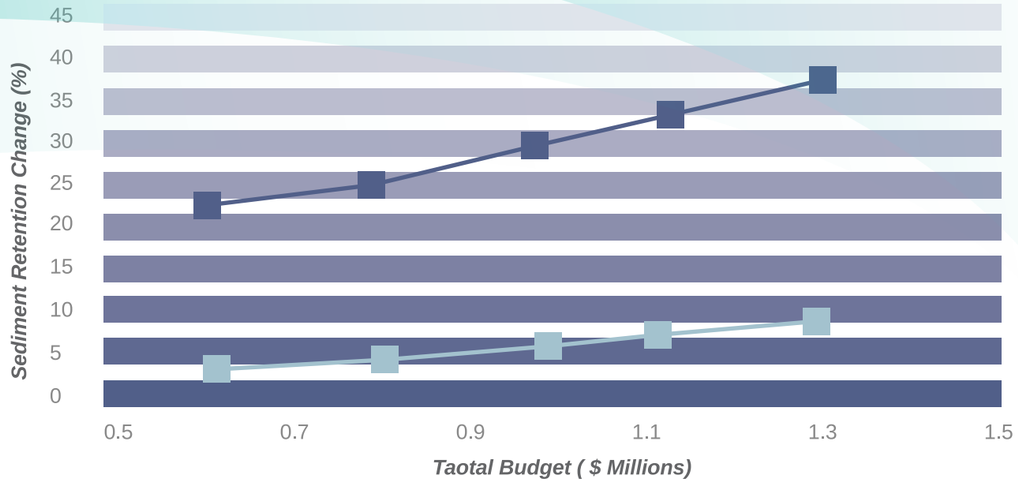
Activities

- Environmental education
- Protected area management
- Fencing sensitive areas
- Silvopastoral practices
- Planting native vegetation
- Improve livelihoods

The Business Case:
Biophysical Benefits

In four of this water fund's 11 watersheds, analysts from the Natural Capital Project used newly developed prioritization models to create investment portfolios that target the parts of the landscape where water fund actions are practical and likely to give the best return on investment. InVEST models were used to estimate biophysical improvements in erosion control that can be expected from these investment portfolios at several different budget levels. At the lowest budget explored, ~$5.5 million across the four watersheds, managers can expect a 4% reduction in erosion in the least sensitive watershed and a 41% reduction in the most sensitive watershed. There is also a large range of possible benefits when higher budgets are considered. At the highest budget level, ~$11 million, the benefits range from 5%-58% reduction in erosion, depending on the watershed.

This approach for targeting water fund investments is new, and takes additional time and resources from the fund. Agua por la Vida y la Sostenibilidad (Water for Life and Sustainability – Cauca Valley Water Fund) wanted to know if this approach is worth the extra investment. Analysts compared the estimated returns from the targeted portfolios with estimated returns from portfolios selected without clear focus on ecosystem services delivery criteria, as usually done. Figure 1 show these results for the Desbaratado watershed across five possible budget levels. For all budgets, the targeted portfolio (black line) will likely provide much higher returns than the traditional portfolio (dotted lines show minimum and maximum possible returns from this approach). Returns may be six times higher using this targeted approach at the lowest budget, and 4.6 times higher at the highest budget. This adds up to a savings of $2.6 million for the fund in this watershed at the lowest budget level and $4.2 million in savings at the highest budget level.



"This initiative has been created based on both economic and social studies that have allowed us to identify the principal intervention areas for conservation. We also have sectoral planning that makes us pioneers in sustainability and competitiveness."
Claudia Calero, ***Director of Environment, ASOCAÑA***

Economic Benefits

The largest water user in the Cauca Valley region is the sugar cane industry. The industry uses 83% of the groundwater extracted annually. Sugar cane yields are sensitive to the amount of irrigation applied, so growers in the region commonly use five to six irrigation cycles per year to maximize yields. Applying one less irrigation cycle per year would reduce sugar cane yields by 9% (10 tons/ha). The area is under severe water stress and it is thought that irrigation may need to be reduced by one cycle per year in the near future. If the water fund could make investments that improve groundwater recharge and stabilize local water supply, this reduction in irrigation could be avoided. Monitoring has not yet revealed how effective the fund is at increasing groundwater recharge, but if the fund was effective with a seven year investment level of $1.75 million, ***crop production benefits would be ~$36.8 million yearly after the 8th year.***

Medellin, Colombia

Setting

Nearly the entire drinking water supply for the city of Medellin, Colombia and neighboring municipalities is provided by two reservoirs in the Aburra Valley. This leaves about 3.2 million inhabitants and regional industries at risk of serious medium and long-term water supply shortages and declines in water quality due to major land use changes in the region. Currently, less than 22% of original forest cover remains as cattle, pig, and general agricultural production dominate the watershed. These agricultural activities lead to high sedimentation and erosion, greater risk of landslides, chemical and biological run-off, and human effluent entering waterways.

Investors

Empresas Publicas de Medellin (EPM)
FEMSA Foundation
The Nature Conservancy

Population and sectors served

3,266,366 people
Industry

Budget

$22.9 million in 5 years

Activities (proposed)

- Fencing livestock away from sensitive areas
- Silvopastoril practices
- Planting native vegetation on degraded lands
- Protected area management
- Best practices to reduce and minimize fertilization inputs

Public Perception

EPM did a study of the general public to gauge their willingness to support and pay into a water fund program in their water supply area.

Between 82% and 97% of the general public interviewed were in favor of the creation of a financial mechanism for watershed conservation in Medellin and the Aburrá Valley.

Nearly all (99.6%) of the people surveyed spoke in favor of the conservation of natural environments, but fewer (34.8%) were willing to pay to preserve natural environments that protect water to ensure their water supply for the future.

Those who were willing to pay identified an acceptable about as 873 pesos (US$0.49) per month. Additionally, the population would be willing to contribute to an increase in the monthly fee of 913 pesos (US$0.51) to ensure a proper color of drinking water and a value of 939 pesos (US$0.52) in the future to ensure a level of adequate water taste.

Biophysical Benefits

At an investment level of $18.5 million, analysts from the International Center for Tropical Agriculture (Centro Internacional de Agricultura Tropical – CIAT) and the Natural Capital Project determined how sediment loads and nutrient pollution would be affected. Results show that at this level of investment, the fund would achieve an approximately 12% reduction in nitrogen pollution and an approximately 28% reduction in sediment loads to the reservoirs providing water to Medellin.

Economic Benefits

The results of extensive modeling efforts found that even a 10% loss in vegetation cover due to further deforestation in the water supply region would result in an average increase in monthly costs for purification of $4.47 million at the primary water treatment facility. Another econometric model showed that impacts could extend to the population in the form of increased health care costs. Increased water pollution could increase Medellin residents' health care costs by 1,575 Colombian pesos (US$0.88) per household. Scaled to the entire population in the Aburra Valley, aggregated costs to households would be 3,489 million pesos (US$1.9 million per year). ***The appearance of cyanobacteria in the dams providing water to Medellin and Aburra Valley over the last decade creates a management risk to EPM.*** Investments to reduce nitrogen flows into the dams will reduce these risks. Further analysis is under development to quantify this risk, which hypothetically is high.

Effective water fund investments that reduced vegetation loss and water quality degradation would help municipal water suppliers, rural farmers and the general public to avoid these costs and risks.

Bogota, Colombia
Agua Somos:

Setting

Bogota's thirst for clean water has been growing for decades, in lock step with its population, now at more than 7 million. Most of Bogota's water originates high above the city in Chingaza National Park. There, forests and Neotropical alpine grasslands known as paramos feed and protect the city's main watershed, its tributaries and, ultimately, the water that flows through Bogota's plumbing. But Chingaza, and the watersheds of Tunjuelo and Tibitoc that complete the water supply for Bogota, lack the money required to be truly protected. Forest and paramo degradation and clearing for cattle ranching and farming occurs in and around the park, and that has taken its toll on water quality. The roots of plants act as natural sieves that retain and release water. With them now gone, erosion and mudslides have resulted, harming water quality and wildlife. Over the past few decades, the sedimentation problem has been growing as the clearing of land for farm fields has increased.

Investors

Bogota Water Facility
Colombian Protected Areas Agency
FEMSA Foundation
Patrimonio Natural
Sab Miller Bavaria Brewery
The Nature Conservancy

Population and sectors served

Population Served: 7.2 million people
Municipal drinking water agency
Beverage bottling company

Budget

$20.5 million in 10 years

Activities

- Reforestation
- Conservation
- Ecotourism
- Park rangers
- Sustainable production systems (silvopastoral systems)

Public Perception

Bogota's residents will not see their water bills increase from the creation of the Bogota Water Fund. However, a willingness to pay study showed Bogota residents were willing to make an initial donation averaging 33,329 pesos (US$18.56) per household, annually, at least.

Benefits

Biophysical Benefits

Models were used to estimate the benefits of future investments by the Bogota Water Fund. If the fund invested US$15 million over 10 years, (US$250/ha average) that would pay for interventions on 60,000 ha of land in the watersheds that provide Bogota's supply. Using the Soil and Water Assessment Tool - SWAT and Fog Interception for the Enhancement of Stream-flow in Tropical Areas - FIESTA models, they estimate that these investments would reduce erosion and the associated sediment load by 2 million tons (CIAT report).

Economic benefits

Reducing sediment loads by 2 million tons would save roughly US$458,000 per year in treatment costs in the supply area with the highest current water treatment costs (CIAT report). In another basin where a reservoir catches most of the sediment in the drinking water supply, the investment in land management would have little effect on treatment costs. ***Across the entire water supply system, these projections equate to around US$3.5 million per year in treatment cost savings, and US$35 million if maintained over the 10 years of the analysis period.*** This emphasizes both the large possible returns from watershed management, and the need to target investments to areas where land management changes will indeed lead to reductions in costs.

Sao Paulo, Brazil
Cantareira and Upper Tiete

Setting

Sao Paulo city and its surroundings, harboring 20.1 million inhabitants, is the seventh largest metropolitan region in the world. This population and the related economy, which represents 19% of Brazil's GDP, rely on three large water supply systems, Cantareira, Upper Tiete/Cabeceiras and Upper Tiete/Guarapiranga-Billings. Land uses in these areas have a direct impact on the quality and flows of water coming into Sao Paulo's reservoir system. Poor land-use practices in sensitive areas such as riparian zones, steep slopes and water recharge areas represent the main threat to water supplies. Impacts such as forest loss, soil erosion, nutrients loads, wastewater pollution and siltation are underway at different scales undermining the system's capacity to serve the growing demand. Under this scenario the future of São Paulo's water supply is very uncertain, and this is the foundation of São Paulo's Water Funds.

Investors

Anheuser-Busch Inbev
Caterpillar Foundation
Dow Chemical Foundation
FEMSA Foundation
Johnson & Johnson
Kimberly-Clark
National Water Agency
The Nature Conservancy
Sabesp
Sao Paulo State Environmental Agency
Watershed Committees
3M Fondation

Population and sectors served

220.1 million residents in 39 municipalities
Beverage bottling
Pulp and paper
Cosmetics and Health
Urban, rural and varied industrial sectors

Budget

$8.5 million

Target budget:

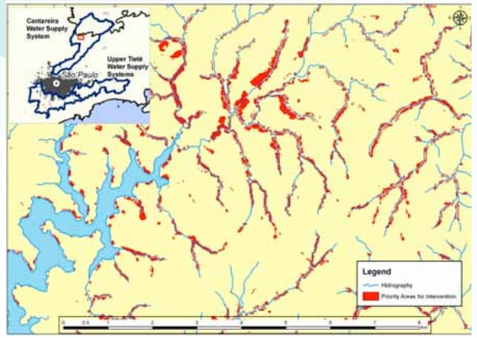
$100 million over the next 10 years

Activities

- Conservation and restoration of riparian areas
- Land management best practices
- Payments for environmental services complementary to interventions in the properties to increase engagement of landowners
- Dirt road maintenance
- Environmental education

The Business Case:
Biophysical Benefits

The Nature Conservancy is using the Natural Capital Project InVEST models to estimate mean erosion rates and the associated sediment loads delivered to the Cantareira and Upper Tietê (Cabeceiras and Guarapiranga/Billings) water supply systems. Results have identified 14,300 hectares (3% of the total area) of priority areas for water fund investments (shown as red areas in the map), mostly located along rivers and reservoirs. This ecological modeling provides guidance to the Water Funds' activities, indicating where investments will deliver the best returns. If investments are made in these priority areas, the Water Funds will reduce the sediment load to the river/reservoir system by 50%. Such reductions would mean 310,000 tons of sediment less per year reaching the Cantareira system and an additional 290,000 tons of sediment less per year reaching both Upper Tiete systems.



Economic Benefits

Sao Paulo's metropolitan area concentrates a multitude of economic sectors including agriculture, industry and services, reflecting the complexity and the scale of demands for water. In order to support the ever growing demands, public administrators regularly consider finding alternative supply areas farther from the city. This costly option cannot be dismissed, but economic modeling suggests that investments in the current water supply areas could significantly reduce water treatment and reservoir dredge costs. ***The biophysical reductions in sediment supply detailed above would result in savings on the order of US$2.4 million/ year in the two Upper Tiete systems and approximately US$ 2.5 million/year in the Cantareira system.*** These values only reflect potential savings in water treatment and dredge costs. Further estimates of the full suite of environmental services (such as nutrient pollution reduction, flood mitigation, carbon revenues) that would benefit from water fund investments will show even greater returns.

Brasilia, Brazil

Setting

Brasilia, the capital of Brazil, was planned and built during the 1960's at the center of the country. The area is a savanna with a strong seasonal climate (with dry and wet seasons). Although plans for the city considered a secure future water supply, the city has grown far beyond its initial planning. The Pipiripau river basin, northeast of Brasilia, produces more than 80% of horticultural products that supply the Federal District and provides drinking water for 10% of the capital's population (200,000 inhabitants). Land conversion to pasture and agriculture in the past 50 years has left only 18% of the natural vegetation cover. This condition resulted in a 40% decrease in the average dry season flow (base flows) of the Pipiripau river, creating conflicts for water use between landowners that use the Santos Dumont irrigation channel and CAESB, Brasilia's water supply company.

Investors

Banco do Brasil Foundation
Brasilia Water Supply Company (CAESB)
Federal District Water and Sanitation Regulatory Agency (ADASA)
Federal District Rural Extension Company (EMATER-DF)
Federal District Environmental Agency (IBRAM)
Federal District Agriculture Secretary (SEAGRI-DF)
Federal District Environmental and Water Resources Secretary (SEMARH-DF)
Ministry of Integration (MI)
National Water Agency (ANA)
National Board of Social Service of Industry (SESI/CN)
University of Brasilia (UnB)
WWF-Brazil
The Nature Conservancy

Population and sectors served

200,000 people in Sobradinho and Planaltina municipalities
Irrigated agriculture and horticulture
Cattle ranching farmers
Water supply company

Budget
$15 million

Activities
- Conservation and restoration of riparian areas and other sensitive areas
- Land management best practices
- Dirt road maintenance
- Environmental education
- Payments for environmental services complementary to interventions in the properties to increase engagement of landowners

The Business Case:
Biophysical Benefits

Priority areas for the water fund's interventions were defined using the Active River Area analysis designed by The Nature Conservancy. The current land use pattern impacts water quality, leading to yearly mean erosion rate of 8.2 ton/ha/yr, while the mean sediment load into the river is around 1,550 ton/yr. Water quantity is also impacted as 69% of the watershed area shows a high amount of surface runoff relative to infiltration, contributing to a reduction in dry season flows. Those impacts affect water treatment costs, frequently leading to water supply shutdowns.

Potential biophysical benefits over the next 20 years have been estimated using a combination of ecological models. If the Water Fund invests in the restoration of all degraded floodplain areas and land management best practices outside floodplain areas, it is estimated that annual dry season base flow will increase by 21.6 million cubic meters. Likewise, water quality is expected to improve with an approximate 75% reduction in yearly sediment load.

Economic Benefits

Implementing the actions proposed above would cost the water fund $14.8 million. It is likely that the hydrological benefits of restoring forests and adopting best management practices would not be seen for 10 years, so analyses were done to consider returns on these green infrastructure investments over a 20 year time frame. ***Benefits to CAESB and the major irrigation canal system are estimated to reach up to $75 million.*** The economic benefit/cost ratio is about 5:1 when the benefits of higher water availability are also taken into consideration.

Quito, Ecuador
FONAG

Setting

One of the most well-known water funds is the Fund for the Protection of Water, known as FONAG. It was established in Quito in 2000 for a period of 80 years with a small investment of $21,000, but has since swelled to $10 million. This capital provides a stable, long-term financial mechanism, using revenues derived from its equity to co-finance activities in the watershed and cover operational costs. The main challenge in this river basin is related to poor livestock management and agricultural practices in nearby areas, which cause water pollution, soil erosion and adversely impact nature conservation. The aquifers surrounding Quito used to be an important source for the drinking water supply decades ago. However, the population increase in Quito and the deterioration of groundwater supply and the economic and operational advantages of surface water supply systems have led to the progressive closure of wells and the need for clean, consistent surface water supplies.

Investors

The Nature Conservancy
Metropolitan Drinking Water and Sewer Company of Quito (EPMAPS)
Quito Electric Company
National Brewery (Sab Miller)
Swiss Agency for Development
Tesalia Springs (water bottling company)
United States Agency for International Development (USAID)
Inter American Development Bank (IDB)

Population and sectors served (list)

Beverage companies
Energy company
Municipal water supplier serving more than 2 million residents
Other private industry

Budget

Current endowment of approximately US$ 10 million; 2% of gross income from EMAAP-Q

Activities

- Protected area management
- Restoration of paramo grasslands
- Alternative livelihoods training and incentives
- Environmental education

Benefits

Biophysical Benefits

In 2011 an assessment of the Quito water fund's effectiveness was conducted on some of the Water Fund's program. At several sites within the Water Fund, observations show that paramo vegetation has been protected or improved by the Fund's activities. Several water quality indicators were found to be higher (better) in stream areas affected by the Fund, though some of these differences were not significant. This is not surprising as river systems can take a long time to respond to watershed management, but the fact that some improvement has been observed in three to five years is promising. The condition of river banks, where much erosion occurs, and in-stream habitat has been improved in all Water Fund sites monitored, but not enough to match more pristine parts of the watershed. This shows that further investments by the Fund are needed, but that these investments are making progress.

Social Benefits

Water Fund projects have benefited 2,500 people in rural parts of the water supply area. Attempts to track the specific impacts of the Fund on these people have been difficult because many organizations work in the area and isolating the impacts of the Fund have been challenging. Households that were willing to reply to surveys claim they have seen improvements in their own farming practices, reductions in household expenses and healthier diets.

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