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Water use, ecosystem health and viable futures for Baja California

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Water use in northwestern Mexico provides one of the most fascinating examples of how social expectations and intellectual paradigms govern how we make decisions. Past decisions on water exploitation in Mexico are so intimately related to water use patterns in the southwestern U.S. - where most of the technology used for Mexican water extraction has been developed, and where similar problems of resource overdraft are also common - that the issue warrants some careful examination.

In Mexico's northwest, the paradigm of 'greening the desert' swept in during the 1950–1960s over all states around the Sea of Cortés, and very especially in Sonora and Sinaloa. Freshwater flowing into the ocean in these arid environments was perceived as a wasted opportunity -- a good resource pouring "uselessly" into an unworthy one.

This allowed the razing of tropical dry forests and pristine desert scrubs in order to open ground for new agricultural developments. Huge, 500 year-old saguaros, millenary ironwoods, and century-old mesquites succumbed under the advance of bulldozers and chainsaws to leave way for fields, ditches, canals, and pump-wells.

The Colorado, Yaqui, Mayo, Gila, and every one of the great rivers flowing down from the forests high up in the Sierra Madre and the Rocky Mountains into the Sea of Cortés were repeatedly dammed. The rainwater harvested high up in the mountains of the "Madrean archipelago," as biogeographers call this beautiful, fragmented complex of sky-islands, ceased to flow into the Gulf of California. At the time, it seemed like a victory of humans over nature, another step in the taming of the natural world to serve our purposes and to provide more and more resources for progress and well-being.

Mining the Aquifers

And because surface waters were not enough, the Mexican federal water authority started granting concessions to drill wells in the large desert plains, and to extract water from their deep aquifers. Farmers realized that an immense mantle of good water lay a few hundred meters below the desert plains, and that new pumping systems could easily bring it to the surface.

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The water fever began. Holes were drilled all over the desert basins - on the coast of Sonora, in the Vizcaíno Desert, in the Magdalena Plains. Agricultural towns were developed and new distritos de riego or irrigation districts sprouted everywhere. Wheat was adapted by plant breeders to grow in tropical climates.

In 1970, Norman Borlaug was given the Nobel Peace Prize for his work in the Yaqui Valley promoting the "green revolution." The water districts around the Sea of Cortés became a model for the world, the cradle of a new paradigm, the war front where hunger was being eliminated from the Third World. It was like a fever, a frenzy of repeated successes seen as the triumph of engineering over traditional backwardness. The desert was finally going green.

Some voices of concern were raised at the time. "What will happen when the aquifers run dry?" some asked. "What will happen when the coastal lagoons cease to receive water?" others inquired. But it this small group of voices drowned by a deluge of cheers and applause.

When critical comments were voiced, the response was invariably the same: Recharge had been well evaluated and the aquifers were being tapped sustainably. The permits were given not to mine water, but rather to use it in a renewable manner. The system was robust; it would not decline.

Environmental Consequences

Soon, however, other news began to spread. Seawater was seeping into the coastal aquifers west of Hermosillo, and thousands of hectares had to be closed to agriculture leaving behind a barren wasteland of salinized soils. Mangroves (wetlands) and coastal lagoons, a critical habitat for the recruitment of fisheries, were degrading. As pumping reached deeper and deeper in ever-shrinking aquifers, arsenic began to appear in the water, creating a health hazard.

Farmers who had installed diesel pumps could not meet the steep cost of fuel to keep their irrigation system working, and therefore demanded the installation of electrical lines with subsidized energy tariffs. Obligingly, the Federal Commission of Electricity lowered the price of electricity for farmers, who now pay around 15 percent of what industry or business have to pay for a similar amount of energy. A perverse system had been put in place, and it became very difficult to step back

Unsustainable Use

To this day, Sea of Cortés development is organized around the subsidized, unsustainable use of water. It would seem the model cannot be changed without facing a serious economic collapse, and no politician is willing to take that risk. Actions have been postponed time after time.

Mexico's own Comisión Nacional del Agua (CNA, the Mexican National Water Commission) has admitted that all large aquifers in the region are being used unsustainably and exploited beyond recovery. The same engineers that gave the permits now bemoan their own lack of foresight. The future, they now claim, is at stake.

The same approach used in agricultural developments a few decades ago is now being used in the construction of large-scale tourism initiatives in Baja California and the Gulf of California, now for hotels and golf courses. The same questions posed two decades earlier around the agricultural irrigation developments have been posed again, and similar replies given.

The aquifer, developers claim, is being used sustainably. Recharge is higher than extraction, some argue – but they show no data. Within this line of argument, desalination has become the trump card and technological fix: When freshwater runs out, they contend, reverse osmosis will provide for all the regional needs.

In short, coastal development in the peninsula is based on the over-extraction of water, and this is very costly to Mexico and the world both in terms of water per se and also in terms of energy. However, as with agriculture, this paradigm cannot be sustained.

Huge Costs

The cost of converting water to agricultural products and tourism services is quite steep: A hectare under agriculture in these hot deserts has an annual evapotranspirative demand of around 20,000 m3 of water, and will produce some 8–10 metric tons of corn grain, or some 12-15 tons of dry alfalfa feed that will, in turn, yield one ton of beef.

Thus, one kilo of maize consumes some 2.5 m3 of water, while one kilo of beef demands some 20 m3, the amount of water in small swimming pool. Similarly, a well-kept 15-hectare golf course will consume on average some 850 m3 of water every day, enough to satisfy the needs of some 3–5 thousand people.

The energy cost of this process is less recognized but equally important. Pumping water is expensive in energy terms. Bringing one m3 of water from a deep aquifer to the surface demands 1 kilowatt-hour, the equivalent of nearly 0.2 liters of gasoline. The ensuing calculations are straightforward.

One kilo of maize grown in these deserts demands 1.5 kilowatt-hours of energy while one kilo of beef will consume almost 20 kilowatt-hours (more than 50 calories of fossil energy for each calorie of beef). On the other hand, a hectare of golf courses or hotel lawns maintained with deep aquifer water will demand 12–20 thousand kilowatt-hours every year only to pump water, contributing in the process two to four metric tons of greenhouse gases to the atmosphere.

Hurting the Disadvantaged

As fossil water begins to run out, large numbers of poor people brought to the region to build resorts or tend the gardens will be priced out. According the Mexican Water Commission, water is rapidly running out in all the coastal aquifers of the peninsula. The collapse of the aquifers in the agricultural district of Santo Domingo, in the Magdalena plains, has already produced emigration away from the region and stunted development in the once-booming Ciudad Constitución.

Existing data show very clearly that the same process is beginning to occur in Los Cabos, La Paz and Loreto, where many marginal settlements have failing water supplies. Aquifer decline is an insidious and muffled phenomenon. It does not happen abruptly, but rather through the gradual decline of water availability for the poorest sectors of society. Not with a bang, but with a whimper, to quote Eliot. In the long term, however, what will the resulting social upheaval mean for Gulf of California communities and tourism investments?

The supposed alternative of obtaining water from the sea through desalination also has serious economic limitations. Desalination works by forcing seawater through a semi-permeable membrane at great pressure (50–70 atmospheres); water molecules are able to pass through but salt ions stay behind. Because of the power needed to reach these pressures, the energy theoretically needed to desalinate one m3 of water is around 14 kilowatt-hours.

Thus, irrigating a single hectare of desert land will demand almost 40,000 kilowatt-hours every year, and emit four to eight metric tons of greenhouse gases. The process is also very expensive. At the current cost of electricity, a 15-hectare golf course will require an annual expenditure in energy bills of up to $200,000.

Potential Solutions

The conclusion is clear: Water is being used unsustainably in the coastal developments of Baja and the

Gulf of California, and in some parts it is running out rapidly. Desalination can be a viable alternative for domestic in-house consumption, but is too expensive for outdoor irrigation, and it also has a large carbon footprint.

In the long-term, coastal developments will demand a more efficient use of water or risk their slow economic decline as water supplies dwindle. The hopeful news is that there is still a lot of space to move the economy towards a more sustainable pattern of resource use. An initiative for sustainable water use should contain, among others, the following action goals:

• Protect the sky islands along Baja California's mountain backbone that provide the water supply to the regional oases and aquifers (Sierra de la Laguna, La Giganta, Guadalupe, San Francisco, San Borja, La Libertad, San Pedro Mártir, Sierra de Juárez);

• Protect and restore coastal wetlands and mangroves, the ecosystems that have possibly suffered the most from consumptive extraction, and change local legislation to explicitly recognize environmental needs in regional water allocation;

• Move developments towards more efficient landscaping alternatives, including xeriscaping and native plant gardening;

• Establish clear, rigorous, peer-reviewed, independent evaluations of aquifer reserves and renewal rates, and force local users to adapt to sustainable consumption levels through differential tariffs taxing wasteful water consumption;

• Treat and recycle wastewater in all developments, as the low salinity of wastewater allows reverse osmosis can be a cost-effective tool for tertiary treatment;

• Promote water harvesting in houses and larger buildings, including roof-collecting, cistern construction, and soil absorption techniques in all paved surfaces; and

• Make water supply a central element in all Environmental Impact Assessments and authorizations for new developments, promoting transparency, open access to information, and public participation in the review process.

Role for Funders

How can foundations and funders become involved in implementing or promoting these strategies? The ways are many and actions should cover a diverse array of strategies, including:

• promoting local conservation organizations working for the protection and/or restoration of mountain sky islands, oases, wetlands, and lagoons;

• supporting advocacy groups demanding transparent land-use decisions, open environmental assessments, and strict law enforcement; and

• encouraging new and innovative initiatives for sustainable landscaping, building, and water extraction.

Funders and NGOs are already working on many of these issues, but a deepening of support and sharpening of focus on communicating the lessons of history is needed.

Decision makers and society at large need to understand that a collapse from unsustainable water use has already occurred in the region, leaving a trail of impoverished towns and degraded ecosystems. Using water sustainably is an issue not only relevant for regional ecosystem health; it is also an issue of social justice, equitable access, and a viable future for Baja and the Gulf of California.

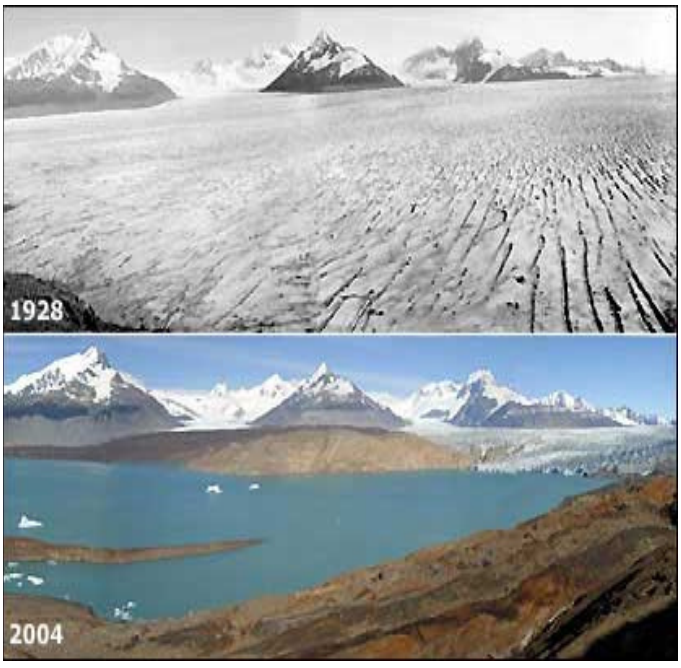
CGBD WORKING GROUPS

Climate and Energy

Over the past few months, the Climate and Energy Funders Group has been busy helping convene a number of funder briefings. The group assisted with several ad hoc sessions at the Environmental Grantmakers Association retreat, including one on federal climate policies and another on Design to Win, a plan for philanthropies role in the fight against global warming.

On September 18, the group hosted a day-long funder briefing in New York City on energy efficiency and climate change. The meeting discussed recent on-the-ground successes and future policy opportunities. On October 18, the group co-sponsored, along with the Merck Family Fund and the Kendall Foundation, a funder briefing in Chicago entitled, Climate Change Solutions: The Role for Forests.

The Climate and Energy Funders Group partnered with the German Marshall Fund to lead a European study tour on global warming, October 20-27, to investigate the policy successes and challenges in Europe in addressing climate change. Funders from the U.S. met with high-level government officials and European funder counterparts to learn of domestic policy lessons as well next steps to an international agreement.



On the home front, the Group is also helping plan and convene a Southeastern funders briefing on November 12-13 in Charlottesville, Virginia. The meeting will offer an overview of the state of climate policy in the Southeast at the regional, state, and local level as well as set a strategy for moving the climate issue in the region.

Also, keep an eye out for the final dates for the Climate and Energy Funders Group Annual Meeting, to be held in early May.

Marine Conservation

In late October, the Marine Working Group hosted a conference call on Limited Access Privilege Programs (LAPPs) and their various iterations, as implementation of the newly reauthorized Magnuson-Stevens Act continues in the US. A public comment period just closed for gathering input around LAPP rulemaking. A potential rule is intended to guide the regional Fishery Management Councils and NOAA Fisheries in developing and implementing LAPPs.

Beyond traditionally considered individual transferable quotas (ITQs), momentum is gathering in the US to implement LAPPs that align incentives with resource protection through other innovative strategies, such as area management, sectors, and cooperatives. However, challenges to implementing LAPPs exist, and there is a need to consider and address social and economic concerns in program design. Speakers on the call included: Astrid Scholz, EcoTrust: Dan Holland, Gulf

of Maine Research Institute; and Tim Essington, University of Washington.

Gulf of California

At a meeting hosted by the Packard Foundation in August, potential donors reviewed details of the creation of a Gulf of California (GOC) marine protected area endowment. In that same month, Gulf of California funders coordinator Marina Cazorla visited Isla Natividad with Martin Goebel and Davida and Aaron Herzl, where they learned about the marine reserve pilot project there headed by the Natividad Cooperative with Comunidad and Biodiversidad (COBI), and partners Reef Check California and PISCO.

The Resources Legacy Fund (RLF) continues to work towards the development of a comprehensive, multi-donor land conservation strategy for the Gulf of California states – Baja California, Baja California Sur, Sonora, Sinaloa and Nayarit – over the next five years. Major areas of planning work include science, conservation planning, communications, NGO capacity assessment, and federal policy reform.

To further develop strategic approaches in development, GOC funders have sponsored a series of workshops related to land conservation in the region. A communications workshop took place October 11-12 in Mexico City, and an NGO workshop was held October 15-16 in San Diego. RLF also organized a GOC funders meeting to discuss land conservation on October 29-30 in Dana Point.

Mexican federal environmental agency Semarnat created nine regional offices within protected areas agency CONANP as a part of efforts to decentralize and increase local presence at natural protected areas. For the states of Baja California and Baja California Sur, and some of the Gulf of California, the new headquarters will be in La Paz. The new regional director for Baja will be Benito Bermudez (formerly director of the Vizcaino protected area). Another regional office will cover Northwest Mexico and the Upper Gulf of California. A group of Bay Area-based GOC funders met on September 18 in San Francisco with Secretary Elvira Quesada of Mexico's Environment Ministry (SEMARNAT), and CGBD will continue to help funders explore opportunities for collaborative conservation efforts in the Gulf of California and in Mexico.

Another GOC funders conference call will be scheduled soon for mid-November. Also in mid-November, a small group of interested funders will hold a conference call to discuss the development of a coordinated, standardized MPA monitoring system for the Gulf of California.

Land and Freshwater Conservation

In October, the Land & Freshwater Conservation (LFWC) Working Group hosted the second in its series of conference calls on water and biodiversity conservation. The conference call explored the relatively untapped potential of conservation and efficiency,

looking at the options for decoupling water use and population growth curves and examining examples of successful demand-side management efforts that save energy as well as water. Dr. Peter Gleick, co-founder and President of the Pacific Institute for Studies in Development, Environment, and Security and Mary Ann Dickinson, Executive Director of the new national advocacy organization, the Alliance for Water Efficiency, participated in the call.

On November 30, the Working Group will host a conference call on the Costa Rica "Peace with Nature" initiative. Dr. Dan Janzen will join funders on the call.

Health & Environmental Funders Network

HEFN is hard at work preparing for its upcoming November meeting. Registration is still open for HEFN's first national funder meeting on health and the environment. The meeting will be set at the Airlie Center in Virginia on November 28-29. Please visit www.regonline.com/hefn to register or for meeting details.

In addition to this national meeting, HEFN's California chapter is held its second gathering on October 29-30 at the Hewlett Center in Menlo Park. The meeting focused on supporting capacity building in non-profit organizations, and cultivating new partners to work on environmental health issues.

The funder conference call series continues with a series of calls focused on health, climate and energy. A call on diesel and health is scheduled for November 12. For more information on HEFN's conference call series, please contact Karla Fortunato, kfortunato@hefn.org.

CGBD MEMBER NEWS

The Turner Foundation is pleased to announce the recent promotion of Katie Eckman to the newly created position of Executive Director. She was previously the foundation's Senior Program Officer for Habitat, a post that she has held for the last seven years. In her new role, Katie will be responsible for the foundation's day-to-day operations and the oversight and management of the four program areas: Safeguarding Habitat; Creating Solutions for Sustainable Living; Healthy Planet Healthy Communities; and, Growing the Movement.

Mike Finley will remain in his position as President of the foundation, focusing his efforts on special projects, including the DMZ between North and South Korea, the greening of the National Restaurant Association, the Energy Future Coalition, and the greening of the American Hotel and Lodging Association.

The Christensen Fund (TCF) has appointed Catherine Sparks as its new Melanesian Program Officer, charged with the growth and development of its culture and environment grantmaking program in the region. Catherine is a Canadian-born gender and community development specialist who has spent seventeen years working with peoples' organizations in Melanesia and the South Pacific, tackling the linkages between land, environment, culture and development. Prior to joining TCF, Catherine served for four years as the Country Representative for CUSO in Vanuatu, partnering and posting volunteers with a wide variety of government, civil society, community and international development agencies.

The Christensen Fund also announced that after nearly five years of service, Dr. Rafique Keshavjee, Program Officer for Central Asia and Turkey, will be leaving the Fund at the end of 2007 in order to return to East Africa to take up an exciting opportunity as Head of Academic Planning for the Faculty of Arts and Sciences at the new Aga Khan University (East Africa).

The Gordon & Betty Moore Foundation is pleased to announce the promotions of Meaghan Calcari, Emily Goodwin and Rachel Strader from Program Associate to Program Officer. All three work in the Foundation's Marine Conservation Initiative. They helped start the Initiative, conducting the original investigation that led to the Board approving the program. Meaghan is responsible for the Foundation's work in British Columbia, while Emily is responsible for its work in the California Current Ecosystem and Rachel covers New England.

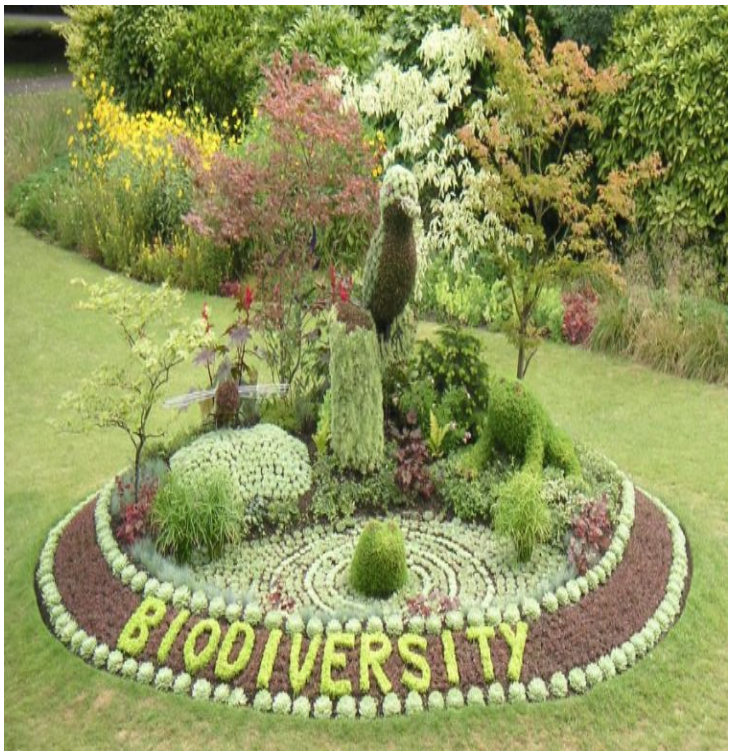
The David & Lucile Packard Foundation has announced that Dr. Richard Cudney-Bueno will be joining the foundation in June 2008 to lead its Gulf of California conservation grantmaking. Over the next nine months, he will assume much of this responsibility, working half time as a consultant with the foundation. Richard is currently an Assistant Professor in the School of Natural Resources at the University of Arizona. He has participated in and directed numerous initiatives concerning education, research, management and conservation in the Gulf of California, Mexico, and across the U.S. border in the Colorado River Delta.

Rhea Suh has joined the David and Lucile Packard Foundation to lead the institution's major new Western Conservation grantmaking strategy within the Conservation and Science Program. The Western Conservation strategy is a new grantmaking initiative being developed by the foundation with the goal of protecting and restoring biologically important and iconic regions of western North America in ways that help to create sustainable communities and build new environmental constituencies. Rhea will also oversee the implementation of the foundation's grantmaking in the Gulf of California.

The Wilburforce Foundation has selected Carol Orr as their new Program Associate for Alaska & British Columbia. Carol has been the Grants Administrator for the Foundation since April of 2002. Prior to joining Wilburforce, Carol was the Information Systems Manager at Philanthropy Northwest, a grantmakers association, working to promote thoughtful and strategic philanthropy in Washington, Alaska, Oregon, Idaho and Montana.

Wilburforce also announced that Yolanda Morris, their former Office Manager, has been promoted to the position of Grants Manager. Yolanda had been the foundation's Office Manager since May 2002. Before coming to Wilburforce, Yolanda managed donor relations as Development Assistant at the Humane Society for Seattle King County.

The Lazar Foundation has appointed Sybil Ackerman as Executive Director. Most recently, Sybil has served as Legislative Affairs Director at Oregon League of Conservation Voters. She will continue there through the special legislative session in January and February, probably joining the foundation in April.



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