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Carbon Credits for Hydros Stand on a “Foundation of Lies”

by Patrick McCully

The global program designed to cut greenhouse gases through carbon offsets from developing countries is being undermined by a huge influx of projects that do not actually need the credits to get built. The UN's Clean Development Mechanism (CDM) is set to provide massive subsidies to hydropower developers while increasing greenhouse gas emissions, according to an investigation by International Rivers.

The CDM, part of the Kyoto protocol, allows richer countries to emit extra greenhouse gases by paying for carbon credits to fund supposedly climate friendly schemes in the developing world.

As of November 1, 2007, 654 hydro projects had received or applied to receive carbon credits from the CDM. If approved, these credits would provide dam developers with a windfall of around a billion dollars each year. Hydro is now the most common technology in the CDM, representing a quarter of all projects in the project pipeline.

“The CDM is blindly subsidizing the destruction of rivers, while the dams it supports are helping destroy the environmental integrity of the CDM,” says Barbara Haya, a consultant for International Rivers, and author of the new analysis.

The great majority of hydros in the CDM would very likely be built regardless of receiving credits (in CDM-jargon they are “non-additional”), in violation of the mechanism's basic principle. The CDM was designed to issue credits only to projects that are “additional” – projects that are being built because they receive revenue from selling carbon credits. Each CDM credit sold from a “non-additional” project means one extra ton of CO₂ is released to the atmosphere. The hydros currently in the CDM pipeline are requesting over 60 million credits per year.

“Money that should be supporting decarbonization in developing countries is flow-

ing into the coffers of hydropower developers with the only effect on carbon emission levels being to increase them,” says Haya. “Hydro developers are repeatedly justifying their applications to the CDM with surreal arguments, such as stating that projects that are already completed will only be completed if they receive CDM revenue. Even worse is that the companies supposed to audit the developers' claims and the CDM's Executive Board seem prepared to endorse such Alice in Wonderland arguments.”

More than a third of the large hydros approved for credits by the CDM's Executive Board were already completed before CDM approval. The majority of the dam projects (89%) were expected to be completed within a year following approval, and almost all (96%) within two years. As a large hydro project typically takes 4-8 years to build (on top of several years of project preparation), few if any of the developers

of these projects could have realistically needed CDM credits to build their dams.

Haya's investigation of hydro projects implies that the same flaws in the CDM's conceptual basis and project vetting procedures also allow many non-hydro projects that are not additional to receive CDM credits.

Haya said that many carbon market insiders privately admit that CDM project applications are rife with deceptions and manipulation. “How wise is it for the main mechanism supporting climate change mitigation in developing countries to be standing on a foundation of lies?”

China dominates

Most of the CDM hydros – 402 projects – are in China, the world's most prolific dam-builder. The majority of large hydros nearing completion in China are now applying for CDM credits. Yet there is no evidence

continued on page 15



Campos Novos Dam in Brazil (shown here after cracking led to uncontrolled emptying of its reservoir last year). This 880 MW completed project is seeking CDM credits.

Photo: FOE Brazil

No Future Without Addressing the Past

The World Bank has traditionally been the most important international funder of large dams. Since its founding, the Bank has supported more than 550 dams around the globe, with over US\$90 billion (in 2007 dollars) in loans and guarantees. World Bank-backed dams include some of the world's worst development disasters, and their legacy lives on.

After a short-lived period of caution and introspection, the World Bank adopted a new high-risk approach to large dams in 2003. In recent years it has approved the controversial Nam Theun 2 Dam in Laos and the Bujagali Dam in Uganda (see page 3). In fiscal year 2007 alone, the Bank approved US\$814 million in support for nine hydropower projects. This is \$132 million more than it provided for all renewable energy and energy efficiency projects combined during the same period. The Bank's preference for centralized, top-down approaches thus crowds out smaller, more sustainable water and energy solutions.

As the Bank plunges back into the big dam business, the legacy of its past dam projects remains unaddressed. This global legacy includes the displacement of at least 10 million people, lost livelihoods, damaged ecosystems, corruption, massive debt burdens and, in some cases, serious human rights violations. The landmark report of the World Commission on Dams (WCD) found in 2000 that "in too many cases an unacceptable and often unnecessary price has been paid to secure the benefits [of dams], especially in social and environmental terms."

World Rivers Review has repeatedly covered the unresolved legacy of the World Bank's past dam projects. Africa's Tonga people, who were forced from their lands along the Zambezi River by the Kariba Dam in the 1950s, are still awaiting assistance to rebuild their lives. Guatemalan farmers are still seeking justice for the murder of hundreds of family members who opposed the Chixoy Dam between 1982 and 1984. Affected people have been left impoverished by the Lesotho Highlands Water Project, while multinational companies enriched themselves through corrupt dealings. And coastal communities in Pakistan continue to be harmed by a seriously deficient drainage project and the floods and devastation it causes (see p. 4).

The World Commission on Dams recognized that dam builders can only regain their credibility if they address the ongoing human suffering and environmental degradation which their past dams have caused. The WCD report proposed in 2000 that "outstanding social issues associated with existing large dams [be] identified and assessed," and that "processes and mechanisms [be] developed with affected communities to remedy them." Governments, the dam industry and funders such as the World Bank share the responsibility to do so.

The World Bank has rhetorically endorsed the strategic priorities of the WCD, including the need to address the legacy of past dams. Yet it still lacks the necessary tools to do so in its own projects. The Bank rarely monitors projects after their physical completion. It cannot provide grants, but only new loans or credits, to compensate affected people for their losses. The Bank's Inspection Panel, which has documented harmful violations of internal policies, has no mandate to monitor and ensure that remedial actions are implemented.

The World Bank defends its renewed zeal for large dams with assertions that it has learned from past mistakes. This claim is not credible as long as it does not address the legacy of its own failures. The Bank urgently needs to develop the tools required to address its big dam legacy. These tools include the following:

- The World Bank should provide reparations from its own resources. It should work directly with communities who have been harmed in its past projects to develop reparations processes and rehabilitation plans.
- The mandate of the Inspection Panel should be extended to include the review and monitoring of remedial actions.
- The Bank should help develop an enforceable compliance system for addressing the needs of dam-affected people. As recommended by the WCD, such a system should include benchmarks for success, and the use of financial guarantees to underwrite commitments to affected people. Truly independent monitoring bodies, which include members of civil society, must be created. The choice of such bodies should be left to affected communities.

Until they have developed the tools for actively addressing the legacy of its dams, International Rivers will continue to keep the World Bank and other dam builders accountable for the failures of their past projects.

Peter Bosshard

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Banking On Big Dams

World Bank, EIB Approve Bujagali Dam Despite Major Flaws

by Lori Pottinger

Who could be against a project that provides energy to Uganda – a country with one of the lowest rates of electrification in the world and one of the highest poverty rates? A country where blackouts are part of the fabric of life?

Quite a few of us, it turns out, and for a variety of reasons. The Bujagali Dam project, now under construction just below Lake Victoria on the Nile, is not such an obviously bad project – no slave labor building the dam or millions of people displaced. In other words, no deal-breaker for the world's reputation-conscious development banks.

Today, the Ugandan economy is in crisis due to over-dependence on hydropower from the Nile and minimal efforts to develop other energy sources available to it, such as the region's abundant geothermal reserves, energy efficiency measures, solar power, micro-hydro, co-generation, and other options.

In the years that activists in Uganda and worldwide worked to save the Victoria Nile from yet another large dam and promote better alternatives to it, the Bujagali project's flaws began to add up. By the time the World Bank and EIB approved the project in April, the US\$799 million dam was revealed to be flawed on economic grounds, in protections for endangered fisheries, and in its potential to harm Lake Victoria.

More to the point for Uganda's citizens, the hugely expensive dam will not bring

power to those in need: its electricity will be too expensive, and connections to the national grid for rural villages too dear. An independent economist who reviewed the World Bank's findings states, "The project is expected to have little or no positive impact on the majority of Ugandans now without electricity, and, at best, only a moderate benefit to the overall Ugandan economy."

Frank Muramuzi of Uganda's National Association of Professional Environmentalists (NAPE) says: "The high cost of the project will further limit funds available for rural electrification, and will likely lead to reductions in tariff subsidies for grid-connected users. Uganda already has the most expensive power in the region and tariffs have more than doubled in recent months, thus pushing more people out of the already limited market for electricity." NAPE has been lobbying for development of the nation's geothermal resources, and for better energy development programs for the rural poor. The group also believes another large hydropower project, Karuma, would be less harmful than Bujagali.

Ignoring inconvenient truths

Perhaps most remarkable is how the various parties downplayed the project's hydrological risks. The World Bank's least-cost analysis ignored extensive evidence that climate change will reduce outflows in the Nile, and proposes a new hydrological flow pattern for operating the dam complex that could slow the recovery of Lake Victoria.

Fast Facts on Bujagali

Project Cost: US\$799
(not including transmission lines)

Electricity: Promoters say the dam will produce 250 MW, but during low flows, could be much less

Timeline: Construction underway, expected to be complete by 2011-12

Money matters: World Bank Group (US\$360mn in loans and guarantees), EIB Euro (100 million), African Development Bank (\$110mn)

Affected People: About 5,000 people will be directly affected by project construction

Independent hydrologist Daniel Kull, whose 2006 study documented how the two existing dams were responsible for more than half the recent drops in Lake Victoria, says the project's hydrology analysis "starts by ignoring the true damage done to Lake Victoria by the existing dams and follows with a selective and optimistic view of current lake levels and possible climate change impacts. It is disturbing that the banks would approve a major infrastructure project based on biased hydrologic analyses." The result could be a repeat performance of the

continued on page 5



Bujagali Falls, before and after. All the water has now been pumped out of the river at the dam site.

Promises for Pakistan: A Washington Diary

by Ann-Kathrin Schneider

I woke up not knowing what time it was, and not even sure where I was. My watch still gave the time in Europe, and the room was unfamiliar. Finally, it dawned on me: it was five in the morning and I was in a small inn in Washington, DC, walking distance from the World Bank, which would be my target in the next few days. It was Annual Meetings time again.

Once I had my bearings, I began worrying whether my colleague from Pakistan had arrived. Three years ago, Mustafa, who lives in Sindh, Pakistan, had filed a request with the World Bank Inspection Panel to investigate a Bank-funded drainage project in his neighborhood. Now, he was to come to the Annual Meetings of the World Bank to tell the story of the Bank's misguided response to the Inspection Panel investigation and to give a first-hand account of the many problems the project had created on the ground.

Filing the request three years ago had been difficult enough. Understanding that the hardships of the people were linked to a large drainage canal funded by the World Bank was one thing. But understanding how to register complaints about such projects was quite another. Mustafa and his friends had to document how breaches in the canal that destroyed their grazing land were linked to World Bank policy violations. Lengthy, often cryptic World Bank documents had to be studied, discussed and linked to the problems on the ground. In the end, six men, including Mustafa, and one woman submitted a claim to the World Bank's Pakistan office on their own behalf, and on behalf of "others who live in the area known as district Badin, Sindh, Pakistan." Their claim stated that the World Bank had violated its own policies during the planning and implementation of the National Drainage Program in Sindh.

More than three years after submitting the document, the requesters understood that filing the claim was not enough. On the ground, nothing had changed. They decided that one of them had to travel to the headquarters of the World Bank in Washington to push for action. Mustafa was chosen to go.

On this October morning, it was not at all sure that he would make it to Washington. An earlier plan to travel to Washington had fallen apart only after meetings had been arranged, hotel rooms booked, flight tickets bought and local partners alerted. Getting a visa for a Pakistani to come to the US proved more time-consuming than we



Mustafa and Ann-Kathrin in front of the World Bank.

had anticipated, and we had to postpone. This time, the visa was in hand, and partners in Washington were excited that they would finally meet Mustafa. World Bankers were preparing to meet an outspoken opponent of a high-profile Bank project. Yet, just a week before the planned meetings, a political hurdle again jeopardized the trip. Would he be able to join me for the meetings and debates at the World Bank?

In the breakfast room in the basement of the historic inn, I joined the other guests at a large table for breakfast. There, a thin man with brown hair in a pink shirt smiled at me. Mustafa had arrived.

Talk Fast

Our first meeting, shortly after breakfast, was in the main conference room of a Washington-based foundation. It was packed with 50 people: activists, lawyers, World Bank Inspection Panel members, academics and NGO colleagues from the Heinrich Boell Foundation, the Bank Information Center and the Center for International Environmental Law who, together with International Rivers, had organized the meeting. Every seat in the room was taken: people were eager to hear Mustafa's story. As Mustafa was not the only speaker, he, and everyone else, was given only 10 minutes to speak. He pointedly joked that he

was given a minute of speaking time for every 1,000 miles he had travelled.

In the end, he managed to get almost twice the time allotted to him. Charming while at the same time straight to the point, he won the audience over in seconds. He movingly described how life in the Indus delta had changed after the construction of the canal, how families who used to have 80 buffaloes now had to make do with only one, and how others had moved to slums in big cities because they could no longer grow anything on their ruined fields.

Inside the Bank, there was also great interest in Mustafa's story. He talked about the wetlands that used to support hundreds of different fish and bird species that are now, in the aftermath of the faulty Bank project, biologically dead. He talked about how people who live near the canal are afraid of being flooded out and losing their homes and their animals. Mustafa talked to World Bank Executive Directors, to staff members and to managers responsible for the drainage project. He talked with the Inspection Panel who had studied the project and its impacts for almost two years. He talked of how the Bank had so far done nothing to redress the problems caused by its project.

In the end, it seemed that Mustafa had achieved something. He started to get calls

continued opposite

and commitments. World Bank Executive Directors promised to send an independent mission to Pakistan to assess the situation. Bank staffers promised to increase the budget for development projects in the area if people had good ideas. And managers promised to make sure that things would move forward.

Yet, more than a month after leaving Washington, Mustafa has not heard back from anyone at the Bank on their promises and commitments. These commitments are even more critical today, in this time of political instability and crackdown on civil society, the media and judiciary in Pakistan. So far, Mustafa has nothing concrete to offer to the other requesters who welcomed him home after his trip to Washington. Sadly, their message to the World Bank sent earlier this year still holds true: "After all these efforts and repeated demands, the poor communities of the area are still waiting for justice." ■

The History of Pakistan's World Bank Waterworks

For five decades, the World Bank has shaped Pakistan's approach to irrigation and spent billions on the construction of canals and large dams that today constitute the world's largest water diversion scheme, the Indus Basin Irrigation System.

In the 1980s, the World Bank realized that its approach to Pakistan's water sector had created massive problems of water logging and salinity in the heavily irrigated province of Punjab. In response, the Bank decided to build large drainage canals to divert agricultural run-off from Punjab to the Arabian Sea. The \$1 billion Left Bank Outfall Drain was constructed to solve irrigation problems in Punjab, followed by the World Bank-funded National Drainage Program. But the design of the canals impacted the region's farmers, fishermen and villagers.

In 2006, an independent investigation by the World Bank Inspection Panel found that the design of the projects was faulty and that the Bank violated key internal rules when building the canals. The project's flaws led to the loss of lives and livelihoods and to the large-scale destruction of wetlands.

Breaches in the canal caused polluted waters to flow onto surrounding fields and wetlands. Plants and animals in the wetlands – where 15,000 people live – have died, fish species are declining and drinking water has become salty. Natural disasters, notably the 2003 floods that killed 100 people and 5,000 animals, were compounded by drainage projects, according to the investigation.

The people affected by the drainage scheme now demand compensation for their losses. However, more than one year after the completion of the Panel's investigation, the Bank still has not mitigated the impacts of the project.

Bujagali continued from page 3

Kiira Dam debacle, in which the Bank used over-optimistic hydrological projections to justify that dam's projected capacity – projections which led to over-releases of water from the dam and the dropping levels of Lake Victoria.

It is particularly amazing that the IFIs would accept the argument that climate change will not significantly affect the Nile River flows. Climate change experts familiar with the science on the Nile say that hotter temperatures are expected to lead to a reduction in the Lake's outflow. Lower flows would wreak havoc on Uganda, as it relies on the Nile for virtually all of its electricity (a situation that will be exacerbated by the building of Bujagali). It is hard to imagine any Northern country accepting a project that would make it almost 100% dependent upon one type of electricity, and one that is uniquely vulnerable to climate change.

The IFIs are proceeding without any guarantee that the operators of Bujagali will be any more careful to protect the Lake's level than the previous dam operators have been. NAPE's Muramuzi says, "The dam's developers say they cannot control the outflow of water from upstream dams, so there is no guarantee that the current pattern of unsustainable releases will be stopped."

The project EIA was also flawed in analyzing the dam's impacts on fisheries. Les Kaufman, a US fisheries expert with long experience studying the Nile, has concluded that

the existing studies are "inadequate to rule out a likelihood of negative impacts to the survival of endangered species caused by dam construction... The potential impacts to species diversity and ecosystem services from the proposed dam are extremely high." He recommends additional comprehensive baseline studies, a sustainability plan for the Victoria Nile, and improved mitigation measures. It appears his concerns were ignored by the IFIs.

Inspection Panels will analyze

In March, NAPE and others filed a complaint with the World Bank Inspection Panel, citing concerns about potential violations of Bank policies on Bujagali, and shortly thereafter, filed a similar complaint with the African Development Bank's compliance unit. Both panels have agreed to inspections, and did research visits to Uganda in December. Their reports are expected in early 2008. The World Bank's panel stated in its preliminary report that it will look at questions about resettlement, the project's impacts on electricity tariffs, the cumulative environmental impacts from multiple dams on the Nile, and hydrological implications in light of a changing climate, among other issues.

Groups have also documented the project's non-compliance with the best-practice standards described by the World Commission on Dams. In 2005, the EIB told International Rivers that it will "align to" the recommendations of the World Com-

mission on Dams (WCD) for any large dams from which it sources carbon credits. Project developers have reportedly considered trying to get carbon credits for the dam. Yet Bujagali fails to meet WCD standards in many key areas, including comprehensive options assessments, addressing the impacts of the two existing dams, analyzing cumulative impacts, and others.

For example, on the issue of options assessments: Uganda's energy crisis is real, but it has been amplified by its over-dependence on hydropower from the Nile and minimal efforts to develop other the hundreds of megawatts of cleaner energy sources (including plugging leaks in the system: the national grid is estimated to leak a third of the electricity that flows into it) that could have been prioritized before Bujagali. The country has developed none of its geothermal energy, only a few megawatts of an estimated 40 MW potential for getting energy from sugar cane waste, and a small portion of its small- and micro-hydro potential.

Sadly, the Bujagali Dam story seems to be the story of Africa's energy-development past, present and future. There is no "Apollo Program" to light Africa's villages, but there are dozens of plans to build megadams that will power huge mines, smelters and factories. While the IFIs hope for a trickle-down benefit from their grand schemes, Uganda's rural poor will remain in the dark even after Bujagali comes online. ■

Dams Threaten Biodiversity and Indigenous People in Panama

by Monti Aguirre

This rainy season, a mushy mess is sliding down the Changuinola River Valley. Huge Volvo machines are tearing up old mountain roads, causing tons of chocolate-brown run-off to flow into nearby streams. The giant machines, operated by Panamanians and other Latinos, are opening new roads for the construction of the first of four large dams planned for this basin. About 100 new houses are being built for the dam's laborers, and a dozen finer homes for the project managers from Vattenfall, a Swedish construction company.

The explosion of dam construction in Latin America has not escaped Panama, which recently gave concessions to a subsidiary of US-based AES Corporation to build three dams on the mainstem of the Changuinola River. The concession for the Bonyic Dam on the Bonyic River was granted to a Colombian utility. The installed capacity for all projects would be 446 MW, or almost a third of the installed capacity in Panama. The project would feed the national electricity grid, which in turn feeds the regional grid.

All of these dams would be located downstream from the La Amistad International Park, a UNESCO World Heritage Site. Environmentalists fear the risks and impacts would be manifold and immeasurable for the biologically rich ecosystems found at the park. The park stretches across Panama and Costa Rica from the coral reefs of the Caribbean Sea to the peaks of the Talamanca mountain range. Cloud forests, coral reefs, mangroves and *paramos* (a high elevation neotropical ecosystem) are found in the park. The varied ecosystems support an abundance of animal life, including jaguars, peccaries, white-faced monkeys, howler monkeys, tapirs, anteaters, sloths, armadillos, pacas and agoutis. More than 300 species of birds and more than 110 fish species are found in the area.

Construction of the lowest Changuinola dam alone would biologically deplete over 500 miles of streams, and the Bonyic Dam would permanently impact more than 100 miles of stream habitat. One of the greatest dangers posed by the walls of cement is that they will impede the natural migration of fish, and alter the level and quality of water vital to the reproduction of many species.

Bill McLaren, an ichthyologist and Director of the Stream Biomonitoring Pro-

gram at Asociación ANAI in Costa Rica, has been studying North and Central American stream ecosystems for 45 years. He warns, "The effects upstream and downstream from the dams would be drastic, possibly involving the extirpation of eight to ten species of migratory fish and several species of shrimps. Remove them and the river system becomes something completely different and much less useful as a human food source."

The lands along the rivers are also home to close to 4,000 Ngobe and Naso indigenous communities. For years these communities have remained relatively isolated, semi-autonomous and largely self-sufficient. But these indigenous communities are vulnerable in that they lack communal land titles, and have for years been fighting to obtain them.

"Blocking the river will flood vast areas where we live; we would have to move our homes, families, crops, animals, and our lives. ... Where would we go? The plans for resettlement are already creating divisions and conflicts among our families. Why is it that we are obliged to go? Why is it that we should lose our peace?" wrote the Ngobe in a recent letter to AES.

Although AES, which has its headquarters in Arlington, Virginia and operates in half a dozen countries, states in its company profile that it has made a commitment to be environmentally responsible, it has found growing opposition by local and international groups to its dam projects on the Changuinola, and in other countries.

Corporate responsibility?

Earlier this year, the Center for Biological Diversity (CBD) in association with indigenous communities, Panamanian organizations, and other NGOs wrote to AES and its shareholders to stop their involvement in the three Changuinola dams.

"The dams would put at risk an internationally renowned World Heritage site and would negatively impact indigenous communities, future tourism in Panama, and many threatened and endangered species," said Peter Galvin from the CBD.

In April 2007, CBD and more than 30 other groups also filed a petition to the World Heritage Centre to list La Amistad Park as an endangered World Heritage site. As a result, the Centre and IUCN are planning a mission

to investigate the threats to the park in early 2008. The Committee stated that it regrets that Panama did not report the existence of the proposed hydroelectric projects to the World Heritage Centre as required under the World Heritage Convention.

According to the local NGO Association for Conservation and Development, the dam projects' environmental impact studies were flawed. They lacked baseline data, a rigorous archaeological reconnaissance, and did not include a thorough resettlement plan for the displaced population. Furthermore, the public consultation was conducted far from affected communities for whom transportation is difficult and costly. Project works were not supposed to start until further required studies were presented to the national authorities. Yet in October, Isabel Becker, an affected person, was forcibly relocated by police from her property where the dam wall would sit.

"...(T)he projects ... would cause environmental damage in an area of global conservation interest and impose serious hardships on indigenous communities living along these rivers," concludes a financial and economic analysis of the projects conducted by the Conservation Strategy Fund. "This is a clear case of an investment that may well be economically efficient, but will be inequitable. This analysis shows that an energy company, lenders and the government will reap the benefits of the projects, while the costs will fall disproportionately on particular indigenous communities and on the natural ecosystems surrounding them."

In addition to the four dams mentioned, four more are proposed in the basin. Panama's rivers, like so many of Latin America's rivers, face rampant, unplanned development that threatens rich ecosystem and the people who depend on them. ■

What We're Doing

International Rivers is part of a coalition formed to support local communities and NGOs that are trying to prevent destructive dams in the Changuinola – Teribe Basin.

Renewable Energy a Practical Alternative for Cuba

by Fabiola Bueno Sánchez

Cuba represents an important model for renewable energy development, with projects going back 50 years. The renewable energy revolution really took off after the collapse of the Soviet Union in 1989, after which Cuba could no longer trade sugar for oil with Moscow and lost most of its petroleum supplies overnight.

Cuba has increased its reliance on a number of renewable energy resources, including biomass, biogas, small-scale hydroelectric, solar and wind power. The use and development of these renewable energies has helped to overcome many of the country's social and economic problems.

The Cuban archipelago is made up of the main island of Cuba, the Isla de la Juventud, and more than 4,000 other smaller islands and keys in the Caribbean Sea. Cuba has a population of more than 11 million people, of which 75% live in urban areas.

Historically, one of the principal sources of renewable energy in Cuba has been biomass from sugarcane. Up until the early 1990s, the Cuban sugarcane industry was responsible for the production of 10% of the electricity generated in the country. However, due to the decline in the value of sugar prices on the international market, about half of the sugarcane processing factories were closed, which forced the industry to restructure and reduce its production. As a result, energy production from sugarcane has dropped significantly in the past 15 years.

Biogas is another major renewable energy source in Cuba. Biogas is produced by the anaerobic decomposition of organic wastes and is a low-cost source of renewable energy that is used for household cooking and the generation of electricity. Biogas also produces useful byproducts such as fertilizers and food for fish and poultry production. For this reason, biogas is promoted and developed for use in schools, rural homes, tourist facilities, and in factories, which might otherwise depend on thermal generators.

Due to the limited size and minimal flows of Cuba's rivers, hydroelectricity has not been an important source of renewable energy for the island. Nonetheless, 176 hydro power plants have been developed in order to exploit the available water resources. This includes:

- 138 pico hydro projects with a total of 3,033 kw installed capacity, nine of which are connected to the national grid.

- 32 micro hydro projects with a total of 4,030 kw installed capacity, 12 of which are connected to the national grid.
- 5 small-scale hydro projects with a total of 7 MW of installed capacity, all of which are connected to the national grid.
- 1 medium-scale, grid-tied hydro project with 43 MW of installed capacity, operated by the government.

The development of solar photovoltaic energy has been one of Cuba's renewable energy triumphs. All rural schools and health clinics in Cuba have been powered by solar PV energy, as well as five hospitals, 1,800 television viewing centers, homes and other off-grid installations. To carry out the ambitious school electrification project, local NGOs Cubasolar and Ecosol trained brigades in each of the provinces on how to install PV systems. Twenty-five brigades went to the rural areas, installed the systems and trained local people in system maintenance. Teachers help with basic maintenance, but schools also receive regular maintenance visits from qualified technicians. There are also repair shops in each province.

Passive solar energy is used for solar drying of agricultural products, while solar thermal is used to heat water for domestic and industrial applications.

In April 2005, as part of the government-sponsored *Revolución Energética*, a committee on wind energy was formed to investigate the potential of wind energy in Cuba. The group analyzed all of the islands'

potential wind project sites. Model wind farm projects have since been built on the islands of Turiguanó and Canarreos, which are in the process of being replicated in other areas of the country.

Public education key

An important consideration for the implementation of any renewable energy source is consumer education. The comprehensive training and education of energy users has played a pivotal role in the successful widespread implementation and use of these non-traditional energy sources in Cuba.

The National Program for a Sustainable Energy Culture has been the platform for the massive dissemination of renewable energy education in Cuba. The principal objectives of the program are to promote, prioritize, strengthen and reinforce the use and development of renewable sources of energy in a rational and sustainable manner, and to contribute to the emergence of a new culture of energy awareness. The emphasis is on the need to use and develop sources of energy that are locally available and respect the environment, while also reducing the demand for energy.

Local and national government leaders, media sources, health and education programs, community organizations, and other institutions work together to project the underlying message for a Sustainable Energy Culture, promote the use of renewable energy sources and the importance of energy conservation. ■



Solar panels in Cuba's "Cuchillas del Toa" biosphere reserve. These panels provide electricity for the forest keepers' buildings.

Ecuador's Water Crisis: Damming the Water Capital of the World

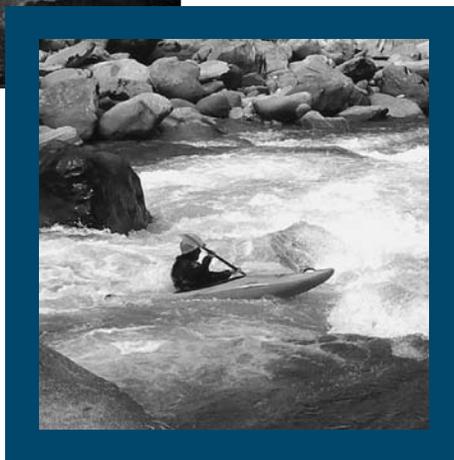
by Matt Terry



San Rafael Falls. Photo: Matt Terry

Ecador is a watery wonderland. Although small (it is roughly the size of New Zealand), it is home to more than 2,000 rivers and streams, at least 17 distinct indigenous groups, and the greatest level of biodiversity of any country in the world in relation to its size. Located in the headwaters of the Amazon basin, Ecuador has more available freshwater resources per capita than almost any other country. No wonder it was recently designated the "Water Capital of the World" by the Panamerican Health Organization. Yet despite this apparent abundance of liquid wealth, Ecuador is in the midst of a water crisis. Most of the nation's water conflicts begin with the lack of solid information. Ecuador does not have a modern hydrological monitoring network to adequately evaluate river flows. Multiple proposals for dam and diversion projects for drinking water, irrigation, and energy

production based on "median annual flows" have resulted in unbalanced water-resource planning and prompted the government to grant concessions that exceed the amount of available water. These "median" values are simply the average of the maximum and minimum flows recorded, and result in distorted flow projections of up to four times the level that is typically observed. In addition, changing climate trends have altered rainfall patterns while widespread deforestation and poor land management practices have further reduced the capacity of the rivers to maintain stable base flows.



Topo River. Photo: Matt Terry

While overly ambitious projects are built without the available water to feed them, existing water infrastructure has been allowed to deteriorate – a condition that leads to acute levels of inefficiency and puts greater demand on water resources. In many cases, municipal drinking water systems register losses of up to 65%. In many irrigation

systems, only 15% of the water reaches its intended destination, while the rest is lost to infiltration through unlined canals, breaks, and poor connections. Inevitably, this inefficiency leads to over-consumption, which in turn incites conflict for a limited resource.

In its struggle to meet growing energy demands, reduce emissions of greenhouse gases and lessen dependence on costly fuel imports for thermal generators, Ecuador has proposed the implementation of up to 226 new hydroelectric projects. Unfortunately, Ecuador's past dam projects (which had an installed capacity of 1,750 megawatts in 2006) have a history of being substantially oversized, and have left large environmental footprints without delivering the promised energy benefits.

For example, the Daule-Peripa Dam has an installed capacity of 213 MW yet generates an average of only 80 MW. The Paute Dam has an installed capacity of 1,075 MW, yet for several months of the year produces as little as 15% of its installed capacity. Ecuador's highly variable production from hydroelectric projects results in an ever-increasing dependence on fossil fuel imports to cover the energy deficit caused by these highly inefficient dams.

The use of carbon credits as incentives for hydro development is steadily gaining ground in Ecuador. There are currently close to 30 hydro projects applying for consideration under the Clean Development Mechanism, and four of these have already been approved. These projects claim to displace the use of fossil fuels for energy production. In most cases, the projects are not actually replacing a thermal power plant, and may cause other significant environmental impacts. Despite the well-meaning intentions of the program to offset emissions of greenhouse gases, the most positive impact of the program may be a steady bonus in the pockets of hydro developers.

Almost every hydroelectric project being developed in Ecuador faces intense opposition. The lack of transparent and open processes for public participation is a key factor in the widespread conflict and unrest. Many projects are planned and approved without meaningful public input and/or local consent. As a result, protests have become more frequent (and occasionally violent).

The following proposed projects are at the forefront of the debate over water infrastructure in Ecuador:

■ **Baba Multipurpose Project**

(42 MW): This project would divert water from the Baba River to the existing Daule-Peripa reservoir to boost its capacity for drinking and irrigation water and produce additional hydropower. The project has continued to generate opposition even after the reservoir area was substantially diminished, and the affected population reduced by 90%. The project remains a very sensitive issue, as many of the people who would be affected by it were already displaced by the Daule-Peripa project and were not adequately compensated.

■ **Topo Hydroelectric Project (29 MW):**

Rivers often form important cultural and ecological corridors, and prevent the fragmentation of critical habitats. Currently renowned as an international destination for expert kayakers, and designated a "Gift to the Earth" by WWF for its riparian habitat and outstanding biodiversity, the Rio Topo is a unique resource that faces an uncertain future. This proposed hydro project would dewater a significant portion of the river that is home to torrent ducks, newly discovered orchids, and more than 17 rare and endemic plant species. One plant found in the project area is a critically endangered aquatic species at risk of extinction; it depends on dynamic natural flows to maintain its sensitive habitat conditions, and is found nowhere else in the world. Critics question the need to build a hydro project in such a sensitive habitat area, and have launched legal action to stop it. There is also doubt whether the project will deliver the promised benefits, as no flow studies were done directly on the Topo River; instead, the hydrologic data used for the project design was extrapolated from other drainages.

Although the Topo project was originally proposed as a 10 MW run-of-river project, it is now promoted as a 29 MW project, even though the hydrologic studies used for the project design indicate a viable production of only 6-10 MW throughout most of the year. Meanwhile, the company promoting the project has divided local communities and even families by offering incentives and promising benefits. The decisions made regarding this project will set an important precedent for how the government considers existing river users and unique biodiversity in the development of hydroelectric projects.

■ **Proyecto Ríos Orientales:** This large-scale, multi-purpose, transcontinental water diversion project would divert water from

up to 30 Amazon drainages for the needs of the growing populations on the west slope of the Andes, including the capital city of Quito, whose population is expected to reach three million by 2025. Quito's water utility has already developed several major transcontinental diversion projects, but claims that this project is the only option for providing water to the growing population for the next 50 years.

Meanwhile, opponents argue that Quito should first reduce its water consumption, which is one of the highest per capita in Latin America, by modernizing existing infrastructure. Bringing down losses in the system, which run from 36-45%, to acceptable standards could eliminate the need for building new projects and would improve water quality at the same time. The project is currently blocked by legal action from local governments in the Amazon region.

■ **Coca-Codo Sinclair (1,500 MW):**

Construction began on this project in the mid-1980s, but the project was suspended in 1987 after Volcano El Reventador erupted and devastated the entire region. Although the volcano is still quite active, a new version of the project has been proposed which supposedly takes geologic issues into account and nearly doubles the installed capacity. The project would develop a road and transmission line corridor into a currently roadless, protected area that is part of the Sumaco Biosphere Reserve, and would threaten to de-water San Rafael Falls, which at 146m (480 feet) is the largest waterfall in Ecuador and an incredible scenic attraction.

■ **Regional Integration:** A proposed competitive trade route between Asia and Brazil includes Ecuador as a central port connection, land bridge and freshwater shipping channel. The project is part of the South American Regional Infrastructure Integration Initiative (IIRSA). In order for the trade route to be competitive with the Panama Canal, the Napo River would need to be dredged and channelized to maintain a navigable route for heavy barge traffic. Hong Kong-based Hutchison Holdings has already committed over US\$520 million to developing the Pacific port terminal in Manta, Ecuador. There is widespread concern about the impacts to the Napo River basin and the indigenous populations and territories along the route, as well as the implications for investment in new water and energy projects that would not otherwise be considered.



Protests against dams have become more frequent. Photo: Matt Terry

Energy Alternatives

While it is generally accepted that hydroelectricity will always be an important part of Ecuador's energy portfolio, where and how new projects will be developed and the standards to which they will be held are under increasing scrutiny and debate. With nearly every proposed hydro project being blocked by strong opposition, it is clear that alternative renewable energy options must be pursued.

The optimization of existing hydro projects and the modernization of the country's electrical distribution system are key areas to start. In 2006, there were losses of 3,053,858 MWh in the system, which is equivalent to nearly a quarter of the nation's energy consumption.

The Ecuadorian Rivers Institute promotes geothermal power as the best option for developing secure and renewable energy in Ecuador. Despite tremendous geothermal potential throughout the Andean subduction zone, with over 500 MW of geothermal sources already identified, none has been developed.

The potential for wind energy is only starting to be explored. The mountain and coastal regions offer many promising options. There are currently three wind power projects being developed in Ecuador that will provide up to 30 MW of renewable energy into the grid.

The possibilities for developing sensible micro-hydro projects, novel applications of free-flow kinetic turbines, as well as traditional solar PV present other attractive solutions for remote off-grid areas.

Now is the most critical time for addressing water management issues in Ecuador and exploring viable alternatives, before controversial projects are implemented and unique rivers and watershed habitats are lost forever. ■

The author is the founder of Ecuadorian Rivers Institute. He lives in Tena, Ecuador.

Running on Empty

China Gambles on Massive Water Transfers to Solve Crisis

by Susanne Wong

Beneath the booming factories and verdant fields of Northern China, groundwater supplies are rapidly drying up. The water table around Beijing drops five meters each year. Some deep wells around Beijing must be drilled up to half a mile deep before reaching water, according to the World Bank. Chronic water shortages have left cities without adequate drinking water and affected plans for economic development.

Scientists now estimate that the aquifers beneath the North China Plain will dry up in 30 years. "There's no uncertainty," said hydrologist Richard Evans, who has worked as a consultant for the World Bank and China's Ministry of Water Resources. "The rate of decline is very clear, very well documented. They will run out of groundwater if the current rate continues."

When you consider that 200 million people live on the North China Plain – the region bounded by the Hai, Huai and Yellow rivers – and 60% of the water they use comes from groundwater, the statistics are sobering. The North China Plain is home to the megacities of Beijing and Tianjin and the provinces of Hebei, Henan and Shandong.

The evolution of this crisis is complex. Since 1949, water use across the country has quintupled. After massive flood damages in the 1960s, Chairman Mao Zedong embarked on a campaign of building dams and canals that altered the country's hydrology and natural landscape. As cities grew, water from reservoirs started flowing to cities, bypassing farmers. Farmers, encouraged to help the government achieve its goal of grain self-sufficiency, began pumping more and more groundwater to grow wheat. As cities grew, they began mining groundwater as well. To make matters worse, scientists now conclude that climate change has reduced rainfall in the region.

The country's focus on economic growth and agricultural self-sufficiency has left little room for consideration of environmental impacts. Chinese industry uses 4-10 times more water for production than industrialized countries, according to the World Bank. Irrigation accounts for about 70% of North China's total water use, yet water use efficiency is only about 40%. In the US, water use efficiency rates of 75-80% are considered to be a good standard.

Replumbing the country

To address the water crisis, the Chinese government has turned to a grandiose engineering scheme originally conceived by Chairman Mao. Named the South-North Water Transfer Project, the US\$62 billion scheme would ship 12 trillion gallons of water per year via three canals from the Yangtze River in the South to the Yellow River basin in the North. This is equivalent to nearly half the amount of water consumed in California annually. Construction on the eastern and central routes is already underway and expected to be completed by 2008 and 2010, respectively. The controversial western route, which would involve the construction of several dams in the upper Yangtze River basin and hundreds of miles of tunnels through the Bayankela Mountains, remains in the planning stages. The entire project is projected to take 50 years to complete.

The primary beneficiary of the project's water is cities and industries. The eastern route will provide water for domestic and industrial water use for Shandong and Jiangsu provinces. The central route is to provide water for more than 20 cities, including Beijing and Tianjin. Farmers will be the last to benefit from project water, if at all.

In 2006, one of the Ministry of Water Resources' lead project proponents, Zhu Ruixiang, claimed that once the project is complete, "the present conflicts caused by competitive water users... shall be alleviated. Water demand of agriculture and ecology system shall be met and over-exploitation of groundwater shall be controlled."

Despite such claims, high-level government officials have recognized that the project won't solve China's water problems.

The government is strongly concerned about water quality along the eastern route of the project, which will rely mostly on existing canals, riverbeds and lakes. Because water along this stretch is already very polluted, many

are concerned that the eastern route will become a conduit for run-off from factories and farms. Companies are also scrambling to build new industrial parks along the proposed route and are likely to dump their wastewater into the canals. Some are worried that pollution may be so severe that the water in the eastern route will not be fit for use.

During the 2006 National People's Congress meeting, Premier Wen Jiabao tried to allay concerns by declaring that China would emphasize "the prevention and treatment of pollution at the sources and along the routes" of the project. The majority of funds for the eastern route are earmarked for the construction of pollution control facilities.

In an effort to encourage water conservation, the project is likely to involve increased water tariffs. However, some cities and provinces are saying that they may pass up project water if it costs too much.

Diversion of water from the Yangtze will likely worsen pollution problems along the river. Roughly 40% of China's wastewater is now dumped in the Yangtze, according to *The New York Times*. As water is diverted northward, less water will be available in the Yangtze to dilute pollution. This will negatively impact biodiversity along the river.

Social impacts are also expected to be great. Roughly 300,000 people are to be resettled by the project. The majority of resettlers would be displaced by the raising of Danjiangkou Dam for the central route. Given China's poor experience with dams and resettlement, many more are likely to be affected and their livelihoods disrupted.

continued opposite



Brazilian Bishop on Hunger Strike to Protect River

by Lucigleide Nery Nascimento

In early December – two weeks into a hunger strike by a Brazilian Catholic Bishop to protest the diversion of the São Francisco River for industrial uses and agribusiness – a federal judge ordered work on the huge engineering project suspended.

Bishop Dom Luiz Flávio Cappio began his latest hunger strike to protest the Brazilian government's plans to divert the São Francisco River. Bishop Cappio, 61, first gained international attention with an 11-day hunger strike in October 2005, which he ended after receiving a commitment from President Luiz Inácio Lula da Silva to conduct a public dialogue on alternative ways to meet semi-arid northeast Brazil's water and development needs. Bishop Cappio now says Lula did not keep his word, and has instead begun construction of the massive project.

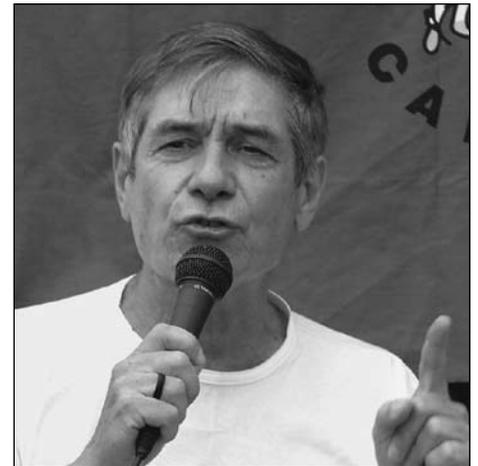
The 2,700 kilometer-long São Francisco River has 168 tributaries, only 99 of which are perennial rivers. It flows through one of the poorest regions of Brazil, where millions live in poverty. The northeast region of Brazil has suffered from desertification and drought, yet agribusiness companies have been the primary beneficiaries of irrigation projects, used mostly to grow export crops.

The US\$3.75 billion São Francisco diversion scheme, one of the cornerstones of Lula's Program to Accelerate Growth, plans to channel water from the river, to be transported through 620 km (387 miles) of aqueducts. The project has been opposed by environmentalists, indigenous people and water experts who say most

of the water will go to the expanding metropolis of Fortaleza and agribusiness, and will not provide water for parched rural communities. According to the Indigenist Missionary Council, a Catholic indigenous rights organization, 22 indigenous groups will be impacted by the diversion.

"Old Chico," as the São Francisco River is affectionately known to the people of the region, is already suffering from the impacts of deforestation, discharge of raw domestic and industrial sewage, and large dam construction which has transformed extensive stretches of the river into a series of reservoirs. The decreased discharge at the river's mouth has caused serious erosion, resulting in the small oceanside town of Cabeço being completely washed out to sea. Critics of the diversion project have argued that the emphasis should be on restoring the São Francisco, through programs of reforestation, basic sanitation improvements, and support to small-scale fishermen and farmers. Although the government has said it plans to carry out a restoration program, its priority has been to initiate engineering works for diverting the São Francisco, and military engineers have been dispatched to begin construction. The project will eventually be built primarily by private construction companies.

Bishop Cappio has lived and worked with communities in the northeast for more than 30 years. He is staging his hunger strike from a church on the edge of the Sobradinho Dam reservoir in Bahia, which is currently at only 14% capacity. In an open letter, the



Bishop Cappio

Bishop said, "I am resuming my fast and my prayers. I will only suspend my fast when the military halts its work on the diversion project, and when the project is dropped. There is no other alternative. It is the life of the São Francisco and its people, or the death of a Brazilian citizen." A recent mass to support the Bishop drew 6,000 people.

President Lula told the press that he will not stop construction of the project, saying, "I would rather be on the side of 12 million people than on Luiz Cappio's side." ■

The author is from the Brazilian state of Bahia.

To sign a petition to President Lula on this project, see: <http://www.petitiononline.com/dluiz/petition.html>

China continued from page 10

Despite the project's high costs and questionable benefits, Chinese water expert Ma Jun has acknowledged that the emergency water shortages in the North have given the country few options. However, if the project's high "external" costs had been considered, government officials would have emphasized alternative methods for solving the water shortage in North China, says Ma.

Many argue that the government should invest in conservation and improving water management practices. "We have to now focus on conservation," said Ma. "We have the same resources and much bigger pressures from growth."

There have also been calls for increased water use efficiency for agriculture. During recent years, China's Ministry of Agriculture undertook a program to use plastic film

and mulches to reduce surface evaporation, introduce drought-resistant crops and use low-flow sprinkler systems.

Increasing water tariffs is also seen as an important step to reduce water use and encourage conservation. Currently, farmers pay for water based on the area irrigated, as opposed to the amount of water used. Changing the pricing scheme could reduce water use, especially for low-value crops like grains. However, without government programs to offset higher rates, it would likely undermine the already fragile economic viability of many farms.

The potential water savings from rainwater harvesting are enormous. Currently, over 21 million Chinese harvest rainwater to meet their domestic needs. Beijing has 55 pilot projects encouraging the use of rain-

water harvesting. Beijing's Municipal Water Authority estimates that 230 million cubic meters of rainwater could be used annually.

"Unlike rainwater harvesting in rural areas, urban rainwater utilization isn't just important for saving water," says Che Wu, a professor with the Beijing Institute of Civil Engineering and Architecture. "It's also important in abating urban flooding, groundwater depletion, and rainwater runoff pollution, as well as for improving urban ecosystems."

Rainwater harvesting presents one important low-cost tool for addressing China's water crisis. The serious shortages and extreme pollution will warrant an aggressive multi-pronged approach. The question is whether China will make decisions thoughtfully to ensure that some "solutions" do not exacerbate water problems in the future. ■

Corraling the Corps of Engineers

by Paul Harrison and Jennifer Kefer

The Mississippi River floodplain was once the largest wetland in North America. Regular overflow from the river provided essential habitat for fish and wildlife. Over time, however, the Army Corps of Engineers (“Corps”) has drained over 90% of the floodplain from the river. In the latest chapter of the Corps’ assault on the Mississippi, the Corps sought to build a \$112 million levee and pump to wall off and drain the last significant part of the floodplain that remained connected to the river in Missouri. On September 17, District Court Judge James Robertson pulled the plug on the Corps’ plans.

Judge Robertson’s decision involved two proposed flood-control projects. The first would close a quarter-mile gap in the levee around the New Madrid Floodway, a gap which fish currently use to access tens of thousands of acres of floodplain during high water. The second would install two massive pumps and widen local streams to remove water from the Floodway and the adjacent St. Johns Basin. The St. Johns Bayou-New Madrid Floodway Project would affect as many acres of wetlands as are affected by all the permits the Corps grants to private businesses each year.

The Corps claimed the project would improve production of cotton and soybeans by allowing fields to be planted earlier in some years. Yet this land is already productive after winter or spring flooding, and local landowners were unwilling to pay even one-quarter of the project costs. Moreover, the federal government is already spending millions of dollars to restore similar habitat elsewhere in the country.

The Corps sought to override the requirement that local landowners contribute local funds by promising residents that the project would “eliminate” flooding in the impoverished town of East Prairie. Enticed by this prospect, East Prairie agreed to use its federal economic development aid to pay its share for much of the project. Yet, agency documents reveal that, even with the project in place, East Prairie would continue to flood about once every ten years – as often as it does today. The Corps further conceded that it could eliminate flooding in East Prairie at about one-tenth the cost by simply improving drainage ditches from the town and building a small bypass channel for a local stream. Yet, the Corps rejected this simple proposal, insisting it was not cost-effective. Once East Prairie dedicates its limited federal aid to the project, the town

will not have any funds to implement a more effective alternative.

Fortunately, a project of this size triggers environmental safeguards, which prevent such consequences from going unnoticed. The National Environmental Policy Act requires that the Corps accurately describe environmental consequences in an environmental impact statement. The Clean Water Act requires that the Corps fully mitigate harms and select the least environmentally damaging, practical alternative.

Do the math

For years, the Corps claimed it could fully mitigate for lost habitat on tens of thousands of acres by planting trees on only 8,375 acres of already inundated cropland. This claim was based on a fundamental math error. Although the Corps’ fish biologist acknowledged the error, the agency itself did not admit its mistake for two years, only days before a critical court hearing. In fact, the Corps’ own calculations revealed that the agency would need to set aside 3-15 times more land, depending on flooding frequency. To proceed, the Corps would have to provide this additional mitigation, while barely increasing costs.

The Corps did so with a magic pen. It had always planned to leave a small area of wetlands undrained. The Corps claimed it could extend flooding on these wetlands, from an average of 20 days per year today to a maximum of 32 days, by closing levee gates after spring flooding to trap water. According to the Corps, this change would transform these wetlands into “permanent” water bodies, which were assigned a much greater habitat value under the Corps’ analysis. In fact, the new wetlands would flood only seasonally and only some years. In addition, the Corps’ “mitigation” would separate the river from the floodplain, preventing Mississippi River fish from accessing the floodplain whenever it was flooded.

The District Court condemned the Corps’ approach, stating: “The Corps has obviously worked backwards from the mitigation dollars it could afford, tweaking several of its original, fundamental understandings of its mitigation obligations” to make it appear economically viable. In short, the Court concluded, “the Corps has demonstrated its willingness to do whatever it takes to proceed with this project – change definitions, abandon core assumptions – even if it means ignoring serious environmental impacts.”

Unfortunately, the St. Johns Project is not unique. The National Academy of Sciences, Government Accountability Office (GAO), Army Inspector General, and esteemed scientists have repeatedly revealed egregious flaws and biases in many of the Corps’ environmental and economic analyses. A 2006 GAO report concluded that each of the Corps studies it considered were “fraught with errors, mistakes, and miscalculations, and used invalid assumptions and outdated data.” Due to these and other findings, in September Congress passed the Water Resources Development Act, which includes reforms to make the Corps more accountable for mitigating damages and providing for independent review of costly and controversial Corps projects.

There are signs that the Corps may pursue a new approach. For example, in coastal Louisiana and coastal Mississippi, the Corps is pursuing plans to reduce the need for large levees by restoring protective wetlands and implementing programs to storm-proof, elevate, and relocate vulnerable properties. The Corps also recently determined that continued maintenance and operation of the wetlands-destroying Mississippi River Gulf Outlet was not cost-effective, and that the channel should be closed and its environmental damage remediated.

Reforms and a new perspective may prevent the Corps from “cooking the books” in the future, but may not stop the resurrection of the St. Johns Bayou-New Madrid Floodway project. The Department of Justice filed a notice of appeal to avoid missing a deadline, although it is still not clear whether they will actively appeal the decision. Moreover, even absent an appeal, the project’s backers in Congress may try to keep it alive. Senator Kit Bond (R-MO) has attempted to circumvent the decision by inserting a provision in the Senate Energy and Water Appropriations declaring the project to be “economically justified and environmentally acceptable” and instructing the Corps to construct it regardless of whether it complies with the Clean Water Act and National Environmental Policy Act. Environmental Defense and a number of other environmental organizations have so far been successful in convincing Congress to reject Senator Bond’s rider and preserve the integrity of the judicial decision, but it remains to be seen whether this bad project will stay dead and buried. ■

The authors are with Environmental Defense.

Alternative Power Planning: 20 Questions, by Prayas Energy Group and Kalpavriksh Environment Action Group, Pune/New Delhi, 2007. Available at <http://tinyurl.com/25x527>

For years, India has been crippled by power shortages and blackouts. Acute shortages of coal and gas have left more than half of its power plants shut down or running at half capacity. To address the crisis, Indian officials are scrambling to construct conventional fossil fuel and hydropower plants and are negotiating deals to build gas pipelines with Iran and Burma.

At this critical juncture, two Indian NGOs that work on energy issues have developed a simple yet compelling booklet to help empower India's citizenry to participate in shaping the national energy future and fight for a better model of power planning. Using an easy to understand question-and-answer format, the booklet outlines the social, environmental and economic costs of large centralized power plants, and explains how conventional power planning favors large power plants at the expense of energy efficiency, conservation and renewables.

The authors argue that we need to stop thinking about energy in terms of "more consumption for more growth" and start thinking about increasing the services energy provides, such as for lighting and for generating livelihoods. Integrated resource planning considers supply-side and demand-side measures to increase energy services efficiently and at least cost. These measures include a combination of clean centralized energies, decentralized renewable energies and efficiency improvements.

As well, the "external costs" of energy development must be better accounted for. "[I]f every spurt of 'economic growth' translates into the displacement of thousands of people and irreversible damage to the environment, then our development paradigm also needs serious inspection," they state.

Alternative Power Planning gives concrete examples of how integrated resource planning can lead to big results at less cost. In the Indian state of Maharashtra, villagers reduced peak demand by 960 MW by using only essential services during peak hours, reducing theft and getting rid of wasteful appliances. An equivalently sized gas plant would have cost about US\$750 million.

Susanne Wong

Powering China's Development: The Role of Renewable Energy, by Eric Martinot and Li Junfeng, Published by Worldwatch Institute, November 2007.

China's electricity use has doubled since 2000, and it is now the second largest user of all kinds of energy in the world. This new report focuses on the green lining to this meteoric energy rise, and concludes that if China's commitment to diversify its energy supply and become a global leader in renewable energy manufacturing persists, renewable energy could provide over 30% of the nation's energy by 2050.

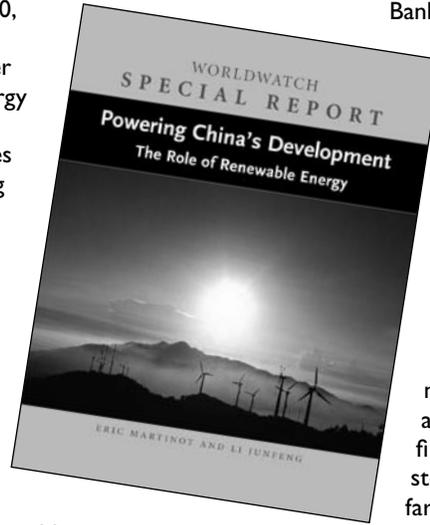
The report does little to dissect the problems associated with large hydropower dams, which comprises a significant portion of China's "renewable" commitments. But there is much to celebrate in the amazing progress China is making in developing wind, solar PV, solar thermal, and other true renewables. "China is expected to invest more than \$10 billion in new renewable energy capacity in 2007, second only to Germany," the authors state.

Worldwatch President Christopher Flavin puts China's quest for renewables into a global perspective. "If China is able to scale up its renewable energy technologies to the levels needed to have an impact domestically, and if it is able to achieve the low prices needed to succeed in the local market (known in manufacturing circles as the 'China price'), it may be virtually inevitable that these same technologies will soon be adopted on a massive scale around the globe." The next step, which many dam activists in Africa and Southeast Asia no doubt long for, would be for China to help its trading partners develop their own renewable energy capacity rather than the large dams Chinese funders and dam builders are now enabling around the globe.

A Challenging Climate, by BankTrack, December 2007. Free from www.banktrack.org.

This new publication demonstrates how private banks can play their part, and even a leadership role, in a climate-friendly future.

When it comes to the climate impacts of banks, the booklet argues, it's the banks' investments that count, not their staff travel policies. The cornerstone to becoming a climate-friendly bank, according to



BankTrack, is to develop and implement a publicly available climate change policy that spells out how the bank will reduce the climate impacts of its lending and how it plans to finance the transition to a low-carbon economy.

Minimizing the climate change impacts of bank lending is straightforward, asserts BankTrack. Ending support for new coal, oil and gas extraction and delivery and new coal-fired power plants is the first step, and would get a bank quite far. Setting clear and ambitious targets on greenhouse gas emissions for investments is another

recommendation that should help banks become climate friendly, step-by-step. Financing renewable energy projects and energy efficiency programs is the way for a bank to play their part in the necessary transition to a low-carbon economy. This guide should be required reading for all the newly hired sustainability managers at private banks around the world.

Ann-Kathrin Schneider

Raising the Bar on Big Dams: Making the Case for Dam Policy Reform at the European Investment Bank, by International Rivers and CEE Bankwatch Network (2007). Available at www.internationalrivers.org

The European Investment Bank currently has no sector policy for dams, yet in recent years has invested more than 400 million Euros in dam projects that have had huge costs for poor countries ill-equipped to resolve their problems. EIB-supported dams have pushed species to extinction, led to worsening poverty for people forced out by their huge reservoirs, permanently damaged critical natural systems that support millions, and resulted in huge debt burdens. The EIB is now investing or considering investing millions more in future problematic dams that are likely to repeat this sorry history. This report uses case studies from Africa and Laos to highlight the EIB's lack of policies that would prevent it from funding destructive dams, and recommends better analysis up-front of options to meet energy and water needs.



GABON: The government has approved a dam to be built at the site of what has been described as the most beautiful waterfall in Central Africa, to power a mine that will supply China with ore.

Kongou Falls, located in Ivindo National Park, has been chosen as the site for a hydroelectric dam to power the US\$3.5 billion Bélinga mine, now being carried out with financing from Chinese firms. China will be the sole client of the project, but is offering a package of development projects with the mine, including 560km of railroad lines, a deepwater port, and the dam.

According to a new report by the Centre for Chinese Studies, a South African research body, "This 'coalition investment project' of Chinese companies across diverse sectors is a developing trend in investment in Africa's extractive industries."

A coalition of local environmental groups called Environment Gabon laid out their concerns in a document presented to President Omar Bongo in September. The groups question why a decision on the dam appears to have been made before an environmental impact assessment was undertaken, as required by law.

The statement further calls on the Ministry of Mines to make public the project feasibility study, which indicates that about 30,000 jobs are to be created. The groups ask: "how many are reserved for the Gabonese, when we know the natural tendency for Chinese firms ... to bring in, extensively, workers from their country?"

Local environmentalists believe that approval of the dam will also lead to the declassification of Ivindo National Park, opening the door to commercial exploitation of Gabon's 12 other parks. These reserves were just created in 2002.

Currently, in contravention of Gabonese law, large contracts with Chinese companies are not discussed in Parliament, but instead are approved by a committee within the National Assembly.

US: A new agreement on water sharing will help seven Western states handle a growing water crisis in the Colorado River basin, but will do little to reverse unsustainable development practices or help restore the ailing river and its delta.

Facing the worst drought in a century and the prospect that climate change could

have long-term impacts on the Colorado River's flow, the new accord puts in place new measures to coordinate the management of the region's two largest reservoirs, Hoover Dam's Lake Mead and Glen Canyon Dam's Lake Powell. These two reservoirs have gone from nearly full to about half-empty in the past eight years.

The agreement will end a decades-old "use it or lose it" approach to water stored at Lake Mead. Previously, the three lower basin states had to abandon unused water at the end of the year; now they are encouraged to store it. This is expected to lead to new off-stream reservoirs, especially in California.

For example, one of the pact's agreements allows water managers in the Las Vegas area, which gets 90% of its water from the Colorado, to get a greater share of Lake Mead water in exchange for financing a reservoir in California. This reservoir will store river water destined for Mexico but beyond that country's entitlement by treaty. Mexico was not invited to the negotiating table for the new pact.

John Weisheit, with the Utah-based group Living Rivers, told *The New York Times* that the agreement sends the message that continued growth is more important than sensible water management. He said greater emphasis should have been placed on water conservation.

"There is more water on paper than there actually is on the landscape," he said. "They are looking at this in a way that will allow more development even though the water is not theoretically there."

IRAQ: The largest dam in Iraq is in serious danger of imminent collapse that could unleash a huge wave of water, possibly killing thousands of people and flooding two of the largest cities in the country, according to the US Army Corps of Engineers.

A 2003 report by US experts found that Mosul Dam's foundation was "leaking like a sieve and ready to collapse." More recently, the corps has labeled Mosul Dam "the most dangerous dam in the world."

"Assuming a worst-case scenario, an instantaneous failure of Mosul Dam filled to its maximum operating level could result in a flood wave 20m deep at the city of Mosul, which would result in a significant loss of life and property." As many as 500,000 people could be killed if the dam failed.

A \$27 million effort to fix the dam has

been ineffective and marred by corruption. The Corps of Engineers is recommending building a second dam downstream as a backup. But Iraq's government is resisting the costly project and says it is not necessary.

The dam has been a problem since it was completed in 1984. It was built on water-soluble gypsum, which caused seepage within months of its completion and led investigators to describe the site as "fundamentally flawed."

CHINA: In November, China announced new plans to confront the growing environmental and geological problems around the Three Gorges Dam. High priorities include improved efforts at water and sewage treatment flowing into the reservoir; creating ecological buffer zones along the reservoir's shoreline; and improving the monitoring and management of geological problems like landslides in the steep mountains above the reservoir.

Landslides in the dam area killed at least 13 people earlier this year, according to local news reports and the dam environmental agency. In response, more people will be relocated out of the reservoir area.

The dam's human and environmental costs have soared since the reservoir began filling. More than one million people have already been forcibly displaced by the project, which is the biggest resettlement in dam-building history. The project's resettlement has been plagued by corruption and serious human rights violations. Auditors reported in January that approximately \$37 million has been embezzled from project resettlement funds.

Since dam construction was finished in 2003, the water level has risen in stages, reaching 156 meters last year.

Other environmental problems associated with the dam (the world's largest to date) include massive algal blooms, damage to downstream fisheries, and soil erosion.

JAPAN: Nomura jellyfish, which can measure two meters across and weigh up to 200 kilos, have in recent years been drifting in huge swarms off the coast of Japan, reports the *Wall Street Journal*. The huge jellies rip and clog fishermen's nets and poison fish.

Until 2002, the jellies were seen only occasionally in Japanese waters. But for the past five years, they have been swarming every year into the Sea of Japan.

Scientists have various ideas about what causes the outbreak, from pollution to warming seas. Research on ocean currents suggests the jellyfish are breeding off the Chinese coast near the mouth of the Yang-

continued opposite

News Briefs continued from page 11

tze River. One theory is that pollution, perhaps linked to industrialization in China, is helping create more algae in the sea. Others believe there is a link to the Three Gorges Dam, which has been changing water flows from the Yangtze to the sea, according to the *Journal*.

A dam on the Danube between Serbia and Romania, completed in 1972, changed the river flow, after which the jellyfish population of the Black Sea exploded.

Chinese officials and scientists deny that China's activities caused the outbreaks.

PHILIPPINES: Schoolchildren in Quezon province are contributing from their own allowances to help fund a campaign against government dam projects in the Sierra Madre mountains.

Chyrralenin Suapero, a Grade 2 pupil of the Disciple Christian School in Infanta, said she contributed one-quarter of her daily school allowance to support the anti-dam campaign. "My schoolmates have also affixed their signatures. Some of them also gave portions of their allowance. And we're all willing to contribute more to stop the dams," she said.

The environmental group Task Force Sierra Madre (TFSM) has been conducting a signature drive among the residents in the region to stop the government's plan to resurrect the Laiban Dam project and construct the Kanan B-1 hydroelectric dam. Both dams would be built in an active earthquake zone.

"Before we asked the people, especially the schoolchildren, to sign the petition, we fully explained to them the contents of the document. The teachers painstakingly clarified and translated every word of the petition to their students for their full understanding," said a TFSM spokesperson.

The 113-meter-high Laiban Dam, a project of the national government and the

Manila water utility, is designed to divert water from the Kaliwa River in the Sierra Madre and augment supply to Manila.

It was supposedly part of the late dictator Ferdinand Marcos' plan of building an industrial complex in northeastern Luzon, but due to strong opposition from indigenous peoples, it was shelved. Only two diversion tunnels are left and serve as reminders of the aborted project.

A BETTER WAY

BIOFUELS: Scientists around the world are racing to turn algae into a commercially viable energy source. Some varieties of algae are as much as 50% oil, and that oil can be converted into biodiesel or jet fuel. The biggest challenge is slashing production costs.

Algae have emerged as one of the most promising sources for biofuel production, since they can convert carbon dioxide into high-density natural oil.

If the cost can be brought down, algae's advantages include growing much faster and in less space than conventional energy crops. An acre of corn can produce about 20 gallons of oil per year, according to scientists at the University of Minnesota, while an acre of algae could yield as much as 15,000 gallons of oil. Algae farms could be located almost anywhere, and don't require converting cropland from food production to energy production.

Algae can also eat pollutants from sewage and power plants. At the University of Minnesota, scientists are growing algae in sewage plant discharge because it contains fertilizer for algae farms. Algae farms could be located next to treatment plants, where they would also consume the carbon dioxide produced when sewage sludge is burned.

Oil giants Shell and Chevron recently announced plans to build algae biofuel plants. Shell said it would begin construction "immediately" on a demonstration project in Hawaii, using saltwater ponds to grow the algae.

The US Pentagon's research arm is funding research into producing jet fuel from plants, including algae. As the single largest energy consumer in the world, the Defense Department needs new, affordable sources of jet fuel. "Our definition of affordable is less than \$5 per gallon, and what we're really looking for is less than \$3 per gallon, and we believe that can be done," he said.

AFRICA: Two new renewable energy initiatives have been launched in the eastern and southern African agricultural sector, with help from the UN Environment Program. The tea and sugar industries will be the recipients of renewable energy technologies resulting in more than 80 megawatts of decentralized sustainable energy for the region.

The East African Tea Trade Association (EATTA) will begin a four-year initiative to establish six small hydropower demonstration projects in at least four member countries, generating a total of 10 MW.

The sugar industry is also preparing to produce its own electricity and heat with 60 MW of biomass cogeneration pilot projects. Kenya, Ethiopia, Malawi, Sudan, Uganda, Tanzania and Swaziland stand to benefit from these projects. The project could set the stage for the eventual installation of more than 200 MW of cogeneration capacity across the region. The pilot projects are modeled on the success of biomass cogeneration in Mauritius, where up to 40% of the country's electricity needs are met by waste by-products from the sugar industry. ■

Carbon Credits continued from page 1

of a substantial increase in the number of hydros under construction in China compared to recent years when hydro developers did not benefit from carbon credits.

The CDM is the main global carbon-trading vehicle. Its credits are expected to be widely used to help Europe and Japan meet their emission reduction commitments under the Kyoto Protocol. CDM offsets are also being proposed for use in emerging US carbon reduction schemes, including at the federal level and in California.

Many of the large dams now angling for CDM certification impose significant environmental and social damage. The mas-

sive 880 MW Campos Novos Dam in Brazil (completed in 2005, yet applied for credits in 2007) displaced 3,000 people, many without being granted the promised compensation. Local project opponents were subjected to arbitrary arrests and police violence.

Similarly, construction on Kenya's Sondu Miriu hydro project began in 1999; yet last year it applied to the CDM saying it proceeded only on the basis that it would earn income from carbon credits.

Fortunately, three-quarters of the hydros in the CDM pipeline have not yet been approved by the Executive Board, so there is still time for the Board to reject

most of these projects. International Rivers gives several recommendations for minimizing conflicts of interest, preventing projects under construction or already completed from obtaining CDM funding, and making adherence to the World Commission on Dams' social and environmental guidelines mandatory. In the longer term, the CDM desperately needs to be completely restructured or replaced. ■

"Failed Mechanism: How the CDM is subsidizing hydro developers and harming the Kyoto Protocol" can be downloaded from www.internationalrivers.org

Saddling Up Against Dams in Patagonia

by Aaron Sanger

Since the proposal to build five dams on the wild and pristine Baker and Pascua rivers in Chilean Patagonia first surfaced, local activists have undertaken unique, high-visibility activities to bring public attention to the problematic projects. In late November, in a colorful and traditional expression from the heart of this campaign, some of the potentially most-affected Chilean communities deployed a cavalcade of horseback riders to stop the dams.

The youngest of this peaceful cavalry was 11-year-old Romlo Lobillo, and the oldest was 88-year-old Cecilio Olivares. These “riders against the dams” traveled for more than 10 days on horseback between the Chilean cities of Cochrane and Coyhaique – a distance of more than 300 kilometers (180 miles). Upon their arrival in Coyhaique, they were greeted and cheered by thousands of supporters.

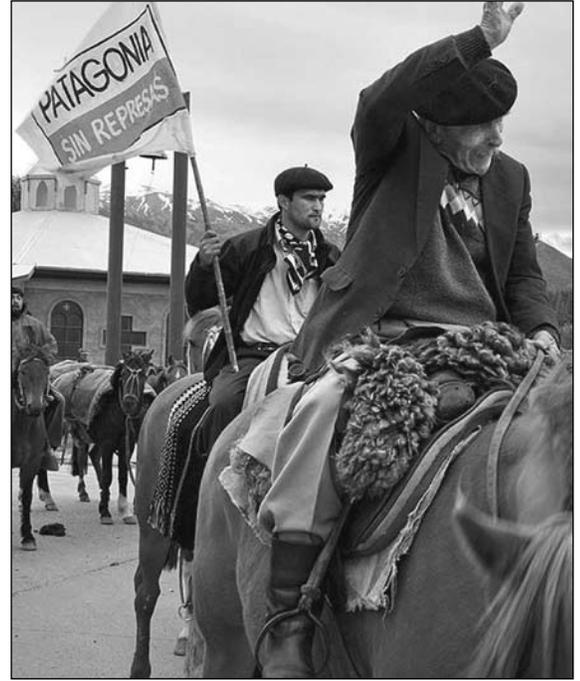
“This might be my last fight, but I am doing it to defend my land,” said Olivares.

Several Chilean lawmakers and govern-

mental officials either met or traveled with the cavalcade. Chilean activists Patricio Rodrigo, of the NGO Chile Ambiente, emphasized the importance of this governmental attention.

“It shows that national political actors, both those aligned with the [current ruling coalition] and those in the opposition, are very concerned about this project,” Rodrigo said. “If the government does not look for alternative solutions, there will be huge problems.”

The Patagonia campaign’s partners include the Chile-based Patagonia Defense Council that includes more than 30 Chilean environmental, civic, business and religious organizations; International Rivers, Greenpeace, Natural Resources Defense Council and ForestEthics. ■



Chilean riders against the dams.

IN THIS ISSUE

- Cuba:** Renewable energy is empowering the island nation. [Page 7](#)
- Ecuador:** The “water capital of the world” is facing a water crisis, and dams are at the heart of the conflict. [Page 8](#)
- China:** The government has grandiose plans to engineer its way out of a looming water crisis. [Page 10](#)
- Brazil:** A bishop fasts to protect the São Francisco River. [Page 11](#)
- In Print:** Reviews of noteworthy new publications. [Page 12](#)
- US:** Fighting for the Mississippi. [Page 13](#)
- Climate Change:** Hydro projects are garnering carbon credits based on a “foundation of lies.” [Page 1](#)
- Commentary:** The World Bank must address its past legacy of dam building. [Page 2](#)
- Uganda:** Will a new dam on the Nile solve Uganda’s energy crisis? [Page 3](#)
- Pakistan:** Looking for justice on a World Bank water project. [Page 4](#)
- Panama:** A series of proposed dams threatens the biologically rich La Amistad International Park and indigenous peoples. [Page 6](#)

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