

## Namibian Dam Study Lacks Social Plan

by Lori Pottinger

**T**he final feasibility study for the planned Epupa Dam on the Kunene River does not include any specific measures to alleviate the impact of the project on the Himba people who would be displaced by the hydroelectric scheme. The semi-nomadic Himba people, whose way of life would be destroyed by the project, remain overwhelmingly opposed to the dam.

The 21-volume final feasibility study was given to the Namibian and Angolan governments on December 4, according to *The Namibian* newspaper. Despite the lack of a mitigation plan, the Minister of Mines and Energy announced at the study's hand-over ceremony that the government will decide in 1999 whether to go ahead with the project.

But in December, a senior official at Namibia's power utility Nampower told an industry publication that work on the Epupa Dam is on hold for at least five years. "The cause of the delay is reported to be the utility's current focus on constructing the 750MW gas-fired Kudu project," according to *International Water Power and Dam Construction* (Dec. 1998).

The Epupa Dam would affect 5,000 Himba people, drown 95 archaeological sites and 160 Himba grave sites, introduce AIDS and other diseases to the area, and drown valuable riparian vegetation, among other problems. It would also have a major impact on the habitat of two critically endangered fish species, and would destroy the only known habitat of a new species which was discovered only in the proposed dam area during the feasibility study period.

The Angolan government, which is preoccupied with its renewed civil war with rebels, is rumored to be concerned that the dam – which would be situated on the border between the two countries – could become the target for sabotage by the rebels, as did the Gove Dam upstream of the Epupa site in the early years of the ongoing conflict. The Gove Dam has never been repaired since it was bombed by rebels.

### Mitigation Plan Required

The feasibility study's authors, the Namang consortium of consultants, based its report on terms of reference which required an assessment of the scheme's potential impacts

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Photo: Karen Retief

*This Himba family lives near the dam site. The government believes the dam will "modernize" them.*

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**D**am fighters and salmon scientists have had it all wrong these many years. It turns out that declining salmon populations in the US are not caused by dams, and in fact only environmentalists and the commercial fishing industry stand in the way of full salmon recovery. This is the belief of some "dam preservationists," a small but well-connected movement that has sprung up in the wake of the nation's burgeoning dam-decommissioning movement.

These dam defenders, most of whom profit from dams in some way, are advocating for dam preservation in areas where dam-decommissioning campaigns are making bold proposals in the effort to restore fisheries and rivers. In the Pacific Northwest, where depleted salmon stocks are making even some dam-builders lean toward dam removal (see our story on the Snake River dams in the December issue of *WRR*), a number of pro-dam groups have arisen.

For example, the Columbia River Alliance, based in Portland, Oregon, represents electric utilities, agribusiness interests, logging companies, and other industries. The group says it was founded to protect the economic interests that are based on exploiting the river's power and water: "Today the Columbia River and its tributaries are vital not only as a historic home to salmon, but also for hydropower production, agriculture, manufacturing, navigation, irrigation, general commerce, outdoor recreation and other aspects of the lives of nine million Northwest residents." Their website ([www.cra1.org](http://www.cra1.org)) provides a host of arguments that attempt to refute the growing sentiment the Columbia River dams have outlived their usefulness and should come down.

The group's attorney, James Buchal, does his own preaching for dam preservation in speeches, in print and on his own website ([www.buchal.com/hoax.html](http://www.buchal.com/hoax.html)). Buchal penned "The Great Salmon Hoax," a book which alleges the dam-breaching movement is driven by pseudo-science and political manipulation. Buchal reassures us that salmon are doing better than they have in years, and that dams are, in fact, healthy for salmon.

Meanwhile, in neighboring Washington State, wheat farmer Tom Flint is leading a campaign to save the dams on the lower Snake River. Flint recently announced an internet petition drive ([www.e-thepeople.com](http://www.e-thepeople.com), click on "environment" – you'll find it below a national petition to take down these same dams). Speaking out in the Capital Press Agriculture Weekly (Salem, Oregon), Flint says his organizing work has been "like a match to a tank of gasoline." The petition is necessary, he explains, "to save our dams and stop this tide of dam breaching."

Organized efforts to stop decommissioning work aren't limited to the Northwest. In Page, Arizona, the Friends of Lake Powell is working to save Glen Canyon Dam. This group hopes to counter the efforts of the Salt Lake City-based Glen Canyon Institute, which seeks to restore Glen Canyon by draining Lake Powell. "Why would anyone want to drain this scenic wonderland?" the group asks, noting that "Lake Powell has 1,960 miles of shoreline (more than the entire U.S. coastline on the Pacific Ocean), [and] can store 27 million acre feet of water ... [which] assures the states of Colorado, New Mexico, Utah and Wyoming will receive adequate water for future growth and development." Friends of Lake Powell fears the effort to drain the lake would result in the dramatic loss of tourism dollars currently coming from jet skiers and houseboaters who now use the nation's second largest reservoir. Visit the group's website at: [www.lakepowell.org](http://www.lakepowell.org).

In California, LAKE (Lakes Are Kind to the Environment) formed recently to stop the proposed decommissioning of Englebright Dam. The group is interested in maintaining the property value of waterfront vacation homes, among other things. LAKE notes, "There are active groups who are determined to destroy Englebright Dam, Englebright Lake, and its riparian habitat [sic]." The group's web site is: <http://home.inreach.com/scove/home.htm>

These dam-defenders represent an emerging branch of the so-called Wise Use movement. But instead of working to allow the wholesale exploitation of public lands, this branch is devoted to pressing for the continued private exploitation of public waterways and the supremacy of economic good over ecosystem health. Like the Wise Use movement before it, the pro-dam alliance has a strong partisan-politics element that becomes apparent the deeper you plunge into the groups' web sites ("Find out more about the outright fraud and corruption in the Clinton/Gore administration," urges one site). This movement, small though it is, is worth studying and keeping track of. Toward that end, we hope readers will let us know of any such groups they come upon.

David Orr

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**Editor:** Lori Pottinger

**Editorial Assistance:** Susanne Wong

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### International Rivers Network

#### Executive Director:

Juliette Majot

#### Staff:

Monti Aguirre, Aleta Brown, Selma Barros de Oliveira, Yvonne Cuellar, Rani Derasary, Tracy Furman, Aviva Imhof, Owen Lammers, Patrick McCully, Pamela Michael, Lori Pottinger, Steve Rothert, Daniel Schacht, Elyse Shafarman, Doris Shen, Glenn Switkes, Susanne Wong, Petra J. Yee

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Lauren Klein, Joshua Mailman, Walter Sedgwick, Brian Smith, Francesca Vietor

#### 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](mailto:irn@irn.org)  
World Wide Web: <http://www.irn.org>

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# Chilean Indian Agency Approves Biobío Dam Relocations

by Glenn Switkes

**A**mid heated demonstrations and a walkout by its members, Chile's National Indigenous Development Board (Conadi) in January approved the relocation of 54 of 83 Pehuenche indigenous families whose ancestral homeland will be flooded by construction of the US\$500 million Ralco Dam on the Biobío River. As the nation's Indian protection agency, Conadi must approve relocation terms as a constitutional prerequisite for the dam's construction.

As of January 18, Conadi had approved 12 relocations unconditionally. Another 42 will require the dam construction company, Endesa, to post a bond as a guarantee in case the substitute lands are found to be agriculturally unproductive.

Significantly, Conadi also rejected the terms of seven resettlements which previously had been agreed to in principle. This rejection, coupled with the refusal by eight other Pehuenche families to accept resettlement terms, could mean another significant hurdle for the controversial Ralco project, the second dam on the river.

Conadi's vote on the relocations severely divided government and indigenous representatives on its board. Six of the eight indigenous members on the board walked out of the meeting in protest, leaving only the bare minimum for a quorum. Eight other protestors who disrupted the meeting were arrested, and two were slightly injured in a scuffle with special forces police.

The action caps several years of controversy for the agency. In recent years, two previous directors of Conadi had resigned to protest what they termed pressure from the Chilean government to approve the resettlements. The current director, Rodrigo González, is a non-Indian.

## Next Steps

In newspaper accounts in mid-January, Endesa indicated that it intended to begin construction of Ralco in the next few weeks, despite the fact that eight families continue to refuse resettlement packages. A group of ecologists, including Manuel Baquedano, president of the Instituto de Ecología Política (Political Ecology Institute), Flavia Liberona, director of the Red Nacional de Acción Ecológica (National Ecological Action Network), and Rodrigo Garretón of the Grupo de Acción por el Biobío (Biobío Action Group), warned at a press conference that



The Biobío River.

the situation in the upper Biobío is a tense one, which could lead to confrontations between supporters of the Pehuenche who refuse relocation and boosters of Ralco.

The activists pledged that "as defenders of the river and Pehuenche territory, we will not permit construction of the dam to resume and any attempt to do so will be blocked by the Pehuenche and those of us who support them."

According to Baquedano, Endesa intends to begin construction now and deal with outstanding relocation issues when the dam is built and the reservoir ready to be filled. "This means they plan to get them (the Pehuenche) off their land at any cost using the argument of a 'done deal', which is an unacceptable form of pressure."

But first, the outstanding resettlement issue may go to the Supreme Court. The court's decision would, in essence, determine which of Chile's two competing laws in this case prevails: either the Electricity Law,

which would guarantee the construction of Ralco, or the Indigenous Law, which states that native people cannot be involuntarily removed from their ancestral lands. The Indigenous Law requires unanimous approval of a land transfer arrangement before a dam construction project may begin. A decision by the Chilean Supreme Court is likely to be made in the next few months.

Endesa argues that the electricity legislation has more weight than the Indigenous Law and that meeting Chile's rising energy needs is more important than preserving indigenous land. Endesa is pressing to have the Supreme Court resolve the primacy of the laws after the dam is built – a move that will be opposed by the activists working on the Ralco Dam issue.

The activists say the Indigenous Law carries more weight than the Electricity Law because "it was democratically approved by votes in the Chamber of Deputies and in the Senate. In contrast, the Electricity Law was hastily approved late one night during the military regime," said Garretón.

The eight Pehuenche families opposed to the relocations say that most families were pressured and tricked into signing the relocation request, and that lands being offered as compensation are of lesser value than their current lands. ■

## Endesa Proposes Dynamiting Nature Reserve

In addition to its Biobío dams, the electricity company Endesa has plans to dynamite Chile's El Dial lagoon nature reserve to produce power. Endesa has sent a proposal to the National Energy Commission (CNE) to dynamite the lake's outlet and use 40 million cubic meters of water to generate hydroelectric energy. The El Dial lagoon is formed by the Troncoso and Palaleo rivers, and is 8.5 km long and 800 meters wide.

The CNE has already approved the project's viability and has sent it to the Public Works Ministry (MOP) for approval. MOP Minister Jaime Toha said the project would not go forward, however, without an environmental impact assessment (EIA).

Socialist Deputy Jaime Naranjo said extracting that amount of water from the lagoon will destroy it and the surrounding ecosystem, adding that the country's current energy crisis does not justify destroying the environment. *Chile Information Project*

# From Hydro to Hydrogen

## Fuel Cells Come of Age

by Aleta Brown

In January of this year, a three-bedroom house in Eugene, Oregon was disconnected from the local energy grid and hooked-up to a washing-machine-sized fuel-cell power system housed in the garage. The unit – made by Northwest Power Systems (NPS) in Bend, Oregon – produces 5 kilowatts (kW) of electricity, 2-3 kW more than is needed for the average US home. This methanol- and water-fueled demonstration unit has been on the road for tests in the Pacific Northwest.

The house was hydrogen-powered for only half a day, after which it was reconnected to Eugene's Emerald Public Utility District grid, which relies on hydropower from Columbia River dams for 85 percent of its electricity. But the test showed that the new fuel cell unit, the first developed to run an individual home, works smoothly and efficiently.

"The unit is a prototype for a new generation of environmentally friendly alternatives for power production," said Alan Guggenheim, president of NPS. "Fuel cells may be the new source of power generation we need if the federal government makes a decision to breach dams for salmon recovery in the Pacific Northwest."

Under contract to the Bonneville Power Administration, NPS plans to have 10 units in full-time operation next year, to be used for demonstration and educational purposes. Converting houses already on the grid is a few years off, as the cost of the unit is still prohibitive. Guggenheim projects that the units will be commercially available by the year 2003. At that time, with increases in manufacturing volume, he believes the units will cost from \$5,000 to \$10,000.

"This is a new technology," says Guggenheim. "There will be a learning curve that utilities will have to go through before they feel comfortable selling the units to their customers."

Fuel cell systems, which are powered by hydrogen, have the potential to change the energy landscape of the 21st century. Many energy experts believe that hydrogen is the energy wave we will ride into the future, and that fuel-cell technology will help create a clean "hydrogen economy" that will supplant our problem-filled fossil-fuel one. "Fuel cells could become an ubiquitous technology with every home and car having one," said

Christopher Flavin, a renewable energy expert with the Washington-DC-based Worldwatch Institute. "It is a very versatile technology that could potentially replace everything from diesel engines to large-scale power plants."

Fuel cells are efficient, clean, quiet, have few moving parts and can run on a variety of fuels. Because they are small and independent of large centralized generating facilities, fuel cells can easily bring electricity to places with no access to an energy grid.

"The plants make good neighbors," says Dr. Hans Maru, Executive Vice President of ERC, "and that saves time and money in transmission and distribution costs and losses."



This prototype fuel cell unit can power a typical 3-bedroom house in the US. Photo: NPS

### How They Work

Hydrogen, the world's most abundant element and one that is available from many sources, is used to make electricity in a fuel cell. Currently, the cheapest way to get hydrogen is to extract it from natural gas, methane or ethanol. Until recently, this "reforming" process had to be done outside of the fuel cell. Now, Energy Research Corporation (ERC) has developed the Direct Fuel Cell, which can process the hydrocarbons inside the cell. The Direct Fuel Cell concept was recently demonstrated at the Santa Clara Demonstration Project in Cali-

fornia's Silicon Valley. This plant ran for one year and contributed 1.8 megawatts to the Santa Clara Utility Grid, giving the project the distinction of being the largest fuel-cell power plant ever operated in the United States. The plant contained more than 4,000 individual cells, grouped into 16 stacks (resembling stacks of CDs), with each stack capable of producing around 125 kW of power. The two fuel cell modules and support buildings had a footprint roughly the size of two tennis courts.

### Cost Factor

As with other alternative energy technologies, fuel cells must compete with entrenched, government-subsidized energy sources. "The main hurdle of commercialization of fuel cell technology is the cost," says Maru. "At this point, most fuel-cell research is focused on bringing the costs down."

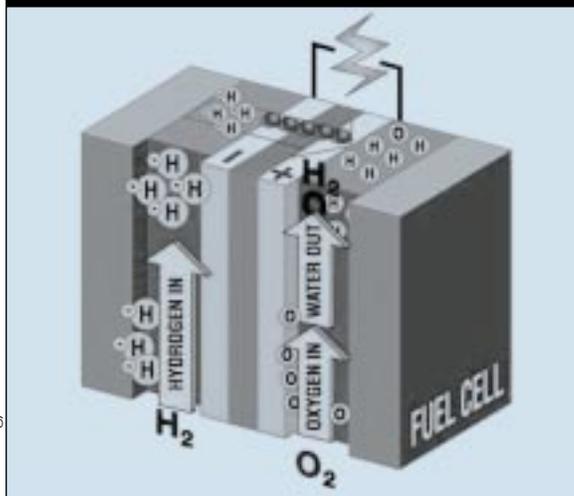
Presently, the cost of fuel cell electricity is around three times that of comparably sized generating systems, according to Maru. The production of fuel cell electricity (depending on the source of fuel) is around 5-10 cents/kilowatt-hour. The cost of fossil-fuel generating plants is 3-5 cents/kWh and hydroelectricity is 2-5 cents/kWh (which does not include the costs of distribution or social and environmental impacts).

The potential for using fuel cells at wastewater treatment plants, animal farms and landfills – which produce abundant methane as a by-product – is very promising. Usually the methane gas from these sites is flared (burned and wasted) or used in a combustion engine, thus creating even more emissions. Fuel cells can utilize the methane to power operations at the site. There are several fuel cell systems at work in landfills and wastewater treatment facilities in the United States. These systems are manufactured by ONSI, currently the only company in the world producing a commercially available fuel cell.

ONSI Corporation, a subsidiary of United Technologies, has around 120 stationary fuel cell units in operation around the world, with another 50 on order. With slightly different configurations, the units can run on pure hydrogen, natural gas, or methane. According to Mike London at ONSI, each 200kW fuel cell unit saves 1,100 tons of car-

*continued opposite*

## How a Fuel Cell Works



Many energy experts believe that using reformed hydrocarbons to fuel the cells is just an interim step on the path to an even more sustainable energy landscape – one that relies on the sun and wind. One of the challenges of using renewables is that they do not provide consistent energy and the challenge of storing their energy has not been completely solved. That's why fuel cells and renewables make a perfect team.

Using the energy from the sun, wind or waves, the hydrogen needed for the fuel cell can be extracted directly from water. No fossil fuels are required in this process. Hydrogen produced this way is called "Solar-Hydrogen," and is hydrogen in its cleanest form. The energy used to split the water molecules is consequently stored inside the hydrogen until the hydrogen and oxygen are reunited in the fuel cell when the energy is released in the form of electricity.

Many wind-power systems operating today are wind/diesel hybrid systems. Wind/fuel-cell hybrid systems would be much more efficient, says Flavin. You wouldn't need to bring in fuel – only water – and the maintenance costs would be lower because fuel cells just don't require as much maintenance.

### Cars Lead the Way

The most rapidly emerging use of fuel cells is currently in vehicles. The US Department of Energy believes that fuel-cell-powered cars may have fuel efficiencies of up to 80 miles per gallon and produce almost no emissions (most of the tailpipe's discharge is water vapor). The fuel-cell auto engine creates electricity from hydrogen and oxygen in the air through an electrochemical process that forms only water and heat as by-products. The hydrogen can be stored on the vehicle or extracted through thermochemical processes from natural gas methanol, gasoline or ethanol or other hydrogen carriers. Unlike current models of solar-battery-powered cars, the fuel cell will continue to run as long as it is given fuel. Presently, methanol looks to be the leading fuel for fuel-cell cars. According to the American Methanol Institute, it would cost about \$150 million to retrofit 3,000 California gas stations to supply methanol.

According to the San Francisco Chronicle, both DaimlerChrysler and Ford Motor Company have poured millions of dollars into research into Ballard Power Systems, a leader in vehicle fuel cell technologies.

DaimlerChrysler plans to have a prototype fuel-cell sport-utility vehicle by the end of this year. And in January, the world's first public hydrogen filling station opened in Hamburg, Germany.

### Iceland's Push for Hydrogen

The Icelandic government announced in the summer of 1998 that it is embarking on a large-scale experiment with fuel-cell systems, thus establishing the groundwork for moving the nation toward a hydrogen economy. According to Hydrogen & Fuel Cell Letter ([www.tccorp.com/nha/thl/](http://www.tccorp.com/nha/thl/)), this island nation of 270,000 people "may become a planetary laboratory for hydrogen energy technology." Iceland's vast amounts of hydrogen in the form of water and of energy from geothermal sources put it in an excellent position for a move in this direction. In cooperation with German car maker DaimlerChrysler and Canadian fuel cell developer Ballard Power Systems, the government is discussing how to convert Iceland to a hydrogen economy in 15 to 20 years.

"One of the reasons that we are exploring a hydrogen economy is that we are now dependent on the ups and downs of the fishing industry, and we need to have more eggs in our basket," says Parliament member Hjalmar Arnason. Power for export is the goal.

Gudmundur Páll Ólafsson, naturalist and award-winning author on Iceland's environment, is skeptical. According to Ólafsson, the talk of moving to a hydrogen economy is a diversion. Dam-building continues apace, he notes, and all the rivers in the highlands – the largest wilderness area in Europe – are in danger. Iceland has the second-highest energy consumption per capita in the world and currently gets 93 percent of its electricity from hydropower.

The example of Iceland shows that the transition to a hydrogen economy won't likely be an easy one. "It will be very difficult to displace the fossil fuel and dam infrastructure," says Jim Ohi of NREL. "Fossil fuel technologies have a long history of development and are constantly being improved. Here in the US, fossil-fuel energy costs are cheap, but we aren't paying the real cost for that energy."

Still, Ohi remains optimistic, and believes that by the middle of the next century, power plants, public transportation systems and personal vehicles will be powered by fuel cells.

There's something comforting about relying on the simplest element known to man for all our power needs. And, as scientists like to say, we will never run out of hydrogen. ■

bon dioxide per year compared with a 200kW combustion-based generator plant.

The Las Virgenes Municipal Water District in Southern California recently purchased two 200 kW fuel cell units from ONSI Corporation. The cost of the units was \$2.5 million, half of which was subsidized by government grants. Brian Whitaker, one of the water district engineers responsible for getting the fuel cells up and running, says that the system should pay for the unsubsidized portion of the cost within eight years. He said that although the initial cost was high, the district made the investment because of the system's environmental advantages and the fact that it will simplify the district's air quality permitting process. Emissions from fuel cells are so low that they are exempt from needing a permit from the South Coast Air Quality Management District, an area with the strictest requirements for compliance under the US Federal Clean Air Act.

"It ties in with our program of re-use," said Whitaker. "Once the fuel cell system is in place, every part of the domestic wastewater we treat will be put to beneficial reuse. We will use 100 percent of the methane to produce electricity which will feed back into the treatment process. And by utilizing the energy in the fuel-cell system's hot water by-product, we will be getting more than 80 percent efficiency from the system."

Another advantage of fuel cells is that they produce clean, potable water. According to the American Hydrogen Association, one pound of hydrogen combined with oxygen will make nine pounds of high-quality water. However, Worldwatch's Flavin doubts that this would be a sustainable way to solve water shortages: "Fossil fuels are not available in sufficient quantities to justify making water, except in very particular geographic regions."

# Turkish Dam Will Fuel Regional Tensions

by Peter Bosshard

**T**urkey is moving forward with a controversial new dam that will increase tensions over water with its neighbors, and possibly even fuel regional "water wars." The 1,200-megawatt Ilisu hydropower project is currently the largest dam proposed for Turkey. It is located on the Tigris River, 65 km upstream of the Syrian and Iraqi border. Construction is supposed to begin in mid-1999 and be completed by 2006. The project is part of a huge hydropower and irrigation scheme, the South-East Anatolia Project (GAP), which is supposed to produce a total of 27,300 gigawatts of power per year and irrigate a land area of 17,600 square kilometers, at an estimated cost of US\$32 billion.

The project's price tag is estimated to be US\$1.52 billion, not including financing costs. At a price of \$1,300/kW, Ilisu does not make much economic sense. The unit costs of a gas project being built in Turkey at the same time are a mere third of the Ilisu costs. Efficiency improvements in the country's notoriously wasteful power transmission system would also be more cost-effective than the new dam on the Tigris. Yet no alternatives to Ilisu were considered by the Turkish authorities.

The scheme was awarded in March 1997 to a Swiss consortium consisting of Sulzer Hydro and ABB Power Generation. The construction part was subcontracted to an international consortium made up of, among others, Balfour Beattie (UK), Impregilo (Italy), Skanska (Sweden), and the Turkish companies Nurol, Kiska and Tekfen. The finance package for Ilisu is being arranged by the Union Bank of Switzerland.

The Ilisu Dam is extremely controversial for a variety of political, social, environmental, economic and archeological reasons. It also appears to violate five policy guidelines of the World Bank on 18 accounts, and core provisions of the UN Convention on the Non-Navigational Uses of Transboundary Watercourses. Non-governmental organizations (NGOs) from a number of countries including Turkey are working to stop financing of the project.

## Political Problems

Water is considered to be a major cause of international conflicts in the 21st century. The claims of Turkey, Syria and Iraq on the water of the Tigris exceed the capacity of the river by 12 percent. Turkey has so far



Photo: Joerg Dietziker.

*Hasankeyf, an ancient town of cultural significance on the Tigris, would be flooded by Ilisu's reservoir.*

not agreed to negotiate a peaceful compromise regarding the management of the Tigris and Euphrates rivers, but instead relies on its position of power upstream to pressure and blackmail the other riparian countries. Syria supports the Kurdish PKK guerrillas as a pawn against this threat. The recent crisis between Turkey and Syria can only be understood in the context of the conflict over water. In 1990, Syria and Iraq went so far as to call Turkey's Ataturk Dam a weapon of war. In late August 1998, the Iraqi government threatened to bring the water issue to an international tribunal if Turkey proceeded with its present water and dam-building policies.

In May 1997, the UN General Assembly approved the Convention on the Non-Navigational Uses of Transboundary Waterways. This convention attempts to prevent significant negative impacts of projects on international waterways on other riparian countries. Apart from China and Burundi, Turkey was the only country which rejected the convention. More specifically, Turkey rejected the provisions ruling the prior notification of riparians about water projects, the preven-

tion of significant harm, and the peaceful resolution of international water conflicts.

While the irrigation projects of the GAP significantly reduce the river's flows, hydropower projects can be used for political blackmail of Syria and Iraq as well. Ilisu is a case in point. Given the average stream flow of the Tigris, filling the reservoir alone will absorb one half of its yearly stream flow. And the spare capacity of the reservoir will be sufficient for Turkey to block any water flowing to Syria and Iraq for several months.

## Social impacts

GAP reservoirs such as Ataturk and Karakaya have so far forcibly displaced hundreds of thousands of people. Compensation has usually been tied to the property of land or houses. Since most land in South-East Anatolia is concentrated in the hands of large landowners, many landless families were not compensated at all. Instead, they quietly moved to the slums of big cities such as Diyarbakir or Istanbul. Given the war between the Turkish army and the Kurdish guerrillas in East Anatolia, affected people

*continued opposite*

cannot voice any protest or discontent against the GAP, lest they be prosecuted as sympathizers of the guerrilla movement.

The Ilisu reservoir will flood 52 villages and 15 small towns, (including the city of Hasankeyf), and will affect 15,000-20,000 people. The exact number of affected people has so far not been established, since the surveys of the reservoir area were in part conducted by helicopter flyovers only. Affected people are not being consulted. Sulzer and ABB commissioned an environmental impact assessment (EIA) on Ilisu, but did not make this document available to affected people or NGOs. When the Berne Declaration asked for a copy, company spokespeople openly admitted that the EIA had been made for the export credit agencies and creditor banks only.

As was the case with earlier GAP projects, the mode of compensation will only be decided after construction starts. Senior managers of the GAP authority in the Ilisu region expressed conflicting opinions when they were interviewed by the Swiss journalist Joerg Dietziker in April 1998. While R. Erkan Alemdaroglu claimed that the affected people would be compensated with cash payments or apartments, Recep Serbetçi maintained that no cash payments would be made. It appears that the authorities will not draw lessons from the negative impacts of earlier GAP projects, and that Ilisu will produce more dam refugees in the region.

### Environmental Impacts

Solid waste and wastewater of major cities in the region are being dumped into the Tigris without any treatment. The Ilisu Dam will vastly reduce the river's flow and therefore its ability to purify itself. Sulzer and ABB regard this as "one of the most important project risks." Wastewater treatment plants are being planned and will reportedly be financed by the German government, but it

is not known whether binding decisions to build and finance these plants have already been taken as well as other crucial details.

The Ilisu reservoir will also infest the area with malaria and other diseases. Although project proponents say health education programs and the setting up of laboratories are supposed to take care of this problem, the global experience with other reservoir projects indicates that such mitigating measures will not protect the affected people from newly introduced waterborne diseases.

### Financing the Project

Because of the political controversies among riparian countries, the World Bank has declined to become involved in Turkey's GAP projects since 1984. The contractors have instead submitted applications for the financing of Ilisu to the official export credit agencies of Austria, Germany, Italy, Japan, Portugal, Sweden, Switzerland, the UK and the US.

On November 30, 1998, the Swiss government, being the lead agency regarding Ilisu, approved an export credit guarantee of SF470 million for Ilisu. In defense of the guarantee, a government spokesperson said that the Turkish government had given written assurances that they would comply with international social and environmental standards in implementing the project. The Swiss government only approved the guarantee under the condition that the Ilisu consortium set up an independent monitoring mechanism for the project. Several other governments – including Germany, Sweden and the US – supported this condition.

Given the shocking human rights record of the Turkish government, especially in South-East Anatolia, the assurances regarding international standards of project implementation cannot be taken at face value. The condition that an independent monitoring mechanism be set up is still a step forward,

in that it opens political space for the victims of the project to fight for their rights. The Berne Declaration in a letter to the Swiss government requested that groups representing the poor majority of Kurdish people in South-East Anatolia be involved in the monitoring of Ilisu.

### Policy Incoherence

With very few exceptions, official export credit agencies do not have social and environmental guidelines matching the World Bank's policies. At the same time, the OECD governments (the grouping of the world's most industrialized nations) control the majority of the Bank's capital, and have supported the establishment of binding social and environmental policies at the World Bank in many instances. It is incoherent and contradictory therefore that the same governments are not prepared to follow similar guidelines when it comes to their own export credit agencies. In cases like Ilisu, OECD governments individually fund projects which, collectively (through the World Bank), they could not. They thereby undercut the policies which they have established at the World Bank, and the provisions of the UN Convention on the Non-Navigational Uses of Transboundary Watercourses which most of them have approved.

In May 1996, the governments which form OECD's Development Assistance Committee issued a report on "Shaping the 21st Century: The Contribution of Development Co-operation." In this report they made the following commitment: "The ramifications and opportunities of policy coherence for development now need to be much more carefully traced and followed through than in the past. We should aim for nothing less than to assure that the entire range of relevant industrialized country policies are consistent with and do not undermine development objectives. We will work to assure that development co-operation and other linkages between industrialized and developing countries are mutually reinforcing."

Ilisu demonstrates that OECD governments still fail to fulfill this commitment. International NGOs have repeatedly called on OECD governments to establish harmonized standards for their export credit agencies, and to avoid all double standards between these agencies and World Bank policies. ■

*For further information on the project, contact Peter Bosshard, Berne Declaration, email: finance@evb.ch, Internet: www.access.ch/evb/bd, Fax: +41.1.272.6060.*

## Irrigating Land to Death

*The dams on the Tigris and Euphrates are causing permanent damage to agricultural lands in the region from salinization and water-logging, twin problems stemming from over-irrigation of arid lands. The book Silenced Rivers by IRN's Patrick McCully (Zed Books, 1996) describes the situation:*

The problems besetting agriculture in the Euphrates Valley in Syria, where half of the irrigated land is already affected by salinization and water-logging, will be greatly worsened by the increased salinity – and reduced volume – of water entering the country due to the massive program of reservoir building and irrigation expansion underway upstream in Turkey. Agriculture in Iraq, downstream of Turkey and Syria on the Euphrates, and downstream of Turkey on the Tigris, faces a "general pattern of steadily impending crisis," according to US geographers John Kolars and William Mitchell.



This bridge, now ludicrously overscaled, was once the right size for crossing Zambezi's wet-season floodplain.

Over the millennia, life in Southern Africa was measured by the ebb and flow of the great Zambezi River. Every year the river's waters spilled over into its vast floodplains, irrigating subsistence crops, rejuvenating vital grasslands for wildlife and livestock, depositing nutrient-rich sediments in coastal mangroves, and triggering the lifecycles of countless species of plants and animals. Low dry-season flows sustained the productivity of coastal prawn fisheries and enabled the people of the river's basin to harvest riverine fishes.

For the past 40 years, however, the pulse of the Zambezi's ancient flood cycle has been harnessed by the colossal Kariba and Cahora Bassa dams. Built with the promise that they would stimulate regional economic growth through hydropower production, these developments have come at great cost to the marginalized people and wildlife of the Zambezi basin. Nowhere has this hardship been more pronounced than in the lower Zambezi valley of Mozambique. For 25 years, erratic and mistimed flooding below Cahora Bassa Dam has adversely affected the living standards of hundreds of thousands of downstream households and decimated one of the most productive and diverse wetland ecosystems in Africa, the Zambezi Delta.

While Kariba was built before the impacts of dams were well-understood, Cahora Bassa has no such excuse – and in fact appears not to have incorporated many lessons from Kariba. The degree to which scientists' concerns were ignored in the planning of the Cahora Bassa project is staggering. Before the dam was completed in 1975, South African river ecologist Dr. Bryan Davies warned of the dam's severe consequences in a pre-project assessment: "Reduced artisanal fisheries and shrimp industry productivity, reduced silt deposition and nutrient availability, severe coastal erosion, soil salinization, salt water intrusion, replacement of wetland vegetation by invasive upland species, reduction in coastal mangroves, failure of vegetation to

recover from grazing, and disrupted or mistimed reproductive patterns for wildlife species." Just ten years later, deleterious changes to the Zambezi's riverine, wetland, deltaic and coastal ecosystems were already apparent. Fisheries ecologists G. Bernacsek and S. Lopez lamented in a UN document, "It is clear that in the case of Cahora Bassa there was no serious attempt to ecologically optimize the dam prior to construction ... Cahora Bassa has the dubious distinction of being the least studied and possibly least environmentally acceptable major dam project in Africa."

Now, a quarter century after the dam's completion, the impacts predicted years ago have sadly come true. Except in years of exceptional local rainfall, the lower Zambezi River no longer overflows its banks at the time of natural peak flooding. Most of the delta's distributary channels are choked with invasive vegetation and no longer convey floodwaters to the desiccated floodplains. Anthropologist Dr. Ted Scudder notes that "villagers correctly attribute the loss of crucial land for grazing and flood recession agriculture, and a drop in the productivity to their fishery, to dam construction."

Due to the lack of the natural seasonal variations in flow, the once lucrative delta prawn fishery has declined precipitously, and only one of the main channels of the Zambezi Delta mouth supports relatively healthy mangrove. According to Davies, "there are now large gaps in the mangrove forest along the entire northern and southern sectors that didn't exist prior to 1975, and areas of coastal erosion with dead mangroves in evidence." Populations of Cape buffalo, waterbuck, reedbuck, zebra and hippo have declined by 95 percent or more as the now-dry floodplain has opened the area to commercial poaching. Grassland burning has intensified throughout the dry season, and more than 90 percent of the lower Zambezi floodplain now burns every year. Research by Mozambican ornithologist Carlos Bento sug-

# Can T

## Rethinking Cahora

by Richard Beilfuss

gests that the breeding cycles of many delta species, including the endangered wattled crane, have been disrupted by the irregular flood patterns below the dam.

The devastation of the lower Zambezi seems all the more tragic in view of the fact that power lines were sabotaged shortly after the dam was completed. For more than 17 years, all but one of Cahora Bassa's turbines remained idle while Mozambique's civil war raged. Only in the past year has power production been restored to its original capacity.

### Restoring the Flood

In 1995, a broad group of interested social and environmental scientists from Mozambique, South Africa, and North America joined together to promote the recovery of the lower Zambezi system through improved management of Cahora Bassa Dam. Through a series of comprehensive studies, this group began to assess the social, economic, and environmental advantages and disadvantages, for a broad range of stakeholders, of different strategies for managing Zambezi waters. These experts hoped to demonstrate that the "best" use of Zambezi waters requires the restoration of natural flooding patterns of the river through prescribed releases from Cahora Bassa Dam.

The benefits of prescribed flooding for downstream communities and ecosystems has gained worldwide attention in recent years. In the western United States, artificial flood releases from large dams are being tested to maintain instream flow requirements for riverine habitats, salmon fisheries and recreational demands. In Africa, artificial flood releases below large dams are gaining acceptance as a means of promoting integrated rural development. In Nigeria, for example, artificial flood releases from the Tiga and Challawa Gorge Dams have been promising and could be used further to help restore the Komadugu-Yobe basin's ecosystems. In the Senegal River basin, studies by the Institute for Development Anthropology have demonstrated that floodplain conditions below Manantali Dam would be improved with only a small reduction in hydropower, and that the cost of the lost

# Can the Zambezi River Be Saved?

## Cahora Bassa Could Make a Difference for Dam-Battered Zambezi

hydropower is substantially outweighed by the economic benefits to agriculture and fisheries. From Cameroon to South Africa, experimental flood releases offer opportunities for reducing the damage in river basins that have been degraded by large dams. Indeed, African nations are leading the way in this emerging science.

Ideally, a prescribed flooding program for the lower Zambezi system would include the coordinated management of both Cahora Bassa and Kariba Dams (the latter controls more than 50 percent of the Zambezi catchment). Unfortunately, Kariba was designed with no consideration of prescribed water releases. Flood releases from Cahora Bassa Dam, however, are possible. Cahora Bassa's eight sluice gates are located significantly lower on the dam wall than Kariba's, and are below the average operating water level of the reservoir.

Flood pulses have been released from Cahora Bassa since its completion to prevent the dam from overtopping. These events were not planned, and took a heavy human toll because they occurred as flash floods. The 1978 flood alone killed 45 people, displaced more than 200,000 and destroyed nearly 60,000 hectares of crops.

These floods did have unplanned benefits to the ecosystem, which led scientists to believe that prescribed floods can play an important role in restoring ecological conditions in the lower Zambezi. Following emergency flood releases from the dam in 1978, floodplain conditions improved dramatically for local flora and fauna. South African ecologist Paul Dutton observed that Cape buffalo and waterbuck populations increased markedly, and encroaching upland vegetation receded from the floodplain. In 1997, emergency flood releases again led to overbank flooding, and again the hydrological conditions in the lower Zambezi showed striking improvement. Waterbird populations increased and dispersed more widely, and the flushing of stagnant waterways in the floodplain led to an estimated 10-20 percent reduction in the cover of invasive plants.

Incorporating planned flood releases into the operation of Cahora Bassa Dam needs to be evaluated in light of a complex economic picture muddled by past debts and the

effects of the long civil war. Mozambique is deeply in debt on the project to Portugal, its former colonial overseer (Portugal still owns 82 percent of the dam, and operates it through the firm Hidroelectrica de Cabora Bassa). Because the Cahora Bassa debt is just one of the many burdens on Mozambique's post-war economy, the government is pressed to generate maximum power output to eliminate the dam debt as quickly as possible. Although negotiations are underway to try to relieve some of the debt, Mozambique also remains bound by power contracts that date back to the 1970s and force the export of nearly all power from the dam.

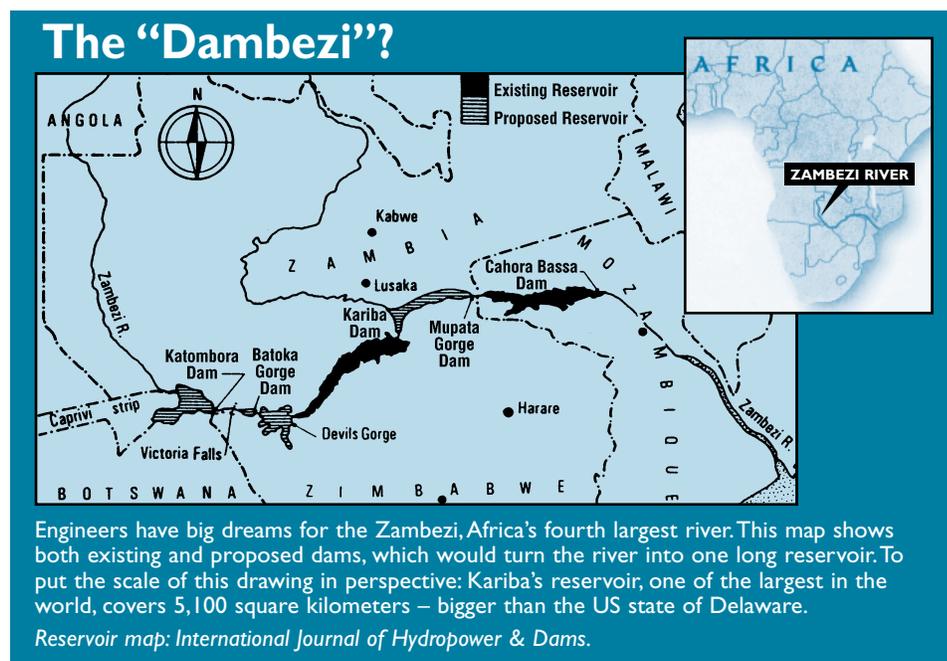
The encouraging news is that the Mozambican government is very enthusiastic about seeing improvements in the river's ecosystem, and has been very interested in studies that will help it evaluate options to improve the dam's management. One step it has taken is to look at the costs and benefits of an artificial flood on the dam's income-generating capabilities. According to the Zambezi Valley Development Authority, the total value of contracts with South Africa and Zimbabwe for hydroelectric power from Cahora Bassa is about US\$200 million per annum (based on about 2,100 megawatts of power). Preliminary hydrological studies sug-

gest that managing outflows to mimic the historic mean annual Zambezi flood might entail, on average, a 10-15 percent reduction in power output. This would result in about \$20-30 million in lost revenues per year.

The economic benefits of restoring natural flood cycles to the lower Zambezi derive from the anticipated improvements in downstream conditions. Although such gains can be difficult to quantify, the benefits to the coastal prawn industry alone are eye-opening. According to Mozambican fisheries ecologist Dr. Antonio Hogueane, "the lowering of dry-season flows and a rise in wet-season flows in the Zambezi River would stimulate recruitment of juvenile prawns to the population and improve production of the industry, leading to an increase in revenue of \$10-30 million per annum within two years of improved water management."

Re-establishment of natural flood-release patterns would also have beneficial effects on the riverine fishery. Many fish species depend on overbank flooding to provide access to spawning grounds on the grassy floodplain, while lower dry season flows tend to improve the catch rate. Since Cahora Bassa Dam was built, local markets have experienced a significant decline in the

*continued on page 10*



## Dams Commission to Study Zambezi Dams

The World Commission on Dams intends to do a detailed study of the projected and actual impacts, costs and benefits of Kariba Dam. The study is also expected to look in less detail at Cahora Bassa and the other main dams in the basin and at their cumulative impacts. Some nine other basins around the world will also be studied in this way. The WCD secretariat is currently negotiating approval for the basin studies from relevant governments.

The WCD basin studies are intended to look at the projected versus actual benefits, costs and impacts (social, economic and environmental) of dams in the basin; unexpected impacts; the distribution of costs and benefits (who gained and who lost); decision-making on the project, and project compliance with the criteria and guidelines of the day. The group also hopes to answer the question "How would this project be viewed in today's context?"

In addition to the basin studies, the WCD will also undertake brief reviews of 100 or more individual dams around the world, and 16 "thematic studies" of social, environmental, financial and planning issues related to dams in general and alternatives to them. The work is expected to be completed by June 2000.

The methodology for the basin studies is being tested and refined through a pilot study of the Orange River which began late last year and is scheduled to be completed in early 1999. The Orange rises in Lesotho and flows westward to the Atlantic through South Africa. The focal dam for this study is the Gariep/Vanderkloof dam complex.

The pilot study has already generated controversy. NGOs say the WCD is giving too little attention to the cumulative impacts on the basin of the partly complete Lesotho Highlands Water Project (the largest dam complex planned for the Orange), and the lack of attention to that project's persistent social problems. The Chair of the WCD, Kader Asmal, is closely involved in the Lesotho dams in his role as South African Water Minister.

Patrick McCully

**Zambezi** continued from page 9

quantity of large fish species taken from the lower Zambezi River. The annual value of improved flooding to the thousands of lower Zambezi fisherman would undoubtedly measure in the millions of dollars.

A more natural flood would also enhance the value of floodplain agriculture and grazing practices. Past studies by Swedish consultants argue that released floods would improve soil fertility, reduce salinity, increase the extent of flood-recession cropping, and improve the species composition and carrying capacity of floodplains for native and domestic herbivores. These benefits are corroborated by findings from recent research in Senegal and Nigeria, which places the economic value of artificial flood releases for subsistence agriculture in the millions of dollars.

Raising the carrying capacity of the Zambezi floodplain may also allow the once legendary concentrations of Cape buffalo, elephant, waterbuck, zebra, lion and hippo to return. According to Dutton, restoration of healthy populations of Cape buffalo and other game species would result in substantial economic returns from tourism and regulated trophy- and food-hunting.

Of course, economic analyses alone cannot begin to capture the full value of restoring the Zambezi ecosystem. The basin is of profound cultural and ecological importance to Mozambique and to the world. It is home to between 400,000-700,000 rural people, all of whom draw their livelihoods from the river and its valley. The lower Zambezi is of international importance for its diversity of mammal, fish, and waterbird species, many of which are endangered or vulnerable. It supports a rich mosaic of more than 12 different natural communities, including some of the most extensive coastal mangroves in Africa. It is the Zambezi river floodwaters that have created and maintained this richness.

Further studies will provide a more complete accounting of these benefits, but clearly there are strong economic, social and ecological arguments for restoring flooding to the lower Zambezi. The fate of the lower Zambezi ultimately depends on using these arguments to garner strong institutional support at the local, regional, national and even international levels for more-natural water releases from the dams.

### Living with Dams

Of course, prescribed flooding is not a panacea for the problems of the lower Zambezi basin. Efforts to re-establish natural flood cycles will not necessarily result in the re-establishment of historic floodplain condi-

tions. The health of river systems depends on many other factors as well, including sediment loading, nutrient flows, and the activities of the system's plants and animals.

Riverine sediments, for example, "play a pivotal role in the ecological functioning and productivity of the river, its wetlands, the delta, and the coastal zone, and hence, greatly influence economic activities in the valley and the adjacent coastal zone," notes Davies. But Kariba and Cahora Bassa reservoirs trap most of the sediment load of the upper and middle Zambezi basins, releasing silt-free waters downstream. Artificial flood releases may increase sediment transport, but they cannot recreate the basin-wide process of sedimentation that once fertilized and aggraded the lower Zambezi. With widespread coastal erosion and mangrove die-back already in evidence, the long-term social and ecological consequences of reduced sedimentation are sobering.

Equally problematic are the changes that have taken place in land use and settlement patterns along the lower Zambezi system. Widespread settlement is occurring in historically flood-prone areas of the riverway, as villagers abandon their upland homes and adjust their livelihoods to the regulated Zambezi. To realize the anticipated benefits of restored flood cycles, temporary movement away from flood-prone areas will be required during peak flood releases. This in turn will require that an appropriate flood warning system and community-based rural development program be put into place. However, after 25 years of mismanagement of Cahora Bassa Dam, attitudes toward floods in the delta are very negative, and these will be difficult to overcome.

Although some village elders recall the importance of the historic floods for their livelihood, most young people think that floods are "created by the government" and do nothing but harm. They point to the unanticipated flash flood releases from Cahora Bassa, which crested much more quickly than natural floods and created hardships that slowly rising and receding floodwaters did not. Overcoming such perceptions will require extensive community outreach. According to IUCN Zambezi Basin project manager Baldeu Chande, "one of the great challenges for conservation work in the Zambezi Delta is to work with people and educate them about the values of floods ... but first, we must learn from them."

Prescribed releases are expected to produce only moderate floods, which are likely to prove beneficial for many floodplain processes. However, large floods – characteris-

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## Zambezi continued

tic of the historic Zambezi system – may be required to remove upland trees that have become established in the floodplain in the absence of flooding, and to flush accumulated organic matter and nutrients from peripheral swamps to the floodplain. As yet, little research has been conducted on the species-, community- or ecosystem-level responses to varied flood releases in the lower Zambezi or elsewhere in sub-Saharan Africa.

## Building Consensus

The process to re-operate the Cahora Bassa Dam in a more beneficial way is gaining momentum and political will, despite the many obstacles and competing considerations. Most notably, a workshop on the sustainable use of the Cahora Bassa Dam was held in October 1997 under the auspices of the Mozambique's Zambezi Valley Development Authority (GPZ) and Arquivo do Patrimonio Cultural (ARPAC), the main government body doing social research. The workshop drew more than 50 scientists, man-

agers, and high-level decision-makers from Mozambique, southern Africa and beyond. Participants discussed how the Cahora Bassa Dam might be managed to optimize use of Zambezi water for local development and conservation in addition to other national interests, and discussed immediate actions that could be taken to improve water management and build consensus among Zambezi users. Participants, including three cabinet-level Mozambican officials, concluded that the Cahora Bassa Dam's outflow should be managed to simulate the river's natural variability in water flow.

Future meetings will engage a widening circle of stakeholders and decision-makers in reaching consensus on an integrated management plan for Cahora Bassa Dam and the Zambezi Valley. Calls to allocate the Zambezi's waters to benefit river basin communities and ecosystems, in addition to other national and international development interests, are now being received favorably in the decentralized political system of Mozambique.

The restoration of the lower Zambezi system is ultimately an exercise in adaptive management. Many conclusions and judgments will be made by observing short-term responses to flood releases and adjusting prescriptions accordingly. Decision-makers and river basin managers alike will need to understand the uncertainties that we inevitably face in trying to ameliorate the impacts of large dams.

Implementation of a prescribed flooding program at the scale of the lower Zambezi basin is a long-term process. It will demand strong political will, constant community outreach, and continuing international scientific cooperation. The alternative – the continued degradation and decline of the lower Zambezi – would ultimately prove infinitely more costly to the people and wildlife of Mozambique. ■

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*The author is a wetland hydrologist and the Africa Program Coordinator for the International Crane Foundation in Baraboo, Wisconsin.*

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## Epupa continued from page 1

on the "culture, lifestyles and livelihoods of the isolated and highly traditional people in the area" as well as "an environmental management plan specifying mitigation measures for dealing with the major effects, as well as a post-construction monitoring program."

The reason for the omission of the mitigation plan, Namang explains, is the breakdown in communication between the consultants and the affected Himba communities. The communities have expressed a "vote of no confidence in the political processes (accompanying the study) in both Angola and Namibia," the consultants write.

The "draft final" version of the feasibility study report, which was released in October 1997, was labeled "incomplete" by Namang because it did not contain measures to address the impact of the planned scheme on the Himba communities in the proposed dam areas. Since then, the affected Himba communities have continued to refuse to discuss mitigation plans with the consultants. Communication on this was finally halted early this year, according to *The Namibian*.

Namang decided to complete the environmental assessment by including chapters on principles for a social mitigation program in place of a project-specific mitigation plan. While the consulting teams now considers the report complete, "Namang in no way suggests that the social mitigation/compen-

sation component of the project is in place or that the people in the direct impact zone are reconciled to the project."

The final study states that since interaction on possible mitigation measures "is not possible for political reasons, the project has achieved what can be achieved and reached a logical conclusion. A political solution has to come prior to continued community interaction for social mitigation."

## Lack of Participation

The final report's introduction says, "In the view of Namang there has not been sufficient dissemination of information concerning the scheme, or local community consultation, participation and involvement in the details of site selection and development of an acceptable social mitigation programme ... It will be the task of the two Governments to eventually work out a Social Mitigation Programme in consultation with the affected local population."

The consultants described a number of reasons that the Himba stopped communicating with project officials. From the very start, the consultation process got off on a bad note, with an early visit by a project team misleading the Himba communities in Namibia about the scale of a possible dam. This meeting led the Himba to believe a small cattle-watering reservoir would be built in their region. Since then, government offi-

cials have made disparaging remarks about the Himba lifestyle at public meetings, implied that the dam was a "done deal," and sent state police to break up meetings between the Himba and their legal council in the nation's capital.

The final report has adjusted the price tag for the scheme's two options upwards, to a total of US\$542.81 million for the Epupa site and US\$554.38 million for the Baynes site.

A dam at Baynes will cover some 57 square kilometers of land under water being held back by a dam wall 200 m high – a height which would be a world record for a dam of its kind. It would also drown some 15 grave sites and 45 archaeological sites, displace nearly a hundred permanent users and affect about 2,000 permanent users of the area.

At Epupa, a dam wall 163 meters high would create a reservoir covering 380 square kilometers when full. The scenic Epupa Falls, which draws tourists to the area, will be permanently drowned by such a dam. The study notes that Epupa Dam would flood some 6,000 mature *hyphaene* palm trees which are an important food source for the Himba people in times of drought. Evaporation from a dam at Epupa was calculated to be some 630 million cubic meters in a year, which was eight times as much as at the Baynes site and many times the nation's total potable water supply. ■

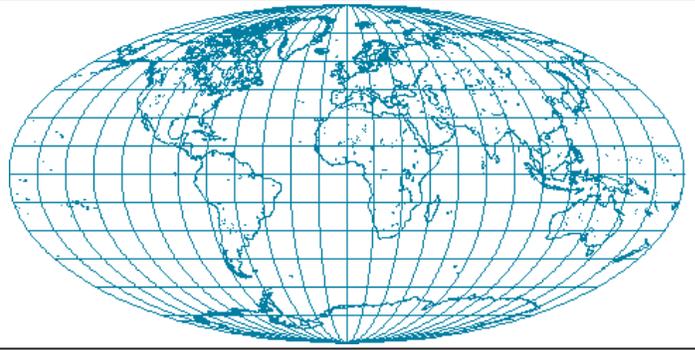
## SHORTS

■ Around 5,000 clients of Dutch banking group ABN Amro Holding NV have signed a petition protesting the US-based Freeport-McMoran Copper & Gold Inc.'s mining activities in Indonesia, for which the bank is one of the financiers, in mid-December. The Dutch environmental watchdog Milieudefensie presented the petition to the bank's management, demanding ABN exert its influence on the US company to make its activities "clean and honest."

ABN's management said it has, in light of Milieudefensie's actions, called on Freeport to reach agreement with environmental organizations and the indigenous people of Indonesia's Irian Jaya province, the site of the mines, to conduct an independent study on the impact of Freeport's operations. NGOs have long complained about the massive human rights and environmental abuses at the mine, including sediment pollution of the Ajkwa River, into which the Freeport mine dumps 260,000 tons of rock waste every day.

■ An estimated 40 percent of world deaths can now be attributed to environmental factors, especially organic and chemical pollutants, according to a study led by David Pimentel, professor of ecology and agricultural sciences at Cornell University and published in the October 1998 journal *BioScience*. "More and more of us are living in crowded urban ecosystems that are ideal for the resurgence of old diseases and the development of new diseases," said Pimentel. "We humans are further stressed – and disease prevalence is worsened – by widespread malnutrition and the unprecedented increase in air, water and soil pollutants," he said.

## News Briefs



### UPDATES

**LESOTHO:** Southern African media sources report that Lesotho may be forced to pay for a September invasion by South African troops which aimed to secure its capital and the Katse Dam site from rebels supposedly planning a coup. This will be a tough request, given the nation's enduring poverty and the huge cost of repairing the damage from riots sparked by the invasion (see WRR, December 1998 for the full story). A news report on South Africa's SABC-TV on January 10 said that government sources had suggested that South Africa may be compensated for its costs in free water from the Lesotho Highlands Water Project (LHWP) rather than cash.

The LHWP is being built to transport water from Lesotho's mountain watersheds to South Africa's Gauteng Province, home of Johannesburg and Pretoria. Early reports indicate this could amount to about five months' worth of free water deliveries. Royalties for sale of water from the LHWP now account for some six percent of Lesotho's gross domestic product, according to the World Bank. A spokesman for the South African Department of Water Affairs says the LHWP treaty gives South Africa no provision to deduct money from royalty payments, so it would be Lesotho's decision to go for a military-debt-for-water swap.

A January 8 mailing of the Danish e-mail newsletter *Afrika News Network* reports that the agreement between South Africa and Lesotho on the military intervention – which resulted in 17 deaths at Katse Dam along with dozens more killed and major destruction of property in the nation's capital – stipulates that "the receiving party (Lesotho government) shall be liable to the sending party for all real expenses and costs incurred by the sending party, with regard to the provision of military assistance to the receiving party." The newsletter says that "sources say about M8 million (US\$1.5 million) was paid to South Africa about three weeks ago, and that over M240 million is expected to be paid at the end of the military mission in three months' time."

**CANADA:** In a speech to dam proponents, Hydro-Québec president Andre Caillé said it's time for a return to the days of big hydro projects or Québec risks losing out on lucrative power sales projects to its competitors. According to a January 22 article in the Montreal newspaper *The Gazette*, Caillé said he wants hydro projects to again become a point of great pride for Québec and a motor for the economy. Hydro-Québec has been targeted by native peoples' organizations for years because of its disregard for native communities and their needs in its planning of large dams on indigenous lands. The utility's president said 1999 will be a turning point for hydro, because it will hold key decisions on the future of \$12 billion worth of potential projects. Hydro-Québec hopes to exploit the new open market in North America for power exports.

Québec's last big hydro scheme, the C\$13.3 billion project to dam the Great Whale River, was shelved by the government in 1994, after environmentalists and the northern Cree mounted an international media campaign discrediting the utility's reputation. Québec's interest in new projects has more recently focused on developing, with Newfoundland, the lower part of Churchill Falls, which is hotly opposed by the local Innu people (see WRR, April 1998).

But Caillé said Québec has nothing to be ashamed of in its past environmental track record. He said hydropower "Never, never did and will never cause any ecological disasters as some have presumed to say."

Caillé distanced himself from the utility's past record by saying he has a different approach to damming rivers, starting with the fact he believes projects have to be built in conjunction with local communities, including native ones. "We must consider them as partners, business partners, not simply partners in the general way. That's why we are examining ways to establish a new mode of partnership which can take the form of common companies or other forms which will participate in the planning of the projects." Caillé also said polls show 80 percent of Québecers support new hydro develop-

ments as long as local communities agree and the environment is protected.

**LAOS:** Poor construction standards by Chinese contractor China International Water and Electric Corporation (CWE) have caused a \$15-20 million cost overrun at the Nam Leuk Hydropower Project. The 60-MW dam and diversion scheme, which is expected to be completed by the end of this year, is wholly owned by the Lao government. Finding the additional funds will be difficult for the cash-strapped country, which has pinned its hopes on hydropower to fuel economic development. The cost overruns represent a 15 percent increase in the estimated cost of the project.

The project was funded by the Asian Development Bank (ADB) in 1996. The ADB is now unwilling to provide an additional loan and has recommended that the government pursue two alternate options for meeting the shortfall. The first option involves the government selling part of their 60 percent equity interest in the Theun-Hinboun Power Company (see back page for more on this project). The other option involves selling part of the project, along with part of Nam Ngum hydropower project – the Lao government's biggest export earner – to Sipte Pacific, a US energy company looking for a suitable investment in Laos.

Construction on Nam Leuk began in early 1997 but was halted several months later by the ADB after it discovered that CWE's poor work was causing excessive sedimentation in the Nam Leuk River. Since then, project consultants Sogreah Ingénierie, a French company initially responsible only for construction supervision, has reportedly taken on extra responsibilities at the site and is expected to receive additional fees for their work. While the quality of construction appears to have subsequently improved, the delays and the need to hire additional staff have caused the cost overrun.

**CHINA:** Chinese leaders called for international inspections of construction at the Three Gorges Dam, their first public note of concern over the massive project. Chinese Premier Zhu Rongji toured the construction site on the Yangtze River, warning workers that any negligence in building the huge hydroelectric project could cause disaster, state-run media reported in late December. A dam failure at Three Gorges would endanger millions of people downstream. In 1975, Chinese dam disasters killed an estimated 230,000 people.

## TROUBLED WATERS

**US:** In a rare wet-season warning, seven million people in the Delaware River Basin area of New York, Pennsylvania, Delaware and New Jersey are being asked to conserve water to avoid still more drastic emergency measures, according to a January Environmental News Service story. Although snowstorms have been battering the area this winter, the area is suffering from a prolonged water shortage. Flows in the Delaware River and tributaries have been far below normal since last July. The Delaware River Basin Commission, which issued the declaration, is responsible for managing the water resources in the 13,539 square-mile basin.

The DRBC's drought plan is based on below-normal water storage in three reservoirs in the Catskill Mountains of New York State. In a normal year, combined storage in those reservoirs would be increasing during the late fall and winter months. Last year, however, storage fell by 77.6 billion gallons from October 1 through December 31 and is continuing to decline.

The drought has not only impacted reservoir storage and streamflows, but has caused significant decreases in ground water levels throughout the basin, which drains portions of Pennsylvania, Delaware, New Jersey and New York. This has allowed salinity intrusion – the upstream migration of salty water – from the Delaware Bay during low-flow conditions in basin rivers and streams. Since August 1998, salty water moved upstream about 14 miles above its average location for this time of year. As the front moves up river it threatens a large aquifer underlying southern New Jersey which is used for municipal water supply. In recent dry years, salty water also has migrated into streams and creeks in Delaware, threatening water supplies.

The Commission could order major changes in water use if conditions worsen. For now, it is merely asking people in the region to conserve water at home by taking shorter showers, stopping water leaks and other voluntary conservation measures. The average person in the area uses 50 gallons per day, about 19 of them just for toilet-flushing. The commission is emphasizing the importance of repairing leaks, noting that a leaking toilet can waste up to 200 gallons of water a day.

## ALTERNATIVES

**WIND POWER:** The world added 2,100 megawatts of new wind energy generating capacity in 1998, a new all-time record and a third more than was added in the previous year, according to estimates by the World-

watch Institute. Wind power is now the world's fastest growing energy source. The new wind turbines added in 1998 have pushed overall wind generating capacity worldwide to 9,600 megawatts at the end of 1998 – double the capacity in place three years earlier. The 1998 boom in wind energy was led by Germany, which added 800 megawatts, pushing its wind energy capacity to over 2,800 megawatts. Spain was another major player, adding 395 megawatts of wind power and increasing the country's overall capacity by 86 percent, to 850 megawatts.

Larger turbines, more efficient manufacturing and careful siting of wind machines have brought wind power costs down precipitously – from \$2,600 per kilowatt in 1981 to \$800 in 1998. Wind power has already reached economic parity with coal-based electricity. And the US Institute for Energy and Environmental Research says recent advances in the technology have made wind power more economical than using plutonium to generate nuclear power. Costs of electricity from plutonium in commercial nuclear reactors are 40 percent greater than offshore wind electricity and, in the long-term, breeder reactors are twice as expensive, according to the online newsletter *Trends In Renewable Energies*. As the technology continues to improve, further cost declines are projected, which could make wind power the most economical new source of electricity in many countries in the next decade, World-watch energy experts believe.

Wind power has also become one of the world's most rapidly expanding industries, with sales of roughly \$2 billion in 1998. The wind industry is creating thousands of jobs at a time when manufacturing jobs are falling in many nations.

The dramatic growth of wind power in the 1990s stems from the introduction of supportive government policies in countries such as Germany and Spain. The most important policies to date are laws that guarantee access to the grid for wind generators at a legally set price for the electricity they produce. These laws have established a stable market for the new industry, and have overcome the resistance of coal- and nuclear-dependent utility companies to the new competition.

Some 80 percent of the global wind power market is now centered in just four countries, which reflects the failure of most other nations to adopt supportive renewable energy policies. Future market growth will depend in large measure on whether additional countries make way for renewable energy sources as they reform their electricity industries.

# Mattaponi Tribe Opposes Virginia Water Scheme

by Susanne Wong

For generations, the Mattaponi Indians have depended on the shad, herring and striped bass that inhabit the freshwater marshes of the Mattaponi River in Virginia for sustenance. Direct descendants of Pocahontas who live on one of the oldest reservations in the country, the Mattaponi tribe has maintained its heritage and customs despite strong pressure to assimilate. However, the tribe's way of life is currently threatened by a \$151 million water diversion project – a project that faces strong opposition from tribes, environmental groups and local citizens.

The scheme would divert as much as 75 million gallons of water per day, or one-third of the river's flow, to a proposed 1,500-acre reservoir on Cohoke Creek in King William County, Virginia to satisfy the water needs of the city of Newport News. As a result, reduced freshwater flows and saltwater intrusion would destroy "one of the most pristine freshwater complexes on the Atlantic Coast," according to the Nature Conservancy, and fish populations which the Mattaponi depend on. The project also threatens the habitats of rare wetlands plants and the bald eagle.

Construction of the reservoir would flood more than 100 Mattaponi archeological sites, destroy 1,457 acres of upland wildlife habitat and destroy 524 acres of wetlands, resulting in the largest single destruction of wetlands in Virginia since the 1970 passage of the Clean Water Act.

"The planners claim that the loss of wetlands will be mitigated by a 2-to-1 conversion of farmland to wetlands, but wetlands aren't just something you make by flooding farmland," says Todd Custalow, a member of the Mattaponi tribe. "Wetlands have evolved over thousands of years. If you flood the farmlands, you won't have wetlands. You'll just have mud."

Opposition to the project is growing both locally and nationally. "It is clear that this reservoir scheme has raised far more serious questions than it has answered, and that staunch opposition to this project is growing and spreading across the Commonwealth," says Billy Mills, Executive Director of the Mattaponi and Pamunkey Rivers Association. Last year, the project's enormous impacts on tribes and the environment landed the Mattaponi River on the Washington, DC group American Rivers' list of "most endangered rivers in America."

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***"Newport News doesn't need the water, so what they'll do is sell it, and ultimately they'll have power over development and growth. You know, water is more valuable than oil."***

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Todd Custalow

The city of Newport News and the King William County Board of Supervisors contemplated building the project for eight years and spent nearly \$8 million on feasibility studies before the plan was made public in 1995. The affected Mattaponi Indian tribe was consulted only once during these initial investigations when they were informed in 1991 that King William County was one of 32 sites being considered for reservoir construction. At that time, however, the city failed to tell the tribe that it had signed a contract to build the project with the county in 1990.

## Water Not Needed

Newport News officials have claimed that the diversion project is needed to meet future domestic, commercial and industrial water needs. However, three independent consultants have concluded that the water from the proposed King William Reservoir is not needed. One of the studies, commissioned by the US Army Corps of Engineers, revealed that water demand projections for the year 2040, which have been used to justify the project, are overestimated by as much as 100 percent (or 20 million gallons per day).

"The bottom line of this whole project is politics and money," says Custalow. "Lots of people stand to gain from this project – politicians, developers, etc. Newport News doesn't need the water, so what they'll do is sell it, and ultimately they'll have power over development and growth. You know, water is more valuable than oil."

The Mattaponi and several environmental groups have been fighting to stop the project through courtroom battles and public outreach campaigns. In July 1998, the tribe filed a suit to overturn a state water control board permit that allowed the city to proceed with plans for the reservoir. The suit charged that reservoir construction would violate a 1677 treaty between the Mattaponi and the King

of England that guaranteed that no English "shall seat or plant nearer than three miles of any Indian town." Although the lawsuit was dismissed, an appeal has been filed. Another suit by environmental groups challenged the state permit on environmental grounds. It, too, was later dismissed.

The fate of the project now rests with the US Army Corps of Engineers, one of the nation's two federal dam-building agencies and the permitting agency for projects that alter wetlands, among other things. The Army Corps will decide in late spring or early summer whether to issue a final permit for the project. The US Fish and Wildlife Service has already recommended that the Army Corps deny the permit because of the major loss of wetlands.

Public pressure will play a major role in influencing this process. An informal citizens' referendum on the project conducted by the Alliance to Save the Mattaponi and the Sierra Club found that more than 93 percent of King William County residents are opposed to the project. The tribe and its supporters are now concentrating on a public information campaign about the project and are urging people to write letters to both the Army Corps and the local government. ■

## What You Can Do

Write letters expressing your opposition to the King William Reservoir project:

*Mayor Joe Frank*  
Administrative Building  
2400 Washington Ave., 9th Floor  
Newport News, Virginia 23067  
Ph: 757.926.8634  
Fax: 757.926.8599  
E-mail: [intergov@ci.newport-news.va.us](mailto:intergov@ci.newport-news.va.us)

*Colonel Allan Carroll*  
US Army Corps of Engineers  
Fort Norfolk  
803 Front Street  
Norfolk, VA 23510

Send copies of your letters to Todd Custalow at the Mattaponi reservation. Donations to the "Mattaponi Heritage Foundation" are also welcome:

*Todd Custalow*  
Mattaponi Heritage Foundation  
1467 Mattaponi  
Reservation Circle  
West Point, VA 23181

**About IRN**

IRN was formed in 1986 by hydrologists, engineers and environmentalists to address the worldwide prevalence of unsound, destructive river-development schemes. Our mission is to halt and reverse the degradation of river systems; to support local communities in protecting and restoring the well-being of the people, cultures and ecosystems that depend on rivers; to promote sustainable, environmentally sound alternatives to damming and channelling rivers; to foster greater understanding, awareness and respect for rivers, and to support the worldwide struggle for environmental integrity and social justice.

**Reports**

**The Asian Development Bank's Role in Dam Building in the Mekong Watershed** by Aviva Imhof, 1997. 19 pp, \$10.

**Proceedings of The First International Meeting of People Affected by Large Dams.** 1997. \$15.

**The Relationship Between Primary Aluminum Production and the Damming of the World's Rivers,** by Jenny Gitlitz. 1993. 150 pp, \$20.

**Considering the Hidrovia – A Preliminary Report on the Status of the Proposed Paraguay/Paraná Waterway Project** by Owen Lammers (IRN), Deborah Moore (EDF) & Kay Treakle (BIC). 1994. 60 pp, \$15.

**River Dolphins –Can They be Saved?** by Elizabeth Carpino. 1994. 42 pp, \$15.

**Damming the Rivers: World Bank Lending for Large Dams** by Leonard Sklar & Patrick McCully, 1994. 89 pp, \$20.

**Lessons Unlearned: Damming the Mekong River,** by Steve Rotherth. 1995. 70 pp, \$15.

**Technical Review of the Mekong Mainstream – Run-of-River Hydropower Report,** by Philip Williams & Steve Rotherth, 1995, 7 pp, \$3.

The following campaign information packets are available for \$15 each: Three Gorges Dam (China) • Pangu Dam / Biobio River (Chile) • Arun III Dam (Nepal) • Nam Theun 2 (Laos) • Xiaolangdi Dam (China) • Lesotho Highlands Water Project (Africa) • Mekong Hydroelectric Development (Southeast Asia) • Hidrovia Dossiers I-5 (South America) • Bakun Dam (Malaysia) • Epupa Dam (Namibia)

**Other Resources**

**World Rivers Review** subscriptions are automatic for IRN members. Back issues are \$5.

**Large Dams, False Promises,** writer and producer, David Phinney; executive producer, Andrea Torrice. 33 min. video, \$35. Features the stories of three dams: Sardar Sarovar (India), Three Gorges (China) and Balbina (Brazil). The stories illustrate the destruction that large dams are causing to ecosystems and riverine communities worldwide.

**Silenced Rivers: The Ecology and Politics of Large Dams,** by Patrick McCully. 1996. 350 pp. \$20/members, \$25/non-members. This book covers the environmental and social effects of large dams around the world.

**River of Words Teacher's Guide.** 1996, 50 pp, \$6. Classroom and field activities on watersheds for grades K-12. Supports IRN's international environmental poetry and art contest, conducted annually in partnership with The Library of Congress.

**Rowing Partners: 101 Ways to Build Community Partnerships,** by Pamela Michael. 1998, 19 pp, \$5. Idea-packed booklet offers strategies and concrete steps to help create local support and enthusiasm for River of Words (or any community project).

**Beyond Big Dams: A New Approach to Energy Sector and Watershed Planning,** edited by Juliette Majot. 1997. 126 pp. \$20. Explores small scale hydro.

**Information Services**

**World Wide Web:** IRN's web site has hundreds of items on river campaigns around the world, links to other sites of interest, WRR articles, maps and much else. Visit it at [www.irn.org](http://www.irn.org)

IRN's resources are used to support the information needs of non-profit organizations as well as individuals and institutions. General research fee per hour is \$50 (\$25 minimum per request, plus photocopy and mailing charges).

**For more information about IRN's activities and publications, or to order our more detailed publications brochure, contact IRN, 1847 Berkeley Way, Berkeley, CA 94703; Tel.: (510) 848-1155; Fax: (510) 848-1008; e-mail: [von@irn.org](mailto:von@irn.org)**

**IRN exposes the myths behind high dams and other destructive river development projects. Please join us by becoming a member.**

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**Is there anyone else we can contact?**

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# Bank Admits to Serious Problems at Lao Dam

by Aviva Imhof

**A**fter months of sustained lobbying by NGOs, the Asian Development Bank (ADB) has admitted that the Theun-Hinboun hydropower project is having a substantial impact on the livelihoods of thousands of people in central Laos. The Bank's admission is particularly significant because until recently it was claiming the project to be a "winner" with "little for the environment lobby to criticize."

The US\$260 million dam, which was partially funded by the ADB and the Norwegian government, opened in April 1998. NGOs have since raised concerns about the project's impacts and the lack of available funds to compensate villagers for their losses.

In a report based on a visit by ADB staff to the project site last November, the Bank admits that it had previously defined the project impact zone too narrowly and that many more villages further downstream have been negatively affected.

The Bank identified the following impacts:

- Village water supplies have been disrupted by the dam's changes to water levels

in three rivers – the Nam Hai, Nam Hinboun and Nam Theun. Seventeen villages have thus far been identified as affected. The impacts on many more villages in the newly defined project impact zone are unknown.

- All villages visited reported decreased fish catches, smaller fish being caught, and greater difficulty catching fish. Two villages claim they have given up fishing because it is too difficult now.

- Virtually all villages reported the loss of gardens. Some report that more time is now required to maintain and water gardens that have had to be moved to higher, less fertile ground.

- Two areas upstream of the dam and 26 villages downstream of the powerhouse have had dry season river crossings impeded by the rise in water levels.

- There has been extensive erosion of banks along the Nam Hai and, to a more limited extent the Nam Hinboun, which has resulted in high sedimentation of those rivers.

The Bank acknowledges that villagers deserve to be compensated for all of their losses. The Theun Hinboun Power Company

(THPC) has apparently agreed to undertake a survey of all villages to determine impacts and to allow the company to immediately compensate for losses. In addition, the THPC is developing a fisheries management plan, and will continue to monitor fisheries impacts with a view to providing compensation.

The ADB is not clear on where additional funds for compensation will come from, but implies that the THPC will shoulder these costs out of project revenues.

Like many other projects in Laos, the dam proceeded without accurate information as to what the social and environmental costs of the project would be or how compensation and mitigation measures would be funded. The project's budget for compensation was limited to \$50,000, most of which was spent on buying land for the transmission-line towers.

Because there is no pre-project baseline data with which to compare project impacts, it will be quite difficult to assess compensation. Whether adequate reparations will be paid to the affected people remains to be seen. ■

Address Correction Requested

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

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