Stop Press

San Roque Dam Power Purchase Agreement a Bad Deal

By Aviva Imhof

A new independent review of the US$1.1 billion San Roque dam project in the Philippines reveals that the cost of the project's power is hugely inflated, and will be a bad deal for Philippine electricity consumers and taxpayers.

The IRN-commissioned review, conducted by Dr. Wayne White of Foresight Associates in the US, shows that the National Power Corporation will be paying the San Roque Power Corporation (SRPC) between 13 to 21 pesos (US$0.32 to 0.51) per kilowatt hour of electricity purchased. By contrast, in 1998 the average rate charged to Philippine consumers was well under 3 pesos per kilowatt hour.

The review, which analyzed the project's Power Purchase Agreement (PPA), also reveals that the SRPC stands to gain massive profits from the project whether or not it successfully produces power. SRPC is a private consortium including Sithe Energies of New York, and Marubeni and Kansai Electric Company of Japan.

The National Power Corporation has agreed to pay US$10 million per month to SRPC regardless of whether there is sufficient water available to generate power. The PPA forces the National Power Corporation to buy San Roque power even if it doesn't need it. Under this arrangement, the Philippine government carries a large proportion of the project risk and liabilities, including hydrological risk (such as drought-induced power shortages) and market risk, by guaranteeing power purchases even if capacity is not needed. The PPA also frees the developer from responsibility for social and environmental risks and costs.

Dr. White states that "despite private sector participation, the project is a public subsidized construction contract which will compensate the developer during project life even in the event of low generation and/or absence of a market for the produced power." He concludes that "not only does the private sector participation not demonstrate economic viability, the reliance on subsidy ... suggest[s] that the project is not economically feasible in its own right."

Joan Carling, Secretary-General of the Cordillera People's Alliance, says, "Under this Power Purchase Agreement, the SRPC has everything to gain and nothing to lose. This agreement is a clear example of how foreign investors in the Philippines are assured of mega-profits while the Filipino people are burdened with the economic, social, and environmental costs of power projects. The government should immediately cancel the PPA.

Although around 40 percent of the project's construction costs have already been spent, the dam is just four percent complete. NGOs and communities affected by the project are campaigning for the Philippine government to cancel the project, and for the Japan Bank for International Cooperation to immediately stop further loan disbursements.

The 345 megawatt San Roque Dam is to be located on the lower Agno River in the Cordillera region of Luzon island. The project will have impacts on thousands of indigenous Ibaloi people. ■

The report is available at www.irn.org

IN THIS ISSUE

International Rivers Network
1847 Berkeley Way
Berkeley, CA 94703, U.S.A.

Address Correction Requested

Non-Profit Org.
US POSTAGE
PAID
Berkeley, CA 94703
Permit No. 126

World Rivers Review
Volume 15, Number 3 / June 2000
Published by International Rivers Network

Thai Villagers Act to Decommission Dams

by Aviva Imhof

The movement to decommission Pak Mun and Rasi Salai dams on the Mun River in Thailand has gathered momentum in recent weeks. Villagers have taken over both dams and are demanding that the gates be permanently opened.

While both protests have been ongoing for months, events have recently escalated, reflecting the villagers' mounting frustration with the lack of an official response to their pleas. On May 15, more than 1,000 villagers occupied the Pak Mun Dam crest and fish ladder and intend to stay until the dam's gates are opened. At Rasi Salai, more than 200 people remain perched in make-shift huts as the waters of reservoir rise around them. They have also vowed not to move until the dam's gates are opened. Others are starting to remove the dam themselves.

The government has issued arrest warrants for 25 village leaders, and the protestors fear violent repression from the police. A national and international campaign is mounting to pressure the government to remain non-violent and to respect the demands of the villagers.

Photo: xxxxxxxx

Pak Mun villagers in the protest camp at the dam.

Rasi Salai

Last August, people affected by Rasi Salai Dam established Mae Mun Man Yuen 2 protest camp in the reservoir area. In late May, the reservoir's rising waters submerged all houses except one large hut, where 200 people remained isolated from dry land.

Chainarong Srettachau, Director of Thai NGO South-East Asia Rivers Network, said, "There is no good reason for the Rasi Salai Dam's gates to remain closed. The project is currently useless and likely to remain so. The reservoir sits on top of a huge salt dome and its water is too salty for irrigation. Because of this, Thailand's Office of Environmental Policy and Planning has refused permission for the dam's irrigation canals to be built. The dam's gates should be opened immediately."

More than 900 villagers have occupied the dam's crest since May 19, 2000. Having given repeated warnings to the government that they would start to take the dam down themselves if their demands continued to be ignored, in early June about 500 villagers started removing rocks from the road that forms the southern part of the dam.

The protesting villagers said they wanted to tunnel through the two-lane road to reclaim the Mun River. The road was built over the old course of the river which was diverted in 1993 to flow through the dam spillways.

"The road and the dam have changed the Mun River channel," said Chalermchai Champhapan, one of the protestors. "The tunneling would return the river to its old course. Nature would be restored to the Mun River." The villagers' demands are that the dam's gates be permanently opened, the river and the freshwater swamp forest be restored and the water salinization problems be solved.

Pak Mun

Two hundred kilometers downstream, frustrated from 14 months of demonstration at the Pak Mun dam site with little response from the government, more than 1,000 villagers have taken over the dam and fish ladder. The takeover was timed to coincide with the commencement of the fish migration season.

Thongcharoen Srihadham, a village leader, said, "Our experience has proved that the Pak Mun Dam has destroyed the river's fertility. It has also destroyed the peaceful livelihood of our community. The fish ladder which was supposed to solve the dam's damage to fish breeding, could not be a substitute for the natural river. Hence, we are demanding that the Pak Mun Dam's gate be

continued on page 11

COMMENTARY

Wall Street Wake-up Call

In a world of market-driven development, the power and resources of Wall Street banks largely determines the development paths of the global South. Environmental and human rights activists are embarking on new strategies to discourage the financing of destructive projects.

In the past five years, private financial flows to developing countries increased 700 percent, reaching a peak of US$212 billion in 1996. The flow of public funds remained stable at about $50 billion. Even at the lowest point in December 1998, private capital still exceeded public capital by 50 percent. The World Bank and International Monetary Fund estimate that private flows will grow in coming years.

Years of persistence and leadership by NGOs have caused the international development banks to enact processes of disclosure and environmental and social criteria. The time has come for privately funded investment banks to start doing the same.

The world's most destructive river project, the Three Gorges Dam in China, has been a catalyst for shareholder action on environmental and social criteria. Ignoring warnings by critics of the massive dam, which will displace up to 1.9 million people and have wide-ranging environmental and public health impacts, American investment banks have been eager to help finance the deal through the China Development Bank (CDB). A year ago, several major banks, including Chase Manhattan Securities and Morgan Stanley Dean Witter, underwrote a $500 million bond offering for the CDB. An estimated 65 percent of the Three Gorges Dam budget is financed through loans by the CDB. The CDB has also funded the problematic Ertan and Xialoangdi dams and two nuclear power operations.

Although the Three Gorges Dam is so odious that both the World Bank and US Export-Import Bank have refused to support it, the role of American investment banks in Three Gorges should come as no surprise. For the past century, they have earned their money the old-fashioned way: with little public scrutiny of their effect on society and the environment.

With the investment banking community now widely owned by shareholders and therefore accountable to them, however, one thing is certain: going public means these banks will be scrutinized for the social and ecological impacts of their financing.

Following its CDB bond underwriting, Chase Manhattan received a shareholder resolution sponsored by Trillium Asset Management of Boston and moved by IRN, which called on the company to prepare a report on its environmental and social impacts and how environmental and social criteria could be integrated into the company's underwriting practices. At Chase's annual shareholders' meeting this past May, IRN encouraged the company's CEO to consider weighing the profits from the bond underwriting against the damage to its reputation.

Although Chase's board of directors voted against adopting the resolution, they did ask for meetings with Trillium Asset Management and environmental groups. It's too early to say if Chase's newly opened door is due to a sudden surge of responsibility or the fact that their credit card operations are the largest in the country, and vulnerable to bad publicity. Chase might realize that it cannot simply ignore the environmental and social impacts of its lending for long.

Large institutional investors, including state pension funds and university endowments, have long been active in supporting socially and environmentally responsible investing, shareholder activism and corporate accountability initiatives. Environmental groups across the US are also educating their millions of members and supporters about the choices financial service consumers have in trying to promote economic and environmental justice.

It is unlikely there will be significant changes in the type of projects the banks choose to finance until a sizable threat to their bottom line forces them to make better choices. One example of such a campaign focuses Morgan Stanley Dean Witter, which played a lead role in underwriting CDB bonds and was reluctant to have meaningful dialogue with concerned groups. In April, IRN launched a consumer boycott of the company's Discover Card credit services (See www.floodwallstreet.org).

The investment banks are quick to take credit for industrial growth in the US. Having access to vast pools of capital in the global economy, these banks also have a public obligation to take responsibility for their role in shaping global development. As the proponents and beneficiaries of the free flowing global economy, the time is now for investment banks to incorporate meaningful environmental and social criteria into their lending and underwriting practices.

Doris Shen

World Rivers Review

Volume 15, Number 3

ISSN Number 0890 6211

Editor: Lori Pottinger

Design/Production: Jeanette Madden

Printing: West Coast Print Center

Contact Information:
International Rivers Network
1847 Berkeley Way
Berkeley, CA 94703 USA
Tel: (510) 848-1155
Fax: (510) 848-1008
E-mail: irn@irn.org
World Wide Web: **http://www.irn.org**

International Rivers Network is an affiliate organization of Friends of the Earth International.

Chinese Engineers Petition Government to Delay Three Gorges Dam

by Doris Shen

In March, a group of 53 Chinese senior engineers and academics filed an urgent petition to China's leaders to rethink plans for the Three Gorges Dam.

The petition warns that filling the reservoir as planned could have dire consequences for hundreds of thousands of people living in the Three Gorges area and for navigation on the Yangtze River.

Submitted on March 3, 2000, the petition was addressed to Premier Zhu Rongji, President Jiang Zemin, National People's Congress Chairman Li Peng, and Li Ruihan, Chairman of the Chinese People's Political Consultative Conference. About one-third of the signatories are former members of the Chinese People's Political Consultative Conference, the official political advisory body to the state government.

> ***"From the beginning, the Three Gorges Dam has been a political project, promoted only by those who would have personal financial and political gain."***
> Dai Qing

The petition, written by Lu Qinkan, a leading hydrologist who worked on the dam's feasibility study, calls for a return to the project's original plan of delaying reservoir filling so that experts would have time to monitor sediment buildup and to determine if higher water levels are viable. The petitioners argue that this would also provide some relief for resettlement authorities, who are faced with the costly and difficult task of resettling up to 1.9 million people out of the Three Gorges region. Maintaining the Three Gorges reservoir at 156 meters would reduce the number of people who have to be moved by an estimated 520,000.

In the original plan, approved by the National People's Congress in 1992, engineers aimed to keep water levels behind the Three Gorges Dam at 156 meters for the first 10 years of operation. During this time, experts could evaluate the impact of sedimentation on navigation and ports at the reservoir's uppermost end. If feasible, the water level would then be raised to a final operating level of 175 meters between the dam's 17th and 20th year of operation. In 1997, dam officials changed the plans to maximize the dam's power output more quickly. The water level is currently scheduled to rise to 175 meters in the sixth year of operation.

Three Gorges Dam authorities have announced that two more dams will be built on Yangtze tributaries upstream of the Three Gorges reservoir specifically to trap the inflow of sediment. Sedimination at the upper end of the reservoir is expected to obstruct commercial navigation. The experts' petition claims the proposed dams will have no impact on sedimentation at the reservoir's upper end.

Ongoing Corruption

The petition comes as yet another corruption scandal engulfs the dam. The Hong Kong *South China Morning Post* revealed on May 3 that the head official at the Three Gorges Economic Development Corporation (TGEDC) has embezzled about US$125 million. The TGEDC, a subsidiary of the Three Gorges Project Construction Committee, and supervised by the Three Gorges Resettlement Bureau, went bankrupt in 1999. The company, which employed 2,600 people, has ceased operations.

This news comes on the heels of a government audit that revealed resettlement officials embezzled about $57.7 million. Embezzled money was used to speculate on stocks, real estate and was transferred to personal accounts.

Earlier this year, the *China Business Times* reported that Yuan Guolin, who until January 2000 was the deputy general manager of the China Three Gorges Project Corporation, the company responsible for construction and administration of the dam, said the corporation would not be floated on the stock market because of its economic and technical problems. Yuan also said that a review was needed on whether the project could sell its output after it began generation in 2003.

Photo: Pat Morrow

Carrying water near the Three Gorges

International environmental and human rights groups have targeted global investment banks including Morgan Stanley Dean Witter, Salomon Smith Barney of Citigroup, Chase Manhattan, CS First Boston and Merrill Lynch for their participation in underwriting China Development Bank bonds in January 1997 and May 1999 (see "Commentary," opposite). China Development Bank lists the Three Gorges Dam as its top loan commitment.

"From the beginning, the Three Gorges Dam has been a political project, promoted only by those who would have personal financial and political gain," says Dai Qing, a respected journalist in Beijing and the project's most outspoken critic. Dai Qing's 1989 publication of *Yangtze! Yangtze!*, a collection of essays that promoted debate of the dam, resulted in Dai being imprisoned for 11 months. Distribution of *Yangtze! Yangtze!* and other criticism of the project's impacts is not allowed in China. Public access to the state-conducted environmental and social impact assessments is not possible. ■

Lesotho Resettlers Demand Improvements in Resettlement Package

by Transformation Resource Centre

People due to be resettled by the second dam in the giant Lesotho Highlands Water Project (LHWP) in southern Africa have issued a declaration to project authorities which, among other things, demands compensation before they move from their mountain communities to Lesotho's lowlands, and final approval of resettlement sites. The demands are in response to advice given them by their former neighbors who were resettled from the area in 1998 for the first round of construction on Mohale Dam.

Mohale Dam, which is the second of four LHWP dams to deliver water to South Africa's industrial heartland, will displace more than 2,000 people before its scheduled completion in 2001. Nearly 5,000 hectares of valuable cropland will be drowned by the 22.8km reservoir. This represents a significant hardship to affected people because, due to the lack of available land in Lesotho, they will be made dependent on cash compensation. The most important cash crop in the area is marijuana, which is grown by 70 percent of affected households. Because the plant is illegal in Lesotho, it is not included in the compensation policy. This means most household incomes will be reduced by 60-90 percent.

Concerned about their predicament, representatives of soon-to-be-resettled villages met with people who were resettled from the Mohale area two years ago. They wanted to hear their former neighbors' experiences of resettlement. During the visits, the already resettled people spoke of late and missing compensation payments, the lack of clean water supplies, unfulfilled promises of job training, crowded pastures, and hostility from lowland host communities. They advised the visitors to demand that all promises related to resettlement be fulfilled before they are moved out of their homes. "If you wait until after you've been moved," they warned, "you will find you have no more power than a toothless dog."

Following the visits, the concerned villages sent representatives to an NGO-convened workshop where they discussed their fears about the resettlement process. They then drew up a declaration which addressed these concerns. The declaration's 15 demands, in addition to that of compensation prior to resettlement, include a request that compensation be given in a lump sum payment rather than stretched out piecemeal over a period of 50 years. "We want transparency," the declaration reads, "We want to see how much money we have been compensated and how much interest that money is earning ... We want to be in charge of our own assets and to invest our money as we see fit."

They also demand that project authorities respect their cultural norms by resettling ash heaps (used for medicinal purposes and as burial sites for stillborn children) and by granting them access to grave sites which lie above the inundation zone. They also want to give final approval to the proposed resettlement sites. "We must be provided an opportunity before resettlement to inspect the resettlement sites to see if basic necessities are in place, and if we are satisfied with moving there," they wrote. The community representatives then signed the declaration and submitted it to the project authorities.

The document has sparked controversy in the project areas. The Lesotho Highlands Development Authority (LHDA) and the World Bank, which is funding the project's resettlement, have accused local NGOs of

continued on page 13

Lethal Weapon: Lesotho Dam Gets Guns

by Transformation Resource Centre

People living on the banks of Katse Dam's reservoir in Lesotho recently reported that what appear to be three camouflaged guns had been mounted at the Katse intake tower. Informants at the dam authority, speaking on condition of anonymity, claim they are indeed guns, which will be operated by remote cameras. They said they are mounted on swivelling turrets, allowing them to fire on anything moving on the ground or in the air. The informants further reported that the South African government is not satisfied with security at Katse Dam following the political unrest of September 1998 during which 17 Lesotho Defence Force soldiers and two South African soldiers were killed in fighting near the dam. Katse was the first dam built in the LHWP and was reportedly targeted for potential sabotage during the 1998 political unrest.

Photo: TRC

These guns mysteriously appeared near Katse Dam.

It is not clear which of the two governments is responsible for the emplacements. There is also concern about who actually is controlling the equipment, and who will be responsible for deciding on its use. One informant claims they are the ultimate responsibility of the Lesotho government but are actually operated by a private security company with offices in both Lesotho and South Africa. When approached for comment in April, the Principal Secretary in Lesotho's Ministry of Defence, Matsepo Ramakoae, at first said she had been told the emplacements are actually cameras, but later promised to investigate the matter. At press time, the ministry said there was no further information on the installations.

Meanwhile, local communities are both frightened and angered by the development. "Who is controlling these guns?" asked one, "How do I know that it will be safe to herd my animals in front of them?" Another said, "This is colonisation. South Africa is putting its guns here to take our water."

TRC continues to investigate the matter and to press the Ministry of Defence and other weapons experts to share the truth about these emplacements. The citizens who feel threatened by them certainly have a right to know why the equipment has been placed beside the Katse road; for what purpose it is expected to be used; and who controls its use. ■

Too Many Dams, Too Little Water

Lesotho's Rivers Could Become "Waste Water Drains"

by Transformation Resource Centre

Rivers affected by the Lesotho Highlands Water Project (LHWP) could deteriorate to "something akin to waste-water drains" if Lesotho delivers as much water to South Africa as the original treaty requires. This is according to the final draft of the Instream Flow Requirements (IFR) study conducted by Metsi Consultants at the request of the Lesotho Highlands Development Authority (LHDA). The report is intended to inform planners' decisions about the proposed Mashai Dam, the project's third dam, which is currently the subject of treaty negotiations between South Africa and Lesotho.

The IFR, heralded by experts as being one of the most comprehensive ever undertaken, attempts to predict the long-term impacts of reduced river flows caused by the construction of Katse, Mohale, Matsoku, and Mashai dams. It also recommends compensation and mitigation measures.

Compensation and mitigation will be a truly formidable task, according to the report's authors. Adherence to the treaty requirements results in 96 percent reductions in river flow below Katse Dam and 57 percent reductions where the Senqu River flows out of Lesotho. This translates into "critically severe" biophysical and social impacts that will cost between US$2.8-$4.2 million annually to address. Residents living immediately below the completed Katse Dam already report increased numbers of aquatic insect pests, and skin rashes after crossing the low-flowing Malibamatso River

Ecological Mayhem

Dams tamper with a river's complicated changes between low flow and flood as well as its delicate chemical composition. These changes can trigger a chain reaction of consequences for the ecosystem, which in turn impact communities that depend on these natural systems. For example, a dam may prevent a flood that would have triggered the emergence of insects that would in turn have fed fish that would have provided essential protein to children living along a riverbank. Katse, Mohale, and Mashai dams will only allow floods on the average of once in a 20-year period (rather than the norm of once a year). Katse affects the Malibamatso River, Mohale affects the Senqunyane, and Mashai affects the Senqu. The Malibamatso and the Senqunyane flow into the Senqu.

According to the report, the dams' impact "will manifest as strongly deteriorating physical and chemical conditions" and major biological changes. They predict dense algal growths throughout the system, which can be toxic to fish; encroachment of exotic plants (at the expense of native plants and the species they support); moderate to critically severe increases of insect pests which prey on livestock; reductions in most fish populations, with some species like the Maloti minnow and trout reaching the point of extinction; declines in waterfowl, and an explosion in rodent populations, which could affect crops along the riverbanks.

These changes to the ecosystem will have major social impacts. Many fish and wild vegetable species will be reduced by over 50 percent. Social studies have shown that when species decrease to this extent, communities living near the river no longer make the effort to harvest them (it is often a long, steep hike into and out of the river valley). Therefore, a reduction of 50 percent is effectively a loss of 100 percent of these resources to riparian villages – a serious situation given the already low nutrition levels in these communities. The low flows will also increase levels of pollutants in the river, causing critically severe increases of diarrhoeal diseases like giardia. Skin and eye diseases are also expected to increase sharply, the authors state. The cost of cash compensation for lost resources and mitigation against public and animal health problems via provision of water supply systems, vaccinations, and VIP latrines will reach nearly $4.28 million annually.

In closing, the report's authors plead for recognition of Lesotho's rivers as "living museums, containing species that could help unlock the ancient history of Africa" and as "places of great beauty and spiritual renewal" and ask that water resource decision-makers seriously consider these facts before making further developments in the system.

The draft IFR's dire warnings put Lesotho in a difficult position as it continues to renegotiate the LHWP Treaty with South Africa. If Lesotho decides to stick to the treaty requirements by building Mashai Dam and delivering 50.8 cubic meters/second to South Africa, the resulting compensation costs may render the venture infeasible to South Africa. If Lesotho decides to allow more water to flow downstream through its dams, less water will be available to sell, again reducing the odds that the project will be cost effective. Either way, South Africa will no doubt choose the least-cost water supply, which may not be more dams in Lesotho.

The consultants present other scenarios that would cause less damage to the ecosystem and the humans living in it. One of these scenarios would allow 38 cubic metres per second of water to flow to South Africa while costing less than $571,000 annually to compensate for resource losses. The question is whether the construction of Mashai Dam will remain cost effective to the South Africans if it means less water for Gauteng along with high pumping and resettlement costs.

Kwame Oduru, General Manager for LHDA's Environmental and Social Services Group, said, "We are committed to finding an IFR scenario that will balance economic and technical feasibility with environmental acceptability."

The next step in this process is for an LHDA-appointed independent expert panel, the World Bank, and the European Investment Bank will review the draft document first. ■

Corruption Trial Begins

The criminal bribery case involving the former chief executive of the Lesotho Highlands Water Project and several of the world's largest international dam-building firms began on June 5 in Lesotho's capital, Maseru.

The charges relate to the now-complete Katse Dam. Several companies, including Acres International of Canada, Balfour Beatty and Sir Alexander Gibb of the UK, Impregilo of Italy, ABB (Swiss-Swedish), Laymeyer of Germany, and Sogreah of France, are accused of paying a total of US$2 million in bribes to the then chief executive of the project. Many of the accused firms continue to work on the project's second dam.

Although most of the companies have denied the charges, the *Financial Times* reported on June 5 that the prosecution is confident it has a strong case: "We would not show up in court if we did not feel we had an ace up our sleeve," one prosecution source told the *FT*. "If the companies involved say they have no recollection of the events, we will show them the payment slips and the bank records. Then I think they will remember."

Neither Cheap Nor Clean

The True Costs of Hydro Add Up to a Bad Deal

by Patrick McCully

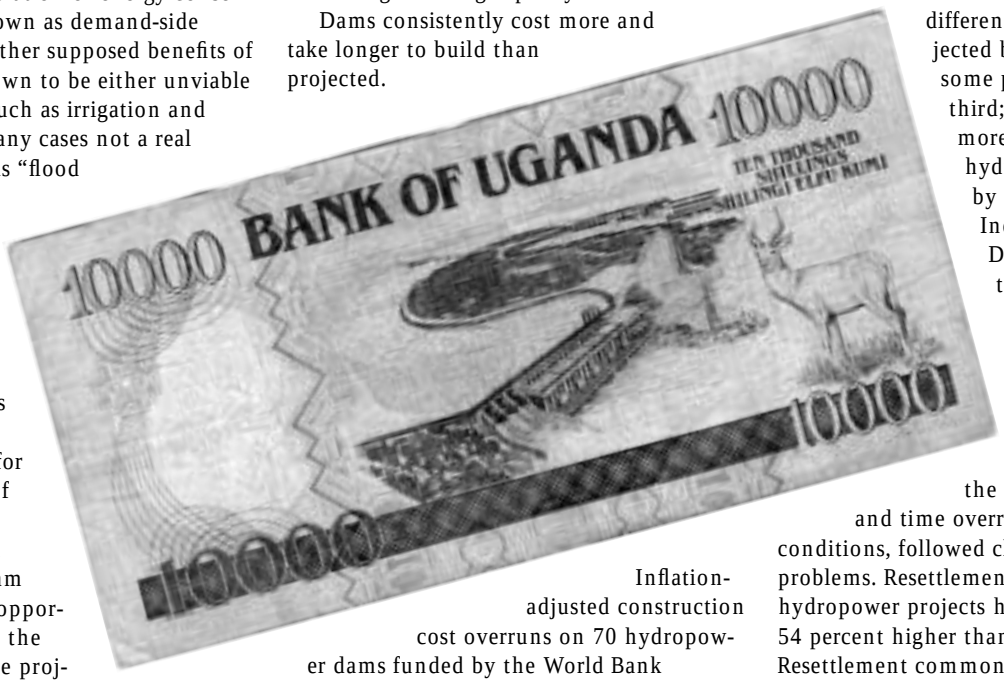
For years, large dams were promoted on the grounds that they provided "cheap" hydropower. Today, the argument that hydro is cheap is no longer tenable. The costs and poor performance of large dams were in the past largely concealed by the public agencies which built and operated the projects. But the true risks and costs of dams are being forced into the open due to increasing public scrutiny and attempts to attract private investors to existing and new projects.

It is now clear that hydropower can only rarely compete economically with other forms of power generation or energy conservation measures known as demand-side management. The other supposed benefits of dams have been shown to be either unviable without subsidies (such as irrigation and navigation) or in many cases not a real benefit at all (such as "flood control" which has wiped out ecologically beneficial annual floods while frequently making extreme flood events more destructive). There is therefore little economic justification for further promotion of dam building.

In the early- and mid-1990s, some dam believers saw great opportunities for dams in the new world of private project finance. A rash of new financing structures known by their catchy acronyms – BOTs, BOOs, BOOTs and others – offered creative techniques for raising private dam finance. At the start of this new decade, however, it is apparent that privatization has been a massive setback to the dam industry. Private investors have looked at dams and found high construction costs, serious operational problems such as sedimentation and vulnerability to droughts and floods, and long delays due to public opposition. The work of the World Commission on Dams, due to release its final report at the end of this year, is also likely to increase dam builders' costs through recommending stricter standards on public consultation and project planning and monitoring.

The combined impact of the inherent drawbacks of large dams and the competitiveness of other forms of electricity generation (especially natural gas but also wind power) means that only a tiny fraction of the privately funded power plants being developed around the world are dams. According to a recent World Bank-funded study, only 2.5 percent of generating capacity under development by the private sector is hydropower. By comparison, hydro makes up 20 percent of the world's existing installed generating capacity.

Dams consistently cost more and take longer to build than projected.



Inflation-adjusted construction cost overruns on 70 hydropower dams funded by the World Bank between the 1960s and early 1990s averaged 30 percent, almost three times higher than the average cost overruns on a similar number of Bank-financed thermal plants. In general, the larger a hydro project is, the larger its construction cost overrun in percentage terms. In the western US, according to Daniel Beard, former Commissioner of the Bureau of Reclamation, a major federal dam building agency, "the actual total costs of a completed [water] project exceed the original estimated costs, including inflation, by at least 50 percent." Furthermore, Beard adds, "project benefits were often never realized."

Cost overruns are particularly damaging for the economics of dams because while their operating costs are low compared to thermal plants, their construction costs are extremely high. According to John Besant-Jones, principal energy economist at the World Bank, capital costs represent around 80 percent of the total life-time cost of hydrodams (excluding, as dam cost calculations always do, decommissioning costs). By comparison, capital costs represent around half the life-time costs of coal-fired plants.

Time overruns can also have a disastrous effect on project economics by delaying the time from which revenues from electricity sales start to flow. The World Bank notes that a one-year delay in revenue earning will reduce the difference between the projected benefits and costs of some projects by almost a third; a two-year delay, by more than half. Forty-nine hydro projects reviewed by the World Bank's Industry and Energy Department in 1990 took on average 14 months longer to build than the pre-construction estimate.

According to the World Bank, the primary cause of cost and time overruns is poor geological conditions, followed closely by resettlement problems. Resettlement costs in World Bank hydropower projects have been on average 54 percent higher than original estimates. Resettlement commonly accounts for around a tenth of total costs (before overruns are taken into account) and can reach more than a third of the total construction cost of dams which displace a large number of people or which involve relatively high compensation payments.

The dam industry's economic woes are compounded by a clear trend of increasing real costs due to the fact that the most economic dam sites tend to get used first. And while hydropower's costs are steadily increasing, those of its gas, solar and windpower competitors are tumbling. Between 1965 and 1990, according to a World Bank study, the average cost of building hydrodams rose at an inflation-adjusted rate of nearly four per-

continued opposite

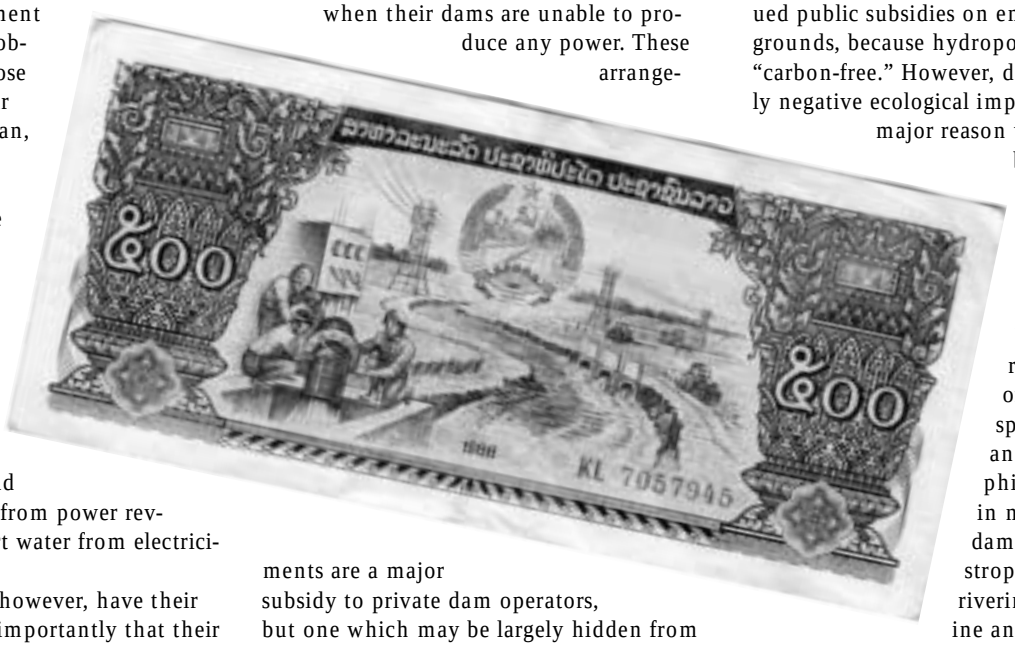
cent per year. While around three-quarters of this cost increase was due to construction costs in general rising faster than inflation, the remaining increase was thought to be due to "site depletion."

Most analysts working on private sector project finance appear to agree that very few dams will be built without considerable public sector support, and those which do get built in the private sector will tend to be small- to medium-size run-of-river hydro dams. Private funders are loath to take on larger dams with reservoirs because of their increased costs and greater probability of resettlement and environmental problems. Large multipurpose dams like India's Sardar Sarovar or Egypt's Aswan, once the pride of the dam industry, have extremely little chance of being built by private investors without major public subsidies. This is because of their huge construction costs, and because their non-power components such as irrigation would require large subsidies from power revenues and would divert water from electricity-generating turbines.

Run-of-river dams, however, have their own drawbacks, most importantly that their low storage capacity seriously reduces their power-generation ability during dry seasons and droughts. Run-of-river dams are also less able to produce the supposed ancillary benefits of storage dams such as water supply, flood control and reservoir fisheries. Promoters have historically used these supposed benefits to help justify projects which might not be supported by the public on electricity generation grounds alone.

One of the main issues which concerns private investors considering dam projects is "hydrological risk." This refers to the possibility that low rainfall periods will reduce power generation and thus revenues. In recent years many countries have suffered major reductions in hydropower generation because of droughts, including Vietnam, Thailand, Guatemala, Chile, Ghana, Kenya, Sri Lanka, Zambia, Zimbabwe, Ecuador, Albania and Colombia. Global climate change is very likely to increase rainfall variability and unpredictability in future, meaning that hydrological risks will increase.

Hydrological consultants are of course supposed to account for likely future rainfall and runoff patterns in their feasibility studies. Before the current wave of privatization, dam promoters appear to have believed in the predictive powers of hydrologists and "hydrological risks" were rarely if ever referred to. Because private investors are concerned with getting their money back, however, analysts have looked at the generating records of hydroplants and found that they have regularly produced less power than predicted. Private investors are now attempting to pass hydrological risks onto the power utilities which buy their power through deals whereby dam operators get paid even when their dams are unable to produce any power. These arrangements are a major subsidy to private dam operators, but one which may be largely hidden from the public.



While the dam industry has found it extremely difficult to find private investors to build new dam projects, they have been more successful in selling off existing state-owned dams to private buyers, especially in Latin America where numerous dams have been privatized. A major reason why existing dams (or in some cases partly built dams) have appeared attractive to private buyers is that they have normally been sold at bargain prices which were set to ensure a successful sale rather than to reflect the actual costs of building the dams. For example, estimates for the amount spent on the huge (and still unfinished) Yacyretá Dam on the border between Argentina and Paraguay vary, but $11.5 billion is commonly cited. The long-running debate on privatizing the dam, however, is based on the possibility of selling it for perhaps $1 billion.

The keenness of newly deregulated and privatized power companies to buy up dams around the world may soon begin to wane as they gain experience in actually operating their new purchases. The consortium of Chilean, Canadian and US companies which bought a 61 percent share in the 1,400 MW Piedra del Aguila hydropower project from the Argentinean government is presumably regretting its purchase. According to the journal *International Water Power and Dam Construction*, cash flow problems resulting from factors including drought and low power prices forced the consortium to default twice on payments on its $423m debt in the first half of 1999.

Faced with these economic problems and declining public support, dam promoters are claiming that dam building deserves continued public subsidies on environmental grounds, because hydropower is "clean" and "carbon-free." However, dams have massively negative ecological impacts and are a major reason why freshwater biodiversity is under severe threat around the world (according to a 1999 World Wildlife Fund report, 51 percent of freshwater species, from fish and frogs to river dolphins, are declining in numbers). Because dams have such catastrophic impacts on riverine, riparian, estuarine and even marine ecosystems, hydropower cannot possibly be considered "clean." It is extremely destructive.

Dams are not "carbon-free" as their promoters like to claim. Reservoirs emit greenhouse gases from rotting vegetation. In some cases the amount of gases emitted may be considerably less than equivalent thermal generation, in other cases not. However the huge range of negative impacts of dams dictate that dams, just like nukes, should not be viewed as part of the solution to global warming. This is especially the case because so many other more socially and environmentally beneficial and cost-effective measures exist to reduce global warming such as demand-side management, renewables, reducing car use and reversing deforestation. Limited public funds aimed at mitigating climate change should be targeted at these beneficial investments rather than at the further destruction of rivers. ■

Dam Money: *Examples of currency featuring dams from the IRN collection. National pride often plays a big role in dam decisions.*

There Goes the

Will We Squander Our Clean-

by Lori Pottinger

Dan Kammen in Kenya.

Dan Kammen is a physicist, environmentalist, and associate professor in the Energy and Resources Group at the University of California at Berkeley, and director of its Renewable and Appropriate Energy Laboratory. He has written extensively on the opportunities and obstacles to the dissemination of clean energy systems. Here he talks about what we can do to support the adoption of renewable energy technologies.

WRR: *You have written, "Small-scale energy systems offer viable alternatives to carbon-intensive energy sources and could further sustainable development and improve human health … While small-scale, decentralized systems can play a significant role in meeting the combined challenges of development and environmental conservation, there has been a general pattern of neglect of and underinvestment in such systems." What are some barriers to improving the dissemination of these technologies?*

DK: The so-called "uneven playing" field is the fundamental obstacle to our moving to a future built on clean energy sources. There are huge subsidies built in for existing technologies. Renewables – solar, wind, and sustainably grown and harvested biomass – don't have these subsidies. Economic comparisons of emerging techologies never take these biases into account. If you add to the cost of coal-fired energy the cost of the US railroad system that made its widespread use possible, coal looks much more expensive. If you look at nuclear energy, the true costs only appear when you figure in the government's integrated investment. This includes the whole R&D infrastructure given to this industry by Cold War-era military scientists, the federal investment in reprocessing nuclear fuel, and the investment in storage of nuclear waste. This huge amount of "shadow support" makes the economic, technological and political playing field so unfair. In the context of competing against these entrenched systems, it is remarkable that renewables have done as well as they have. (See page 6 for more on the hidden costs of hydro.)

It's also the case that any new technology will be expensive on a cost-per-kilowatt basis. That is because you've invested in research, but haven't generated many kilowatts yet, so the new energy source looks expensive compared to tried-and-true systems. You divide the number of kWh by cost per unit, and if there aren't many units yet, you get a big number. However, the more of any technology that you sell, the price goes down; and it goes down in a remarkably uniform way. For every doubling of production, the price goes down 20 percent. It's called the learning curve, and it's due to improvements in manufacturing, distribution, and more people getting involved in the industry. This is true of almost anything that you can manufacture in a central facility, including photovoltaics (PVs) and windmills. But the rule holds only for technologies that can be manufactured in standardized ways, in large numbers. Thus, this rule does not hold for big dams or nuclear power plants, because they're not uniform – each one is a unique creation and their lessons don't transfer from one to the next. Proponents of large-scale energy systems say the economics favor these big technologies, but they ignore both this opportunity for learning and cost-declines that are possible in smaller-scale, environmentally clean, decentralized energy systems. This is yet another example of the uneven playing field: entrenched support for existing energy systems despite new information and ideas, particularly those that link energy and the environment. It's doubly perverse to be investing in these dinosaur technologies that are not showing good, solid economics. Today, the cost of nuclear energy and hydropower is rising; I would call that an "unlearning curve."

WRR: *More than two billion people worldwide depend on traditional biomass fuels for the bulk of their energy needs. What are the environmental and social implications of this?*

DK: It had long been assumed that using wood was mostly negative for the environment. While there are places where deforestation is a critical issue, primarily where overpopulation is a problem, it has turned out that in a lot of places, using wood for cooking – the average in many developing nations is a ton of wood per person per year

Sun

-Energy Future?

– is more or less sustainable. But wood use does have a huge impact on human health. The #1 cause of illness worldwide is not cancer, malaria or HIV, it's acute respiratory infections (ARI). In areas where I work in Kenya, ARI accounts for 30 percent of all hospital visits – twice the rate of visits for malaria, which is #2. The cause is indoor cooking with wood stoves, which expose users to huge amounts of particulates – over 100 times the level deemed very unhealthy by US health authorities! We need to move these people up the energy ladder, to have them use cleaner and more efficient combinations of fuels and stoves. Those are areas where we need more research and field projects. Improved stoves and higher quality fuels, if introduced through a process of education and collaboration, can dramatically reduce the levels of pollution and thus ill-health in developing nations.

One of the ironies of work on energy, health, and the environment in developing nations is that it is seen by industry as an area of research with no great payoff. We often hear that malaria could be controlled if only drug companies were willing to invest a fraction of the funds that they put into research for "diseases of the rich." This is even more true for ARI. Kirk Smith, a professor here at Berkeley in the School of Public Health, recently estimated that the total amount of money invested in improved stoves around the world is smaller than the average cost overrun on a typical large-scale hydroelectric dam – about $100 million. This kind of underinvestment is a serious problem.

The real challenge is to provide services to the poor and services to ecosystems that are sustainable. For me sustainable in this case means something that goes on beyond the project. If you want to have a PV or wind energy industry, you need to build in support systems so that the industry will not die when the loan or other support goes away. From our research in Africa and Mexico, what that means is not investing 80 percent of the money into hardware. It means investing much more into human resources – the support stuff. If you look at companies like Coke or Pepsi, they invest something like 40 percent of their profit stream in advertising, in various forms. The product is almost secondary to the packaging. To translate that grossly capitalist message into development projects, we should probably be investing at least 40 percent of what goes into a development project into the people, because in some sense training is the same thing as advertising. So let's take that lesson

to heart, and invest the most in the customers and in the vendors, entrepreneurs and the people who make an industry go.

WRR: *Do you think an energy revolution is in the making, as some renewables experts suggest?*

DK: Yes, I think we're going in that direction, but we're not doing enough on the policy level or in supporting both basic and applied research to make it happen very quickly. The joke about many renewables is that they're 20 years from being commercially viable, and they've been that way for 20 years. That joke isn't true anymore. In the US right now the least expensive source for new, installed power is wind energy. Photovoltaics are also both increasing in efficiency and decreasing in cost. People in Kenya are installing PVs not because of environmental concerns, but because they are the best provider of service, and in many cases the least-cost option.

Renewables are coming of age, but on a policy level we are certainly making it as hard a birth as possible. We could do a lot more simply by investigating some of the policy options that could level the playing field. We also have to look at the economics as seriously as the technical side. People working in renewables are getting more realistic about what is workable in this global economy. If we can keep the balance alive between the social, technical and economic advances, I do think we can get renewables largely in place, taking up significant fractions of the power market in both developed and developing countries pretty soon.

WRR: *What are the cost barriers to such technologies?*

DK: There are vast opportunities to expand the market for renewables in both developed and developing nations. To take advantage of these opportunities will require a more organized effort to jump-start these markets. Intelligent policies – both to support research and to encourage and sustain new markets – would make a huge difference. Subsidies can jump-start a market, but must be judiciously used. Some argue when you subsidize the hardware, you distort the market, and that is true in some cases. But subsidizing training does work. One of my students here wants to set up a radio show in Kenya that is the renewable-energy version of "Car Talk" (a call-in show on National Public Radio that answers listeners' questions about car problems). People could call in with questions like "What are the costs of putting up a solar panel on my roof?"

One problem is that development agencies like the World Bank don't invest in these kinds of long-term support programs. I've got a good example of how the Bank approaches training and R&D. One of the Bank's biggest successes is a project it considers something of a failure, based on its economic analysis. Right now, Kenya has the most active PV industry in the world, which

continued on page 14

Indigenous People End Urrá Dam Protest

by Monti Aguirre

After years of pressuring the builders of the 340-MW Urrá I Dam in Colombia to properly address the project's impacts, the Embera-Katío indigenous people reached an agreement with the Urrá S.A. Company and the government on April 19.

"We are pleased that we came to an agreement, but this is just the beginning of the negotiations, since we did not get all we wanted," said Kimi Pernia, an Embera spokesperson. "We are glad we are back on our lands, people were very distressed over this situation."

Negotiations between the Embera and the company broke down in September. In November, after the Ministry of the Environment granted the environmental license for filling the reservoir, the Embera launched a 700-kilometer march to Bogotá to pressure the government to open negotiations. They stayed in a camp at the Ministry of Environment building for four months.

Of the 32,000 hectares of land they were demanding as compensation, the Embera got just 12,880 hectares. But their settlement on this new land might help prevent the construction of a second dam, Urrá II, which would flood 74,000 additional hectares. In fact, the government agreed to "abstain from promoting, authorizing or building such a project."

The Embera have proposed that the company pay them for the contribution their watershed lands make to the project. They feel they are strategic partners of Urrá, since an estimated 40 percent of the waters that supply the reservoir come from Embera land. This element of the agreement remains unresolved at this time.

The Embera had demanded public recognition that there had not been a proper consultation process, but the government and the company refused. "We maintain that the environmental license has been granted illegally because there was not a proper consultation process and we will go to the State Council in order to demand its annulment," said a spokesperson.

The problem began when Urrá S.A. disregarded traditional authorities and negotiated with a group of Embera who did not oppose the project. The environmental license was granted on agreements with this group, an arrangement that violates Colombian law, as indigenous lands transactions must be handled collectively. Additionally, the Constitutional Court had ruled that the company must negotiate with the Embera before the Ministry of the Environment granted the license, which it did not do.

The Embera also demanded that they be involved in the planning of decommissioning the dam in the future. Although this point is vague in the agreement, it is perhaps the first time in history that dam-affected peoples have gotten language about future decommissioning into an agreement with project authorities, even as the reservoir is still being filled up.

Photo: Monti Aguirre

Embera residents at the Bogotá protest camp.

The agreement states that the company restore fisheries in the reservoir and watershed; and that the Embera oversee plans for resettlement, for basin restoration and management, and to improve their livelihoods. Harm to the river's fisheries has been extensive.

International pressure to support the Embera has been building recently. While the agreement was being signed, Embera representative Neburuby Panesso and Juan José López Negrete from the Association of Fishing and Peasant Communities of the Greater Lorica Wetlands (ASPROCIG) went to meet with officials from the Swedish Parliament, the Swedish company that built the Urrá Dam, project funders and others. The purpose of the trip, sponsored by the Swedish Society for Nature Conservation, was to seek support for affected peoples' decommissioning campaign.

Skanska, the Swedish firm that built Urrá, was unrepentant about the problems caused by the project. "Urrá is history for us," said Skanska's general manager. He added that the project's consequences could not be forecast in 1992 when the company signed the contract. Representatives of the Swedish Export Credit Agency, which provided loan guarantees for the dam, said at the meeting that Urrá would have found no support from them today, due to its now well-documented impacts.

ASPROCIG's Juan José López Negrete said, "We didn't come here to pose moral questions to your company because you built Urrá," he said. "We came here to let you know that the construction of Urrá signifies the slow death of our culture. What we are asking is that you learn from the experience of Urrá and reform your environmental policies so you don't make the same mistakes in other parts of the world. Even though you think Urrá is history, we are counting on your support for the decommissioning of the dam, given your technical knowledge," he added.

In addition to the activists' trip to Europe, the Embera worked with an international commission comprised of representatives of indigenous peoples, human rights and environmental organizations, to help document the project's problems. The commission met with high-level government officials and visited Embera lands in the dam area. The mission concluded that there are critical social and environmental impacts which are going unaddressed, and that information presented by the authorities as fact is not supported by field observations. They also noted that authorities are not resolving fundamental human rights and legal issues; and that the project's environmental license was granted in violation of the law. ■

Scientific Panel Finds Flaws in Brazilian Channelization Plans

by Glenn Switkes

A blue-ribbon panel of eight scientific and technical experts which analyzed the proposed Araguaia-Tocantins Waterway Project, called the "Hidrovia," has found the project will fail to meet its stated goals of lowering transportation costs, and could well cause irreversible damage to the principal river system of the Brazilian savanna and eastern Amazon. The hidrovia, a priority in the Brazilian government's multi-year development plan "Advance Brazil," is intended to deepen and widen the shipping channel along 1,782 km of the river system to permit passage of barges hauling soybeans and other grains to European ports.

In its study, coordinated by the Cebrac Foundation of Brasilia, the scientific team found that the Environmental Impact Assessment (EIA) for the project ignored many of the most obvious impacts of the project. Different parts of the EIA, they said, had striking discrepancies in terms of the number and intensity of interventions for dredging and rock removal which would be needed to channelize the river, as well as in estimates of the project's total cost.

The experts' panel also found claims of economic benefits resulting from the project to be based on incorrect interpretation of available data. "From the economic point-of-view, the hidrovia makes no sense – sufficient, lower-cost alternatives already exist. Constructing the hidrovia would be a waste of public money." The specialists cited the already-existing Ferronorte Railroad and North-South Railway (under construction) and road links to be cheaper means of shipping soy.

The scientists viewed the blasting and extraction of rocky ledges along the Araguaia River to be the most worrisome part of the hidrovia proposal. Removing these natural dykes, they said, could "destabilize" the river system, causing unique ecosystems upstream to dry up (including the Bananal Island, a national park and protected wetlands under the international Ramsar Convention), and causing the river to flow more rapidly below the blasting, potentially resulting in serious flooding of downstream riverbank towns.

According to the report, the environmental changes caused by rock removal along the Araguaia and das Mortes Rivers would affect floodplain lakes where fish reproduce. This would trigger a chain reaction of impacts affecting other forms of aquatic life, mammals and the human population of the region, which depends on fish as a primary source of nourishment.

The project's potential impacts on indigenous populations have been a source of heightened controversy. Four of the seven anthropologists hired to prepare studies for the EIA said their conclusions that the project would have serious impacts on indigenous populations were distorted or simply omitted in the final EIA text. These and other irregularities caused a Federal Judge last year to suspend the licensing process for the hidrovia.

The Araguaia-Tocantins hidrovia is one of four large-scale river channelization projects being promoted by the Brazilian government. The others would affect the Madeira-Amazonas Rivers, the Paraguay-Paraná Rivers, and the Tapajós-Teles Pires rivers. All are intended, according to project promoters, to lower the cost of soy shipments, principally to Europe, where they are used as a feedstock for pigs and chickens. ■

Thai Dams continued from page 1

opened in order to regain the abundance of the Mun River."

The response from the government has been mixed. A group of senators visited the area on May 21 and recommended that a special neutral body be set up to resolve the issue through peaceful means. The protesters and government have agreed to this recommendation. A panel has been established, and its first recommendation is that the dam's gates be opened for three months of the year during the wet season. At press time the villagers' response to this was unknown.

Meanwhile, the Thai electricity utility EGAT has used underhanded tactics to try to force the protesters to disperse, including sending gangs of drunk thugs to the area dressed as protestors to provoke the villagers. EGAT has also issued statements claiming that the protest could lead to flooding and power shortages in Ubon Ratchathani and four other northeastern provinces, claims which the protestors say are aimed at discrediting them and pitting them against other groups of people.

An independent study of the Pak Mun Dam's costs and benefits has been recently completed by the World Commission on Dams. The WCD study found that the dam, which was supposed to generate 136 megawatts, is barely generating 40 megawatts in the high-demand months of April and May. Even in the rainy season, when water levels are very high, EGAT has to shut the power plant down because there isn't enough head to drive the turbines.

Completed in 1994, the dam's final cost was US$265 million, almost twice as much as originally estimated, WCD reports. Today it isn't generating enough electricity to recover its investment costs. The WCD concludes that "it is unlikely that the project would have been built if actual true benefits would have been used in the economic analysis."

Kasetsart University economics lecturer, Mr. Detcharat Sukkumnoed, said that decommissioning Pak Mun would have a trivial impact on electricity prices for Thai consumers. He said that the economic loss of decommissioning the project could be reimbursed through a surcharge to be imposed on users that amounts to a 0.3 percent increase, which is affordable. He also said that there would be no interruptions to electricity supply in the northeast if the dam was decommissioned, contrary to claims by EGAT. "According to EGAT's statistics, there are times when the dam stopped generating and there was no security problem," he said.

On fisheries, the WCD recorded that 169 out of 265 species of fish in the Mun River were affected by the construction of the dam. Of these, 56 species have completely disappeared. The WCD estimated that the actual catch in the reservoir and upstream is 60 to 80 percent less than in the pre-dam era, resulting in an economic loss of around US$1.4 million per annum. The WCD also confirmed that the fish ladder "has not been performing and is not allowing upstream fish migration."

The hydropower project was financed by the World Bank and built by the state-owned utility EGAT. The villagers are also demanding that the World Bank take responsibility for its role promoting the project. In a letter delivered to James Wolfensohn, President of the Bank, on June 5, villagers demanded that "the World Bank work with the Thai government to decomission Pak Mun dam by opening the flood gates permanently and restore the Mun River." As of press time, there had been no response. ■

India's Drought: Where Has All the Water Gone?

by Ashish Kothari

India is waking up too late to the horrors of drought. A specter that should, and could, have been banished long ago is again stalking the land. As images of desperate farmers and nomads migrating in search of water and fodder, skeletal remains of starved cattle on parched land, and queues of water-vessel-bearing women are splashed across newspapers and on television, the question naturally arises: where has all the water from the past 12 successive good monsoons gone?

The rain has fallen on increasingly barren lands, devoid of forests and other vegetation, where it runs off quickly rather than percolate into the ground to recharge wells and aquifers. The rain has fallen on small checkdams that are unable to retain it because they have silted up due to neglect. All the resources which should have gone into preventing deforestation and other forms of land and water mismanagement have gone instead into grandiose schemes of big dams and canal networks, which have simply not delivered in proportion to what they cost. Whatever rainwater has been retained by rivers or seeped into aquifers has been quickly sucked up by big cash-cropping farmers, cities and industries, leaving very little for small farmers and other rural poor. The current drought is a combination of debilitating centralization of power, adoption of mega-solutions to micro-problems, neglect of the critical role of forests, and pandering to the ever-increasing demands of large farmers, urbanites and industries.

There is nothing new in the monsoons failing. Subnormal rainfall for years at a time has always been a part of human existence, yet for thousands of years, communities learned to adapt. They built ingenious water harvesting and retention structures and used water sparingly. Villages considered water sources as common resources to be collectively managed.

Centralization of power in the pre-colonial and colonial periods saw rapid changes in traditional systems. The responsibility of managing small waterbodies passed from the local communities to centralized state agencies. The concept of water as a "national asset" was used to justify this transfer, as if the local community could not be trusted with "national" property. Disinvested of their customary powers and responsibilities, communities became apathetic to the maintenance of check dams and water channels.

The rapid erosion of the earth's power to retain rainwater is the second part of the crisis. In the past, even arid lands had extensive scrub vegetation which covered the land and acted as a sponge for the meager rain that fell, recharging aquifers, wells and streams. It is no surprise that the well-forested tracts in the drought-hit areas of Rajasthan, Gujarat and Maharashtra face less water shortage than areas where the land's vegetative cover has been destroyed.

Uneven Distribution

Finally, it has become clear that it is often not the absolute quantity of water that is lacking, but its skewed distribution amongst consumers. Shamjibai Antala, who has pioneered innovative methods of recharging wells in Saurashtra, says industries in this region used 300 million liters of water a day even during the current drought. The social action group Disha has estimated that the Gujarat government spent over US$61 million on drinking water in 1998-99, yet most of the arid regions of the state are facing serious drought this year. Where, asks Disha, did the money go? The answer is simple: the government has siphoned all the money allocated for these and other decentralized projects into the pipe-dream that is the Sardar Sarovar project on the Narmada River. The dam, even if it does get finished, will provide water to only 10 percent of the most drought-prone regions of Gujarat.

Also instructive is the example of dozens of villages and regions that have withstood the current drought and now stand out like oases. This is no quirk of nature. Several hundred villages in Alwar district of Rajasthan are bearing up despite the failure of the rains, because over the past 15 years their residents, along with the NGO Tarun Bharat Sangh, have built several thousand small checkdams that have recharged wells and underground aquifers, and even brought dying rivers back to life. In Maharashtra, villages like Ralegaon-Siddhi and Manegaon have become famous for having eradicated water scarcity. In Saurashtra, wealthy businessfolk from Mumbai have pitched in to fund the construction of water harvesting structures. In the same region, the Aga Khan Rural Support Programme has helped villages to drought-proof themselves. In Dewas town of Madhya Pradesh, an enterprising district collector has encouraged roof-top rainwater harvesting, substantially reducing dependence on scarce municipal supplies.

These are also striking examples of developmental and attitudinal changes. In many places that have proved well-adjusted during the drought, the limits of nature are well-recognized. Farmers have taken a pledge not to plant crops like sugar cane which are water-intensive. Villagers in Mendha, Maharashtra, decided to have a community well with strict regulations on pumping, as they had seen farmers in another district suffer the consequences of over-using private borewells. The more empowerment of communities to manage their resources, the less the chances of misuse and bad decisions being tolerated.

Huge amounts of money have been spent on drought relief in Rajasthan in recent droughts. Yet the situation is hardly better. There is little doubt that if this kind of money had been put into decentralized alternatives, into the hands of community institutions, and into long-term drought-proofing measures, the results would have been vastly different. In Kutch, for instance, a coalition of 14 NGOs has drawn up a plan to ensure adequate water for the whole district.

It is time that we learn from the shining examples set by NGOs and sensitive officials, and demand that:

- Governments facilitate the empowerment of communities to harvest and manage water resources, and put its full resources into decentralized structures;
- Cities and industries be forced to harvest their own rainwater and recycle wastewater, rather than mine rural areas;
- All existing forest areas be protected as water catchments, and degraded lands be afforested.

Perhaps then we will not have to wake up to another rude reminder that it is not nature that has been unkind to us, but our own short-sightedness and skewed priorities. ■

The author is an environmental activist in India. *This article originally appeared in* The Hindu, *May 14, 2000.*

Privatization Leads to Water Wars in Bolivia

by Glenn Switkes

Following mass demonstrations which resulted in 6 deaths and 175 wounded, a popular uprising against water privatization in Cochabamba and a new national water law succeeded in forcing the Bolivian government to tear up its contract with a multinational consortium.

Protests began after the September 1999 signing of a contract between the Bolivian government and the Aguas del Tunari consortium, headed by the San Francisco-based engineering giant Bechtel and including the Italian group Montedison, the Spanish construction company Abengoa, and Bolivian engineering and construction companies with close links to the government of President Hugo Banzer.

For years, Cochabamba has suffered water rationing. The Bolivian government was advised by the World Bank that this situation could only be remedied by privatizing water services. The controversy centered around the Misicuni Multiple-Purpose Project, which included drilling a tunnel to bring water from the highlands to the city, construction of aqueducts for irrigation in the surrounding rural area, and eventual construction of a hydroelectric dam using water being tunneled from the mountains.

In exchange for building the Misicuni complex, the Bechtel consortium would have the right to a guaranteed rate of return that prompted them to raise water rates by between 100-300 percent. In a country where most of the population earns a minimum wage of less than US$100 per month, water rate increases of as much as $20 per month threatened to severely burden the poorest sectors of society. The rate increase affected some 500,000 citizens. People took to the streets in protest.

The demonstrations were also directed against a new water law which, among other things, charged users a fee for the right to dig wells.

Following the outbreak of mass protests in Cochabamba, police responded in a heavy-handed way. With more than 10,000 farmers blocking roads, and strikes and marches escalating in other cities including the capital La Paz, President Banzer decreed martial law. Police used teargas, clubs, and rubber bullets to subdue protesters. Protest leaders summoned to a negotiating meeting with municipal officials were summarily rounded up and arrested.

The Bolivian government, which had said it could not rescind the contract without paying a stiff fine, finally gave in, and the Bechtel engineers quietly fled the country.

According to Maria Teresa Vargas of the Rios Vivos Coalition, "The water crisis came at a time when Bolivia has fallen into a serious economic crisis, with increasing unemployment and extreme poverty. The issue of water struck deep, requiring rural communities to pay for services that until now were free."

The World Bank's policies helped set the stage for the violence. In its June 1999 "Bolivia Public Expenditure Review" the World Bank wrote that "no subsidies should be given to ameliorate the increase in water tariffs in Cochabamba," arguing that all water users, including the very poor, should have bills that reflect the full cost of proposed expansion of the local water system. World Bank President James Wolfensohn, when asked about the Bolivia protests at a press conference, said that giving public services away for free inevitability leads to waste and that countries like Bolivia need to have "a proper system of charging." In the wake of the protests, a group of international NGOs has called on the World Bank to halt its support for water privatizations.

Were there alternatives to the privatization of the Cochabamba water system that the World Bank might have recommended instead? The Bank was well aware of Bolivia's successful Santa Cruz water cooperative (SAGUAPAC), which efficiently supplies water to a million people and has since been duplicated in two other Bolivian cities. A World Bank report on urban water systems in Bolivia called SAGUAPAC "one of the best water and sewerage companies in Latin America." While the Bank has provided loans to SAGUAPAC, it has never promoted the co-op model, instead promoting privatization as the model of choice. In fact, the Bank instead chose to support a technical assistance project for regulatory reform and privatization of Bolivian water utilities that intends to "convert water co-operatives into corporations with private investment in order to comply with investment and operational requirements." ■

Lesotho Resettlement continued

imposing their views on affected communities and of causing "confusion" and a "complaint culture" among community members. In a recent letter to the World Bank, Motseoa Senyane, coordinator for the Lesotho NGO Transformation Resource Centre, wrote to the project task manager at the World Bank about the accusations: "Why should the LHDA and Bank be reluctant to minimise the tremendous disruption that is resettlement? In the declaration, communities ask to be compensated before they resettle; they ask for the opportunity to inspect and approve the resettlement sites after LHDA deems them complete; they ask that their cultural norms be respected; and they want the right to manage their own assets. Are these not things that any person facing the prospect of forced removal from her/his home and land would reasonably and rightfully request? Are we to assume that World Bank and LHDA staffmembers would not feel they are entitled to these things if put in the same situation? We doubt it ... Comments and attitudes expressed on the Bank's recent visit reveal an attitude that the marginalised people of this world need not be afforded the same consideration as those of us who have been 'educated' and are lucky enough to fly across oceans to decide the fate of those less fortunate."

In response, Andrew Macoun, the World Bank task manager for the project, said, "We are fully aware of the disruption resettlement causes and are committed to ensuring that those affected by the LHWP are treated fairly and compassionately. The terms of the treaty concerning resettlement and compensation will be fully implemented." ■

Interview continued from page 9

is an amazing achievement. The Kenya market has 40-50 companies vying for sales, there are more people on solar than on the national grid, and it's all been unsubsidized private sector. In the early '80s, the World Bank's ESMAP [Energy Sector Management and Assistance Program] invested quite a lot of human resources in Kenya to train people to use and install PVs. When the Bank reviewed the program a few years later, its economists said, "This money didn't go anywhere, there's no PV industry, the people we trained went into other fields. Not a good investment." But if you look at Kenya's PV market today, many of the industry's important players were first introduced to solar through that ESMAP program.

I think this program was a great success, and should be one the Bank learns from, replicates and adapts. They took a small amount of funds and invested heavily in training, and some in technology. It just happened that they invested in a technology well before it was cost effective, and that's why there was a 15-year lag before it took off. Right now they could do similar programs with technologies that are much closer to being commercially viable. They could do a program training people how to use wind power, or they could analyze what cities in the world could convert quickly to using fuel-cell powered vehicles. These kinds of programs could bear fruit in just a few years. But all this requires the Bank to invest far more in education, training and research.

WRR: *Give an example of how a modest investment could have a big impact in helping to get such technologies wider use.*

DK: I can think of a few, and they're easy. If you're going to fund a given area in the energy sector, fund it for a decent amount of time, to avoid the roller-coaster funding cycle that we now have on the research side. Don't try to pick winners in advance – for example, don't let your favorite fuel company suggest in detail what area you're going to invest in. Compete various options together. The US loves individual winners, but that's wrong for energy. In energy you win by having a diversity of sources that each provide energy services and may each be well suited to different economic, environmental and social situations. Sustaining the training and the learning after the technology is installed is also critical. For example, a clearinghouse for training and information sharing in PV systems in Kenya would be immensely valuable. It would be a trivial investment, and it would ensure that information flow matched technology flow.

WRR: *Have you experienced a prejudice toward or resistance to renewables by those making decisions about energy in developing countries?*

DK: Yes, and the examples are unfortunately all too numerous. Some governments are reluctant to subject the national utilities to competition from stand-alone or mini-grid systems. And many seem to see renewable technologies as homespun, small-scale, second class. Many people seem to think that connecting to the grid is more advanced than having their own local power supply. In Kenya, that is changing, because people see the quality of the service of PV systems – it comes without a monthly bill, without having to burn kerosene, and without the blackouts that are becoming more common in Kenya. That's why Kenya is selling something like 20,000 PV systems a year.

WRR: *IRN is working on the Bujagali Dam project in Uganda that was subject to evaluation with a study that purported to look at energy alternatives for Uganda. The study was done by a dam-building company and mostly looked at various hydro alternatives. In this study, solar was found to be not financially viable for Uganda, despite neighboring Kenya's huge successes with solar.*

DK: I actually know that case pretty well. There is no comparable analysis of rural PVs in Uganda that is as extensive as that which shows the possible benefits of this dam. By doing one study and not the other, you guarantee that the one with the most detail is the one you favor, because it's better documented and analyzed. It's dishonest to investigate technology "A" for a year and technology "B" for a day and then conclude that technology "A" is better. This case also reveals the problem of a lack of participation in the decision-making process on energy projects by people who could provide alternative energy sources and people who will use the energy. It is also a classic case of preserving the uneven playing field.

WRR: *It seems like the lack of energy is holding back poor communities in the way that a lack of capital does. Should there be a "Grameen Bank" to offer microcredit for small-scale energy technologies?*

DK: There already is one – "Grameen Shakti" in Bangladesh provides microcredit for solar panels, to wire homes, and other projects. And in Inner Mongolia small-scale wind turbines – developed through a public-private partnership – provide power for the majority of the nomadic population. There needs to be more examples of this, because it can put power into the hands of small-scale industry and families, without requiring them to assume the burden of supporting a large national power project.

And yet it's not really the lack of energy, but inefficient or inequitable energy services, which are holding back poor communities. There are ways to get the same amount of energy services from smaller amounts of energy. It is important to recognize that things like a refrigerator or water pump will use a lot of power, and some of those needs can be served better not by increasing the amount of voltage that comes into your home, but by converting to mechanical power where feasible. For example, an efficient mechanical water pump, such as a dedicated windmill, is almost always the least expensive solution. Another example: both in California and parts of Kenya, the most efficient way to heat water is not grid-based hydroelectricity or a solar PV water heater, but a solar thermal system – a tank on your roof. It's cheaper, more reliable and more efficient.

WRR: *Many who follow the ongoing privatization of the world's water systems argue that all people have a right to water – at least a minimum amount. Do you think people should also have a similar right to a minimum amount of energy?*

DK: On one level, the answer is absolutely yes. More energy, up to a point, inevitably leads to a better quality of life – increased literacy rates, increased life expectancy, increased number of years of students in schools, etc. Unlike water, we're not limited by the amount of energy that's out there to be harvested. We could run the global supply of energy just from photovoltaics if they were cheap enough; there is more than enough solar power striking the earth. What we need to do is find the way to harvest it efficiently.

So ramping up the amount of energy per person – up to about the equivalent of two tons of oil per person per year – improves quality of life. Above that amount, the correlation between quality of life and energy use flattens out. The US standard of living is pretty comparable to that of Japan, and yet Japan is about half as energy-intensive as we are. They've found ways to provide the same services for less energy. So at these higher levels of consumption, policy matters a lot – how you use it, how you plan for it. One does not have to grow into an energy-consuming monster like the US to have a US

continued opposite

IN PRINT

New Dams Report Criticizes European Corporations

European corporations are violating people's rights and ruining ecosystems around the world by exporting dam technology that has been discredited in their own countries, says a new report.

The report, ***Dams Incorporated: The Record of Twelve European Dam Building Companies***, was written by the UK group The Corner House and published by the Swedish Society for Nature Conservation. It calls for laws to curtail the industry's "power to oppress," including holding them to their home country's tougher environmental, social and economic standards when working overseas.

The report analyzes the record of firms that have built, or are building, some of the most destructive dams in the world: ABB (Swiss-Swedish), Balfour Beatty (UK), Coyne et Bellier (France), Electrowatt (Switzerland), Impregilo (Italy), Knight Piesold (UK), Kvaerner (Sweden), Lahmeyer (Germany), Siemens (Germany), Skanska (Sweden), Sogreah (France) and VA Tech (Austria).

The report analyzes the companies' role in the following dams:

- Itaipu and Yacyretá, the most infamous examples of hydro-corruption, on the border of Paraguay and Argentina. The combined cost of the two dams was more than $30 billion – it should have been a little over $7 billion;
- Ilisu, a Turkish dam that opponents say is being used as part of a strategy to eradicate the Kurds as an ethnic group;
- Lesotho Highlands, where a US$2m case of dam bribery involving 20 or more foreign firms is now underway in a local court;
- Chixoy, where Guatemalan armed forces massacred more than 400 Maya Achi indigenous people;
- Pangue and Ralco in Chile, where local people were not consulted before the projects were started;
- Three Gorges, which will result in forcible resettlement for up to 1.9 million Chinese people.

The report notes: "Not only have the companies continued to remain involved in projects where human rights abuses have been demonstrated or where resettlement plans have been inadequate, they have in many cases actively promoted such projects against local opposition and often in contravention of their own corporate environmental guidelines."

"Many dam-affected communities are now calling for reparations," the report goes on. It is time to hold Europe's dam building companies accountable for their past. It is also hoped that a knowledge of the record of European dam builders could help European citizens who are demanding that the companies which operate from their countries, often with the backing of tax-payers' money, and certainly with their governments' blessing, are held accountable for their actions abroad."

The report is available for US$12 from:
Swedish Society for Nature Conservation
Box 4625
SE-116 91 Stockholm, Sweden
Tel +46-8-702.6509
email: goran.ek@snf.se
Web: www.snf.se

Brave, New World of Electricity

Transforming Electricity by Walt Patterson (Earthscan, London, and Brookings Institute, Washington, DC; 1999)

Those of us with grid-based power take it for granted that the lights will always go on when we flip a switch. The 2 million people in the world currently without power despair they will never get it. This important, eminently readable book shakes up conventional notions about power generation for people on both sides of the electricity divide.

Walt Patterson believes that in a few years, the electricity industry as we know it will undergo radical transformation, not unlike the changes in the computer industry in the past 20 years:

"Long-accepted ground rules for technology, fuels, ownership, operation, management and finance are changing by the day. Technical innovation is altering options and priorities. Environmental constraints on traditional technologies [including dams] are tightening inexorably. The balance of fuels is changing; so is the allocation of risks. Heart-stopping sums of money are changing hands. Power and influence are at stake … Two billion people are watching from the sidelines, waiting for electricity. How did the world electricity come to this, and where might it go from here? The question is too important to leave to insiders."

Patterson describes a future based on a diverse, highly efficient, decentralized electrical system which takes us away from the polluting, large-scale, centralized systems we rely on now. He says that "bigger is better" for energy supply "is now comprehensively discredited," noting that smaller stations are easier to site, and can be built and producing power more quickly.

Interview continued

quality of life. That's the energy holy grail – to increase energy use dramatically without doing it by mimicking the US.

WRR: *Describe your vision for an equitable energy world.*

DK: With the range of clean energy options we have now, and the economic and policy lessons we have learned, it would be neither difficult nor overly expensive to shift the energy industry from the current systems of large power plants to a small-scale, distributed one. For example, using biomass wastes in various ways could probably account for about a quarter of the world's energy budget right off. Closing down our large, dirty fossil-fuel plants could be done if we invested significantly in new sources, or had a modest carbon tax to ramp up the work that's being done on wind, solar and fuel cells. You could cover all of the US energy supply by covering rooftops with roofing tiles and shingles that were PV systems themselves. We would do much better economically, socially, and environmentally to have an energy system that is safe, clean and distributed rather than centralized. A basic reason we haven't made more progress in this direction is that the fossil fuel industry doesn't want it to happen. The interesting thing is that the opportunities to move from a pollution-intensive energy economy to one based on cleaner energy sources is a wide-open field. Any forward-thinking company could invest a modest amount now in photovoltaics, wind, or fuel cells, and open incredible new avenues for itself, and for society. The key question is this: which companies, governments, and community groups are going to take on that vision, and are we going to implement policies to make this route attractive?

For more information about the Berkeley RAEL program, see http://socrates.berkeley.edu/~rael