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*International Rivers Network*

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Volume 12, Number 4 / August 1997

## **Special Focus: Dam Decommissioning**

### **IN THIS ISSUE**

- **Cover Story**: "Review Panel Blasts World Bank Over Chilean Dam".
- **Latin America**: Studies for the channelization of the Paraguay-Paraná are profoundly flawed, experts say.
- **Dam Decommissioning Stories:**
  - **Commentary**: Dam removals are our best hope for restoring rivers.
  - **Dam Decommissioning**: An overview.
  - **United States**: An ecologist talks about the movement to drain Glen Canyon Dam.
  - **United States**: A new report looks at the history of dam removals in the US.
    - **Sidebar**: "New Resource on Relicensing".
  - **Europe**: Saving the Loire for salmon will include removing dams.
- **Malaysia**: Bakun Dam's continuing troubles slow investment.
- **Europe**: France cancels the Rhine-Rhône canal project.
- **Africa**: Community leaders in the Okavango Delta speak out against a proposed water diversion pipeline.
- **News Briefs**: Watching the world's rivers.

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# World Rivers Review

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## Independent Review Blasts World Bank Over Chilean Dam Project

by Aleta Brown

A just-released independent review of the World Bank's role in the Pangué Dam on Chile's Biobío River blasts the International Finance Corporation (IFC) for disregarding its own policies on the controversial project. "IFC did not follow fundamental World Bank Group requirements in any consistent or comprehensible manner throughout the development and implementation of the Pangué Project," the report states.

Among other issues, the review team found that the IFC seriously failed to ensure compensation for indigenous people affected by the Pangué Dam. The IFC also failed to identify and monitor environmental impacts, or provide clear guidelines on its own policies to the Chilean authorities. The review team was headed by Dr. Jay D. Hair, president-emeritus of the National Wildlife Federation and past president of IUCN. The 450-MW Pangué Dam was built with the help of a US\$150 million loan from the IFC, the private-sector arm of the World Bank. The 113-meter-high Pangué, completed in 1996, was the first dam to be built on the Biobío River. Preparations for Ralco, a 155-meter-high dam upstream of Pangué, are now underway. Both dams are being built by Chile's largest private power company, Endesa. Ralco Dam would displace 400 Pehuenche indigenous people, with



*These Pehuenche people would be affected by Ralco Dam*

devastating cultural, social and economic impacts.

### **Bank Censors Report**

While the independent review is highly critical of the IFC's involvement in the Pangué project, it does not reveal the full extent of the problems found by the team. At least one-third of the report has been cut - ostensibly for reasons of commercial confidentiality, according to a Bank press release. But in a July 25, 1997 letter protesting the censorship, Hair told Wolfensohn that "there are numerous deletions that appear to have been made for no other reason than to avoid embarrassing the individuals who made certain decisions regarding the Pangué Project or how it was supervised by IFC."

Hair's letter to Wolfensohn is particularly critical of cuts that seemingly had nothing to do with "commercial confidentiality," making specific reference to an eliminated section that revealed the IFC's own lack of compliance with World Bank environmental and social requirements. "The fact that the IFC was not in substantial compliance with over 80 percent of those requirements for the Pangué Project was a fundamental conclusion of our report and should have been disclosed to the public," Hair wrote.

"Instead, IFC glossed over this important matter in their rebuttal statement by noting, 'IFC considers that the Pangué Project complied with five out of eight policies and procedures applicable to the project.' That was very misleading, inaccurate and self-serving statement," Hair continues. "If the public had access to the full report I do not believe many objective readers would agree with IFC's characterization of their level of compliance with World Bank Group requirements of the Pangué Project."

Perhaps anticipating the disclosure problems, the review team stated in the report itself that it contained no proprietary or confidential business information, and recommended that the Bank publicly release the full report. "Sporadic and partial release of information invites abuse, engenders suspicion, and fails to capture the benefits that a fuller policy of disclosure would bring," it stated. The full report was delivered to the Bank in April, but the edited version was only made available on July 15.

### **Earlier Claim Spurs Review**

The idea for the independent review was triggered by a claim filed in 1995 with the World Bank's Inspection Panel - the independent team charged with investigating affected people's claims on Bank projects. The claim, filed by the Chilean group Grupo de Acción por el Biobío (GABB), alleged that the IFC did not comply with the social and environmental conditions of its Pangué loan agreement. Although World Bank President James Wolfensohn rejected the claim on the grounds that the IFC, unlike the Bank's public-sector arms, is exempt from Inspection Panel investigations, he later commissioned an independent review to investigate the IFC's role in the project.

Juan Pablo Orrego, President of GABB, says he was not surprised by the report's criticisms of the IFC: "This report vindicates our claim and backs what we have been saying since 1989. It clearly shows that the IFC and Endesa did not adequately evaluate the impacts of the dam, and did not ensure the rights of the Pehuenche people."

### **Cumulative Impacts Ignored**

One critical aspect not covered by the report is the issue of cumulative impacts caused by a multi-dam scheme, possibly because the team was not directed to look into this issue. Although activists have long maintained that Pangué and Ralco are interdependent projects - thus needing a cumulative impact assessment - the IFC continues to claim that Pangué is a stand-alone project.

Mark Constantine of the IFC said, "As far as we're concerned, it's a stand-alone project, though I couldn't argue that Pangué helped pave the way for subsequent dams to be built on the river."

However, the Chilean government's longterm plan to build six dams on the Biobío River was known at the time that the IFC began to get involved in Pangué. Furthermore, Pangué was designed so that an upstream dam would maximize its efficiency - a fact that the IFC had to have been aware of when it agreed to support the project.

Cristian Opaso of GABB says, "To a great extent, Pangué was built due to IFC. The IFC gave international legitimacy to Endesa's false claim that Pangué was a stand-alone project."

Ralco Dam would displace 600 people, 400 of them Pehuenche. Jose Antolin Curriaó, a leader in Quepuca-Ralco area, says this about the project: "The arrival of the first dam angered us. We do not want to be moved. The dam has caused a lot of damage because of the lake. We cannot perform *Niratún*, our ceremony, because of the lake - the lake which is causing the death of the Biobío. Our communities were stripped, and are still being stripped of our culture and our tradition. The Biobío is our unique river. We all live for the Rio Biobío."

This is the second independent review attacking IFC's involvement in Pangué. Another report commissioned by Wolfensohn in 1996 sharply criticizes the IFC and Endesa's dealings with the Pehuenche people, as well as project initiatives to help mitigate the effects of the dam on the Pehuenches. This report, written by anthropologist Theodore Downing, details the failures of these mitigation efforts and their lack of compliance with IFC agreements. The IFC refuses to release any part of this review.

The Downing report is especially critical of one mitigation project, the Pehuen Foundation, which he says "was designed and injected into Pehuenche culture without informed participation, without an analysis of anticipated impacts of the Project on the Pehuenche cultural ecology, subsistence economy, and socio-political organization." In a December 1996 letter to the Bank, Downing wrote, "IFC officers responsible for the project are involving the institution in unacceptable, racial and ethnic discrimination."

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- See the [Biobío Campaign Page](#) for more information.
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Volume 12, Number 4 / August 1997

## **Hidrovia Studies Called Profoundly Flawed**

*by Deborah Moore*

Studies justifying the Hidrovia Paraguay-Paraná navigation project have been found to be profoundly flawed by an international team of independent experts. The panel also determined that alternatives to the costly project - many of which have been effective elsewhere - were not investigated by the consultants as required by the terms of reference for the studies.

The Hidrovia is being put forth as the backbone of regional development by the governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay, through which the Paraguay and Paraná rivers run. The project would dredge a deeper channel along the 3,400-kilometer river system, remove rocks and river curves, and undertake other heavy engineering works to expand shipping in the hopes of spurring economic development throughout the region.

Concern about the project and its potential impacts led to the convening of the Hidrovia Paraguay-Paraná Panel of Experts, which consisted of eleven scientists and scholars: six from South America and five from North America. The panel included internationally respected professionals in economics, hydrology, ecology and anthropology. Panel members were invited by the US-based Environmental Defense Fund and Fundação Centro Brasileiro de Referência e Apoio Cultural, a Brazilian NGO, to review and critique the results and the process of preparing the official engineering- and economic-feasibility studies.

The panel's review found that the project studies are too narrowly defined, ignore significant indirect and cumulative impacts, overestimate benefits, and underestimate costs and environmental and social effects. The panel found that the studies were not as thorough as the scale and significance of the project warrants, that conclusions are overstated and not backed by analysis, and that the project's expected impacts were minimized.

Two members of the review panel - Thayer Scudder, an anthropologist at California Institute of Technology, and Michael Clemens, an economist formerly with Johns Hopkins University - wrote in their review: " [project] consultants systematically avoid any comparison with similar historical projects in the same region, whose history reveals the potential for Hidrovia to fail to meet rate-of-return expectations and to further impoverish the region's low-income majority. [This paper] argues that a series of grave errors and gaps in the environmental impact assessment analysis undermines the

credibility of the consultants' opinion that Hidrovia will induce no regional land-use changes, no local population growth, and no significant alterations of the Pantanal wetlands. If indeed the net benefits of Hidrovia to the societies of the Southern Cone countries are positive - where benefits and costs are considered in their broadest sense and over the long term - the project should go forward. The studies in their present form are insufficient to establish this and in fact suggest otherwise."

The critiqued studies were prepared by a consortium of engineering firms called Hidroservice-Louis Berger-EIH (HLBE), and the environmental assessment, prepared by the consortium Taylor-Golder-Consular-Connal (TGCC). The studies cost about US\$7 million and were financed primarily by the Inter-American Development Bank (IDB) and the United Nations Development Program (UNDP).

### **Project Design Misses Boat**

The panel concludes that the Hidrovia project - as currently conceived, described, and defined - does not appear to help achieve the five countries' stated goals of sustainable development and poverty alleviation. The project's negative impacts on the Pantanal, the world's largest intact wetlands, have made headlines around the world, but the impacts on the region's poor rural populations have received less attention. The panel found that the project would likely make conditions worse for the low-income majority of people in the watershed.

The panel's main findings include the following:

- The Hidrovia will result in a concentration of benefits, which is an inequitable and inefficient development strategy. The primary beneficiaries of the project will be the shipping, construction, and agribusiness industries, rather than the region's low-income majority of the population, which conflicts with the stated goals and priorities of the five countries and the international development institutions promoting the project.
- The panel found the analyses of the potential ecological consequences on the Pantanal so seriously flawed that the consultants' conclusion - that the impacts will be low to moderate - cannot be accepted as credible. Specifically, the serious risk of contamination from resuspension of sediments contaminated with mercury, and from increased spills of hazardous chemicals as a result of increased barge traffic, is downplayed. No analysis of the impact of dredging and contamination on sources of drinking water was done, such as for the city of Asunción, Paraguay.
- Rather than transforming the entire landscape, alternatives to improve existing river transportation via boat- and barge-design modifications, upgraded navigation signals, dissemination of information on real-time river flow, and better integration of existing river, rail, and road networks should have been investigated. Other economic opportunities that have succeeded elsewhere, such as community-based ecotourism, production of high-value crops, provision of basic community services and access to credit, were not evaluated by the consultants.
- The statistical analysis was arbitrarily limited to a 25-year wet period, which could mean that the analysis of dredging requirements and economic costs are underestimated if dry periods recur.

The consultants' models and data are inadequate for assessing channel-floodplain interactions, and cannot be used to support the optimistic interpretation asserted by TGCC that the results of the project on the wetlands of the Pantanal will be small, local and insignificant.

- The projected benefits of the Hidrovia are overestimated, and the costs of associated infrastructure, environmental monitoring and mitigation, social disruption, and compensation are grossly underestimated. Increased export of soya and iron ore are two of the project's stated benefits, yet estimates of projected soya yields and prices for iron ore are both significantly overestimated.
- The valuation of the project's impacts was one of the central purposes for these studies, yet the consultants conclude with little evidence that the environmental costs are negligible. The HLBE consultants estimated the cost of environmental monitoring to be about \$378,000 and the TGCC consultants estimated the total program of monitoring and mitigation to be about \$1.7 million per year, which members of the panel thought were an order of magnitude too low for the scale of the described program.
- Neither consortium analyzed competition between the Hidrovia Paraguay-Paraná and other transportation projects being planned or underway in the region, such as the Tocantins-Araguaia Waterway, the Madeira-Amazonas Waterway, and the Santa Cruz de la Sierra-Corumbá-Baurú Railroad, among others. These projects will make the Hidrovia Paraguay-Paraná less viable and cost effective.
- The studies by HLBE and TGCC did not adequately examine empirical and historical evidence from past troubled development projects such as Polonoroeste, Itaipu Dam, Carajás, the Trans-Amazon Highway and Yacyretá Dam, which would help avoid more costly mistakes.
- Public participation was essentially excluded. There were few arenas for public input, and no requirements that any of the public concerns be responded to, incorporated, or addressed. In particular, there has been very superficial consultation with the region's indigenous communities.

### **Unaddressed Risks**

The eleven panel members all agreed that the studies did not address the central risks and concerns about the project. Ecologist Juan Paggi, of the Instituto Nacional de Limnología in Argentina and a member of the review panel, disputes the conclusions in the project studies that the environmental impacts would be "low to moderate" and "limited in time and space" and notes that these conclusions are not supported by the project studies' own evidence.

"In the Corumbá-Cáceres reach, the consultants project an enormous increase in traffic - more than 1,000 percent - with a barge convoy passing approximately every 90 minutes during the five months of the soya harvest season. Thus, resuspension of sediments will occur almost continuously for five months over a length of river more than 600 km long. This can't be considered 'limited in time and space,' as the consultants assert," said Paggi.



The panel found no evidence to support project proponents' claims that either the regional transportation system or economy are on the verge of imminent collapse. Therefore, the panel said it believes there is adequate time to implement a more broad-based and sustainable approach to improving quality of life, transportation, and resource management in the region. The panel's report makes recommendations for improving the technical quality of the studies and environmental assessment, for promoting alternative development and transportation strategies, and for creating a transparent and participatory planning and decision-making process.

### **Confirming Public Concerns**

The Panel of Experts' findings validate public concerns that the Hidrovia Paraguay-Paraná may not be a sound economic development strategy. "People here have had an intuitive sense that this project will only benefit a very few," said Alcides Faria, Executive Secretary of the Rios Vivos NGO Coalition, which has opposed the project in its current design. "Now we have more evidence from independent and objective observers that we were right."

Dr. Henrique Rattner, an economist from the University of São Paulo and another member of the panel, said, "Hopefully, creating a more-informed debate will help avoid the environmental, social and economic debacles of the last few decades of large-scale river development projects."

The Inter-American Development Bank is considering conducting its own independent review of the Hidrovia studies it supported before it makes any further decisions regarding the project. And Brazil's Environment Commission is planning to hold its first public hearing on the Hidrovia project on August 21, 1997. These investigations could offer opportunities to consider and respond to the findings of the Panel of Experts and the public, and to stop or significantly reform the project in favor of better alternatives.

The governments of the region are currently reviewing the official project studies. There is increasing evidence that their unconditional support for the project is softening, and that alternatives to the megaproject are more likely to be considered. In June, Paraguayan President Juan Carlos Wasmosy asked the US Waterways Experimental Station to advise his government on ways to improve navigation security without large-scale engineering works.

Also, the government of Brazil's Mato Grosso State has publicly indicated that the HLBE engineering design is unacceptable to them, and Brazil's Transport Ministry is expected to begin the process of designing a new engineering plan for the project. It remains to be seen whether the final project design will bear any resemblance to the current and prior versions that have aroused so much international concern.

*Copies of the Panel of Experts' report are available from: Deborah Moore, Environmental Defense Fund, 5655 College Avenue, Suite 304, Oakland, CA 94618, USA; email: [deb@edf.org](mailto:deb@edf.org); or Mauricio Galinkin, CEBRAC, SCLN 112, Bloco B, lj. 10 CEP: 70.762-520 Brasília. DFBrasil; email:*

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## Deconstructing Dams

*by Philip Williams*

In early April, the US Army Corps of Engineers - one of the country's two major dam building agencies - quietly issued a request to civil engineering firms for a construction bid. Unlike hundreds of other bid requests it had sent out over the past 60 years, most of which signaled the start of another dam and the destruction of another river, this one represented a turning point for the agency and new hope for rivers around the country. The project being bid was the construction of a "fish passage corridor" - essentially, a free-flowing river through the middle of the partially complete Elk Creek Dam.

One of the worst products of the US "pork barrel" system, construction of the 25-meter-high Elk Creek Dam had been stopped in 1987 by a vigorous campaign led by the Oregon Natural Resources Council. At the time it was stopped, the dam was already 40 percent complete and \$100 million had been spent. Not content with merely stopping the dam, ONRC next initiated the campaign to remove the Elk Creek Dam, followed in 1994 by its "damnable dam" campaign to remove 12 existing dams from the rivers of Oregon.

Across the US in the last few years, activist groups like ONRC and many others have gotten bolder and bolder with campaigns urging the removal of ever-larger dams. They argue that rivers should not remain constrained by obsolete river engineering works, most planned in ignorance and deception many years ago and requiring massive continued public subsidies. California, for example, last year approved \$1 billion to be spent on habitat restoration over the next decade to attempt to remedy some of the ecologic impacts of continuing to operate the state's aging reservoir system.

Within the last year, activists have started to organize to [allow the Colorado River to run through Glen Canyon Dam](#), and have waged campaigns to remove the Elwha, Savage Rapids and Snake River dams. Whereas only five years ago such initiatives would have been dismissed as hopelessly impractical, public attitudes appear to be changing as the true costs of dammed rivers become apparent.

It seems that people are now starting to better understand the value and complexity of our river systems and how they are disrupted by the continued presence and operation of a dam and its reservoir. At IRN we have noticed a subtle change in the way journalists ask us questions. Before, it was always "why are you against this dam?" Now we are frequently asked, "What would you propose if this dam was

decommissioned?"

Answering this question is the new challenge to both dam fighters and the dam-building lobby alike. It is no big surprise that just like the nuclear-power lobby, the dam builders like to act as if there is no tomorrow, taking the profits and glory now, and leaving it to future generations to pay the bills. In its 70-year history, the International Commission on Large Dams - the major industry professional organization - has yet to offer dam decommissioning as a topic at one of its international conferences.

Yet the decommissioning of large dams is inevitable - it is only a question of when. Whether decommissioning is due to inevitable dam aging like siltation or concrete deterioration, or whether it is done to restore a river, the fact remains that we will be shooting in the dark when it comes to taking down the big ones. The best way to manage such projects has yet to be fully examined by the industry that put our rivers behind concrete walls in the first place. These questions are already facing us, with the silting up of 30-year-old dams like Tarbela on the Indus River or Sanmenxia on the Yellow River. To date, the industry response has been predictable: build another dam to solve the problems of the first. Examples of such projects are the planned construction of the Kalabagh Dam on Pakistan's Indus River and China's Xiaolangdi dams, projects which pass the buck to future generations.

There is another way. Instead of accepting the inevitability of large dams or the permanence of their destruction, it is possible to start planning now for more sophisticated long-term and sustainable river management. The starting point of such planning would be to fairly and fully compare the economic, social and ecologic costs and benefits of managing a river in a more natural way, one which meets the needs of the larger community, with the costs over time of building, maintaining, repairing and replacing obsolete large dams. These issues will be the dam fights of the 21st century .



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## **Taking Down Bad Dams**

*by Patrick McCully*

Dams do not live forever. A dead or dying dam may have silted up, stopped producing electricity, or become increasingly unsafe, at which point it may be a candidate for removal. Not all dams slated for removal are targeted for safety reasons, however: another major reason prompting activists to call for the removal of dams is the decimation of fisheries.

Although dams have been found unsafe or destructive of fish habitat in many parts of the world, few major dams have yet to be removed. The engineering of dam removal is still young and untried, and the cost of dam-removal is still ignored when construction costs are estimated. How exactly to dismantle a very large dam, what to do with the sediment clogging the reservoir behind it, and how much such an operation would cost, is largely unknown. Removing a hydrodam could even cost more than building one, especially where reservoir sediments contain heavy metals and other toxic contaminants.

But momentum is building to remove more dams, and to find the best ways to take them down and restore the rivers they impounded. Dam removal campaigns can now be found in many parts of the world, some of which target very large dams (see page 10 for one such story). Currently, the United States - with some 74,000 dams (most of which are relatively small) - has perhaps the most active dam-removal movement. Grassroots groups around the country have launched campaigns to dismantle dams in their communities, and hundreds of small- and medium-sized dams have already come down. Another sign of progress is that the American Society of Civil Engineers just published technical guidelines for dam removal - the first important sign that the dam-building industry is beginning to take this issue seriously.

Dam decommissioning (defined as anything from merely stopping electricity generation to the expensive and challenging operation of totally removing a dam and restoring the river to its pre-dam state) has in recent years been forced onto the agenda of an unwilling hydropower industry in the US. More than 500 of the 50-year licenses given by the US Federal Energy Regulatory Commission (FERC) to private hydrodam operators are expiring between 1989 and 2004. A coalition of river conservation groups have used this spate of expiring licenses to urge FERC to institute a comprehensive dam decommissioning policy. The Washington, DC-based Hydropower Reform Coalition believes that new licenses should only be given on the condition that owners pay into special decommissioning funds

during the lifetime of their projects, just as nuclear power plant operators in the US have to put money aside to pay their inevitable decommissioning costs. Despite strong opposition from the hydropower lobby, FERC announced at the end of 1994 that it has authority to order owners of the more than 1,800 dams under its jurisdiction to decommission dams which fail to win new licenses, although it has not yet conceded the coalition's call for it to require payments into decommissioning funds.

### **Old Dams**

Safety concerns have been the most common reason for dam removals. Dams age at a different rates and in a different way, depending on a variety of circumstances. Some dams may remain safe for a thousand years, others may start to crack and leak after less than a decade. Around the world, some 5,000 large dams are now more than 50 years old, and the number and size of the dams reaching their half century is rapidly increasing. The average age of dams in the US is now around 40 years. Between 1977 and 1982 the Army Corps of Engineers inspected 8,800 non-federal dams in the US, most of them privately-owned, which it classified as "high-hazard" -p; where a failure could cause significant loss of life. One-third of these dams were considered "unsafe," primarily because of inadequate spillway capacity. A 1994 survey showed at least 1,800 non-federal dams were still unsafe. The situation is similar for federal dams: in 1987 one-fifth of BuRec's 275 dams were classified as unsafe, as were one-third of the 554 dams operated by the Corps of Engineers.

An Ontario Hydro study of data from several hundred North American dams shows that on average hydrodam operating costs rise dramatically after around 25-35 years of operation due to the increasing need for repairs. When the cost of maintaining an old dam exceeds the receipts from power sales, its owners must decide either to invest in rehabilitating the dam, or, if the cost of repairs would be prohibitive, to disconnect the dam from the grid and cease producing power.

Many old dams in the US have simply been abandoned by their owners. According to the Michigan Department of Natural Resources (MDNR), several abandoned small dams have been washed out during storms in recent years. "These failures," says the MDNR, "have caused extreme erosion, excessive sediment deposition and destruction of aquatic habitat accompanied by the loss of the fisheries." Michigan taxpayers, through the MDNR, have had to pay for removing several "retired" hydroelectric projects, while their ex-owners have suffered no financial liabilities.

### **Fish-Killing Dams**

The largest dam to be removed in the US to date is the 19-meter Grangeville Dam on Idaho's Clearwater River, which was dynamited in 1963 to restore salmon runs. This dam and hundreds like it have decimated productive fisheries in the western states in this century. The Pacific Northwest has been particularly hard-hit. In the huge Columbia River Basin - which covers an area larger than France - the annual run of adult salmon and steelhead trout is estimated to have averaged between 10 and 16 million fish before non-native settlers arrived in the 19th century. Today, after decades of decline due overwhelmingly to the 130 or so dams in the basin, only some 1.5 million salmon and steelhead enter the Columbia each year, and around three quarters of these are hatchery-reared fish. The National Marine Fisheries Service estimated the cost of salmon fishery losses due to dams in the Columbia Basin to be \$6.5 billion for the period 1960-80 alone.

While most adult salmon swimming upstream can negotiate their way up fish ladders, the slack water of reservoirs provides a much more formidable barrier to their offspring. The downstream migration of juvenile salmon (smolts) can be fatally delayed by the time needed to drift and swim through multiple reservoirs - if the smolts do not reach the sea within around 15 days after spawning they may lose their downstream swimming behavior and their ability to change from a freshwater to saltwater environment. During years of relatively low flows, smolts from the upper Snake River, the Columbia's main tributary, can now take up to 39 days to swim to the sea, compared with less than three days before the dams were built.

### **Restoring the Elwha**

The best-known dam decommissioning controversy surrounds a pair of dams that decimated fisheries on the Elwha River in Washington State: the 31-meter Elwha and 70-meter Glines Canyon Dams. Built in the 1910s and 1920s with a combined installed capacity of 19 megawatts, the dams all but wiped out the river's once-rich runs of steelhead trout and salmon, fisheries to which the Elwha S'Klallam Tribe had been guaranteed rights "in perpetuity" in the remarkably aptly named 1855 Treaty of Point No Point. Power from the two dams (now within the borders of Olympic National Park) is devoted entirely to supplying a pulp and paper mill. Since the Glines Canyon Dam FERC license came up for renewal in the late 1970s, the Lower Elwha S'Klallam and environmentalists have been trying to get the dams removed. In 1992 their long campaign started to bear fruit when Congress directed the Interior Department to detail the best plan for "full restoration of the Elwha River ecosystem and the native anadromous fisheries." The Interior Department concluded that only removing the dams could fully restore the ecosystem.

Removing both dams and dealing with the 11.5 million cubic meters of sediment which has built up behind them is estimated to cost \$113 million and take up to 20 years. The dams would be taken down after the river had been diverted around them. Removing the sediment would be the biggest problem and is planned to be done with a combination of dredging, allowing the newly free-flowing river to wash the sediments downstream, and stabilizing with vegetation the sediments higher up the river banks. Removing the Elwha dams enjoys cross-party support in the nation's capitol, but has powerful opponents that have been able to delay funding for the project. However, there is legal impetus to take action: an Act of Congress in 1992 ordered the restoration of the river's fish stocks.



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## Let A River Run Through It

*Dave Wegner is a ecological scientist specializing in the restoration of river systems in the West and throughout the world. He has lived in the shadow of the Glen Canyon Dam for 14 years, studying the dam's effects on the downstream ecosystem for the Bureau of Reclamation. His work on last year's major experimental flood release from the dam taught him there is much good to be gained from appropriate dam management- but also that such experiments are just a drop in the bucket for seriously impacted riverine ecosystems. He is now involved in a new effort to drain the dam's reservoir and restore the Colorado River and its canyons to their former glory. Here he speaks passionately about why this river, why now.*

### **An Effort to Restore the Colorado River and Glen Canyon Gathers Steam**

In the arid west, those who control water control the way the landscape will look. The Colorado River has been the center of a power play over its water resources for decades. But in the zeal to control the river, those fighting for a piece of its watery wealth have virtually ignored the impacts on biological and cultural environment from the overallocation of its waters. The developers, led by the Bureau of Reclamation, were very successful in providing water for development of sprawling cities and agribusiness, but failed to recognize the longterm unsustainability of the desert kingdom they helped create.

The developed Colorado River watershed supports over forty dams, several transbasin diversions and numerous irrigation siphons. This infrastructure has helped the Southwest become one of the fastest growing areas of the United States. Las Vegas alone grows at a rate of 4,000 people a month. Many of these new desert residents have water-wasteful lifestyles more appropriate to the wetter climates of the east coast or south.

The price for such development has been steep. Today a disjointed Colorado River system, which bears little resemblance to the historic river, supports more houseboats, jet skis and ski boats than it does native fish species. Artificially created reservoirs have drowned thousands of Native American artifacts



and with them the cultural heritage of the ancient peoples who depended upon the Colorado River and respected it for the life it provided. The changes to the ecosystem have meant lost riparian zones, increased water quality problems, and a crippled Colorado River delta that can no longer provide the seasonal lifeblood of water and nutrients to the fisheries of the Sea of Cortez and the Cocopa Indians who live there.

### **Rivers of Life**

Rivers have been crucibles of evolution, the pathways of colonization and sources of inspiration. Rivers are continually balancing themselves in a symphony of movement resulting in a complex and dynamic equilibrium supporting a natural web of life. The Colorado River's evolution over the last 20 million years has created a unique assemblage of native fish, plants and cultures. But when the gates of Glen Canyon Dam closed in March 1963, the waters of Lake Powell quickly began to fill the canyons and transform the riverine environment. Greatly reduced water movement, entrapment of the sediments, and modified water quality changed the character of the water resource. The Grand Canyon immediately began to feel the effects of the constrained and modified river, much like a human whose flow of blood from the heart is restricted. Seventeen years after storage began, the waters of Lake Powell reached the top of the dam and the reservoir was full. From the Bureau of Reclamation's perspective a great triumph had been achieved. To the fish, birds and Native Americans who lived with the river, it was a dark day.

Dams have limited life spans, both structurally and economically. When a dam has lived its useful physical and economic life, become an ecological burden or completed its original objective, it is time to make restoration of the river a priority. Today we are at that point with Glen Canyon Dam.

Last October a symposium was held in Arizona to raise these issues in a public forum. At the meeting, David Brower, former Executive Director of the Sierra Club, and representatives of the Glen Canyon Institute challenged the audience to support a move to drain Lake Powell. The response from the 1,600 people in attendance was resoundingly positive. Next came a recommendation from the Sierra Club to pass a national resolution to support the effort. The campaign to Drain Lake Powell was born -p; a movement born not out of spite but out of a sense of purpose and hope that we as a society could step back and reevaluate our past actions and assess whether we are on the right track for the future.

### **The Time is Ripe**

So why now? We are at a critical crossroads with the Colorado River and Glen Canyon Dam. First, the precedent setting Environmental Impact Statement on the operations of Glen Canyon Dam was completed in 1995. That EIS sets the stage - in fact demands - that additional innovative approaches to ecosystem maintenance and restoration be evaluated. The vehicle to accomplish that is through an Adaptive Management program which was initially put forth by scientists as a way to integrate scientific learning and ecosystem response with management opportunity. Secondly, the native fish and bird species are at a threshold, and if actions are not taken quickly, their future survival may be in peril. Lastly, the political winds have shifted. California, Nevada and Arizona are now being pushed to search for additional water sources and new ways to manage the river that balances the needs of the ecosystem with the need for water for human uses.

This shift provides a window of opportunity to evaluate the overall management of the Colorado River, seriously look at alternative approaches to protect the environment and restore lost ecosystem processes.

## **Unprecedented Restoration**

The Glen Canyon effort would be the largest restoration project ever undertaken in the world. It will be a slow process - it could take more than ten years to drain the reservoir, and years more for sensitive ecosystems to reach a natural balance. It is intended that the dam wall itself remain as an icon to the past, with the river flowing freely around it. After the initial draining, water and sediment would be seasonally routed around the dam to replenish the Grand Canyon's ecosystem. Sediment deposits in the upper end of Lake Powell would slowly move down to river level and onward to the Sea of Cortez where they will replenish the delta. Restoration on this magnitude has not been attempted before. The scientific knowledge gained from draining Lake Powell could be applied to other dam-impacted river systems throughout the world.

The Glen Canyon Institute is initiating a Citizens Environmental Assessment to evaluate the effects of draining Lake Powell by diverting the waters around Glen Canyon Dam. The objective is to take the finished proposal to Congress and the Department of the Interior. Once the data on lost water, lost species and lost cultures are fully documented, the government will be asked to move forward with administrative approval for the draining of Lake Powell. The American people will have an opportunity to voice their opinions on this issue.

There are many hurdles that need to be negotiated to make the restoration of Glen Canyon come true. Detailed analyses of the hydrology, economics, recreation, cultural and environmental issues will need to be accomplished. Funding for this program will come from private citizens and concerned interest groups. We will deal directly with the issues of concern and importance in the preparation and public review of the Citizens Environmental Assessment on draining Lake Powell. An opportunity to publicly debate and develop a restoration project of this magnitude provides the ability for people to work cooperatively towards the future.

Rivers follow their chosen paths with fortitude but are forever adapting to the environment that defines them. Throughout history, rivers have carved the canyons, developed and maintained fertile floodplains, created deltas - and supported life. Today in the United States, we must decide if we continue on the path of overallocation and use of this river for development, or take a bold and innovative step forward on its restoration. It would be a great credit to our civilization to return the Colorado River to Glen Canyon.

*Dave Wegner is vice president of the Glen Canyon Institute, which was created in 1995 to facilitate the discussion and study of the return of the Colorado River to Glen Canyon through the draining of Lake Powell. For more information, call the institute at (801) 322-0064 or visit its website: [www.glencanyon.org](http://www.glencanyon.org). Dave Wegner previously wrote about the [Glen Canyon Dam's artificial flood experiment](#) in the July 1996 issue of WRR.*

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# World Rivers Review

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## US Dam Removals Documented

*by Shawn Cantrell*

A new report documenting hundreds of dam removals across the United States will be released this fall by Friends of the Earth (FoE). The report contains a state-by-state listing of known dam removals, as well as detailed case studies of several completed removals. It also outlines pertinent issues which should be considered in a decision about whether to remove or retain a dam. The report provides policy makers and concerned citizens valuable information regarding past dam removals as they consider the future of dams in their own communities.

The report shows that safety concerns have been the most frequent reason cited for dam removals in the US. Related to safety issues are economic concerns: it is often cheaper to remove an aging dam than to invest in necessary maintenance and repairs. One of the many hazardous-dam-removal stories described in the new report is that of Two-Mile Dam on the Santa Fe River in New Mexico, demolished in 1994. In 1993, a crack was found in the wall of the 85-foot-high earthfill water-supply dam. Then a new fault line was discovered near its base. Public opposition to the dam removal was great, but the state engineer ordered an emergency removal once the full extent of the safety concerns was realized. Removal took five weeks, and revealed serious structural problems caused by leakage through the crack. The municipal water supply is now stored in two upstream dams, and the former reservoir has been revegetated with wheat grass. A small 5-acre pond remains, providing habitat for ducks and other animals. The cost for the dam removal (including site restoration) was \$3.2 million, and was covered by the Sangre de Cristo Water Company.

The report also documents several instances in which environmental restoration was a major factor in the decision to remove a dam. In the Columbia and Snake river basins, a startling 95 percent of juvenile salmon fall victim to dam turbines or to the alien conditions of reservoirs behind eight large federal dams. In New England, over 900 dams have contributed to the reduction of Atlantic salmon populations, which are now at less than one percent of historic levels. One example of a habitat-restoration removal described in the report is that of Idaho's Lewiston Dam. The small blast that helped bring down the 45-foot-high hydroelectric dam in 1972 prompted Idaho Governor Cecil Andrus to comment, "for me, the [explosion] is a large one, for it symbolized that the main stem of the Clearwater River will always be free of dams." The dam removal improved the lot of migrating salmon and steelhead, and restored four

miles of free-flowing river.

FoE's research found that dam removal has not been restricted to a particular type of dam, size of structure, or region of the country. Hydro-electric dams, municipal water supply dams, flood control dams, irrigation dams, and mining dams have all been removed. While the majority of the historic removals have been smaller structures, dams over 75 feet high have been taken out. The report found information on dam removals in every part of the United States, from New Mexico to Wisconsin to Washington state.

The Federal Energy Regulatory Commission (FERC) has recently recognized that it has the authority to order the decommissioning and removal of dams. FERC has utilized this new-found authority in the case of the Newport #11 Dam, on the Clyde River in Vermont, removed in 1996. Other federal agencies such as the National Park Service have also taken the lead in the removal of outdated dams. In addition, numerous state agencies and private dam owners have removed dams under their jurisdiction or control.

There are more than 74,000 dams listed in the 1993-1994 National Inventory of Dams, which includes all dams that are at least 25 feet high or hold more than 50 acre feet of water, and thousands of smaller dams on rivers and streams around the country. Removal has moved to the forefront in several river restoration efforts around the country. The Elwha, Glines Canyon, Edwards, Condit, Savage Rapids, and four federal dams on the lower Snake River are all under consideration for removal, primarily to restore fisheries and avoid further extinctions of dwindling salmon stocks.

As the case studies in this report demonstrate, dam removal is a well-established response for dealing with unsafe, unwanted, uneconomic or obsolete dams. The decision to remove a dam is not as "radical" an idea as some opponents might imply: dams have been removed countless times, for a wide variety of reasons, and under many different conditions. It is important to recognize that dams cannot and should not last forever. Dam removal has been and will be a useful and necessary responsibility we have to our rivers and watersheds.

*For a copy of the report, contact Friends of the Earth's Northwest office at (206) 633-1661.*

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- See "[New Resource on Relicensing](#)" in this issue.



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# World Rivers Review

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## **New Resource on Relicensing**

The Hydropower Reform Coalition has just released "Relicensing Toolkit: Guidelines for Effective Participation in the FERC Relicensing Process." The process of relicensing dams by the Federal Energy Regulatory Commission (FERC) has only recently become a major tool for river conservation and restoration. But because FERC's relicensing procedures are complex, it can be difficult for parties less experienced with the process to participate effectively. The Coalition hopes that this "Tool Kit" will provide some assistance to groups and individuals as they seek to influence how a FERC dam will be operated.

The Hydropower Reform Coalition was formed in 1992 to take advantage of the once-in-a-lifetime opportunity to restore river ecosystems presented by the FERC relicensing process, and to reform the way FERC licenses all hydropower dams. Through the relicensing process, the Hydropower Reform Coalition has made progress in restoring rivers impacted by hydropower dams, and has made FERC take seriously its legal obligation to give equal consideration to power and non-power river resources (such as fish, wildlife and recreation) when reviewing hydropower applications.

To get a copy of the Toolkit or more information, contact:

Andrew Fahlund, Hydropower Reform Coalition,  
1025 Vermont Ave., NW  
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## **Loire Dams to be Dismantled For Salmon**

*by Marie Arnould*

Before the dams were built, before the onslaught of industrial pollution, before overfishing took its toll, approximately 100,000 Atlantic salmon would make the annual journey to their spawning grounds in the headwaters of the Loire River and its tributaries. After traveling an amazing 4,000 miles from Greenland in the North Atlantic ocean, they would swim upriver to spawn in clear waters.

In 1996, only 67 salmon were counted on the upper Allier River, the sole tributary in the Loire basin where salmon still return to spawn. As with the Columbia River in the United States, dams were the main cause for the spectacular drop in the salmon population. Young smolts swimming downstream to the ocean get lost in the slack waters of the reservoirs or chopped up in turbines or pumps; adults swimming upstream are foiled by dam walls or inadequate fish ladders. Numerous dams in the Loire basin have destroyed habitat and blocked the fish from their spawning grounds.

Atlantic salmon have completely disappeared from all large rivers on the European Atlantic coast: the Rhine, the Thames, the Elbe, and others. This makes the tiny Loire stock a precious genetic pool for reintroducing salmon in other European rivers. The Loire salmon are also a potent symbol of the "last wild river in Europe." Their plight helped spur the "Loire Vivante" campaign, which arose to stop construction of four new dams in the Loire basin and defend the last remnant salmon populations. The government reacted in 1994, by canceling the largest planned dam (Serre de la Fare), postponing another, reducing the size of a third and devising a program to save the remaining salmon of the Loire basin. The fourth dam, although still officially on the books, may die from lack of funds.

Perhaps the most amazing part of the program (and a first for France) is that two dams will be destroyed in an effort to restore salmon habitat: the Saint-Etienne-du-Vigan on the Upper Allier and the Maisons-Rouges on the Vienne River. Both are operated by Electricité de France, the French state-owned electricity utility. Located near the sources of the Allier River, Saint-Etienne-du-Vigan sterilized 70 acres of the basin's best salmon spawning grounds. Before this 44-foot-high dam was built, the surrounding villages produced approximately 10 tons of salmon per year, which contributed heavily to the local economy. The dam produced just 35 megawatts per year, a tiny fraction of the nation's electrical output.

Preliminary studies have found that the reservoir can be emptied when a flood of about 2,800 cubic feet per second (80 cubic meters/sec.) occurs, which will wash out the accumulated silt in the reservoir and minimize damage on the ecosystem downstream. Everything is now ready for this precedent-setting operation, which will be technically challenging even though the reservoir is relatively small and the sediments not too polluted. It is expected to be finished in 1998 and cost \$60,000.

In spite of the importance to salmon populations of removing the Maisons-Rouges Dam, political opposition on the local level has slowed the process. However, the new government seems intent on quickly scheduling a timetable for taking down this 15-foot-high hydroelectric dam which destroyed the Vienne river basin's entire 1,900 acres of spawning grounds.

Other measures are planned for saving the Loire basin's salmon, including construction of a hatchery on the Upper Allier, suspension of all fishing and elimination of other obstacles to salmon migration. The goal of the program is to have 6,000 adults return to the Loire estuary in 10 years. But the dream of the groups trying to save the Loire salmon is to have this magnificent fish come back on the Upper Loire. To fulfill this dream, two large dams would have to be dismantled: Villerest and Grangent, both about 200 feet high. And that's quite another kettle of fish!

*The author is with European Rivers Network. For more information, visit the group's web site: [www.rivernet.org](http://www.rivernet.org).*



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## **People to be Resettled for Bakun Dam Face Food Shortages**

*by Patrick McCully*

Some of the farming families to be displaced by Bakun Dam in the Malaysian state of Sarawak are reported to be facing food shortages due to delays in compensation payments. George Adam Talek, a leading member of the Bakun Development Committee (BDC), recently protested to the Malaysian press that "residents were in a dilemma and facing hardship." The BDC was set up by the government to represent affected people and has in the past vocally supported the dam.

The people from Bakun's submergence zone - a number that Talek gives as 15,000, or 50 percent higher than previous estimates - had been told that they would be resettled in July this year. Many had therefore ceased tending their rice fields in preparation for moving and in the belief that they would receive compensation payments. According to Talek, thousands of hectares of land planted with cocoa, pepper and rubber had already been abandoned over the past three years. The residents were initially told that compensation and resettlement would begin in 1996. They were then told moving would begin in July 1997, and then on July 24 were informed that it would not be until December at the earliest. The authorities have blamed the latest postponement on delays in beginning dam construction and in completing housing at resettlement sites.

Talek also complained that the BDC and affected people were not informed in advance of the latest delay, and that they were still unaware of how much compensation they could expect and how it would be paid to them. "The important point is we must be told of what is due to us without any delay as it is affecting our daily lives," Talek told a journalist. Talek's open criticism of the treatment of affected people is remarkable given that the BDC is a government-sponsored body headed by an ex-Minister. Talek himself is head of a company operating as a sub-contractor on the dam.

Although the authorities do not admit it, the resettlement delays are clearly linked to the morass of technical, contractual and financial problems besetting the project. The most recent crisis to hit project developers broke on July 15, when Malaysia's Deputy Prime Minister, Anwar Ibrahim, announced that a major contractual dispute had broken out between the Malaysian company in overall charge of the project, Ekran, and the construction consortium led by Swiss-Swedish multinational ABB. Ibrahim stated that the dispute would further delay dam construction and directed the Malaysian Energy Minister to mediate between the companies.

The day after Ibrahim's remarks appeared on the front pages of Malaysia's newspapers, Ekran's controversial Chairman, Tan Sri Ting, publicly insisted that there was no dispute, only "some small matters waiting to be sorted out." At press time, the latest reports from Malaysia quoted Ting as admitting the seriousness of the dispute and saying that it centered on the level of ABB's exposure to cost overruns. It had earlier been believed that the dispute was over ABB's opposition to awarding subcontracts on the dam to a number of firms owned by Ting. Ting now alleges that the supposed row over subcontracts was "just [ABB's] way of diverting the public's attention from the real issue involving cost overruns."

- See the [Mekong Campaign Page](#) for more information.



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# World Rivers Review

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## **Rhine-Rhône Canal Cancelled**

*by Marie Arnould & Roberto Epple*

French Prime Minister Lionel Jospin confirmed on June 19 the cancellation of the Rhine-Rhône canal project, on the grounds that the environmental costs would be too high and the economic viability of the project too uncertain. The decision was announced shortly after the victory of the Left-wing coalition in the general election by Dominique Voynet, the new Territory Management and Environment Minister and leader of the Green Party. The cancellation of the Rhine-Rhône canal was part of the common political program agreed on by the Socialist, Communist and Green Parties in the general election campaign. This political alliance between the "classic" Left and the ecologists led to the installation of seven Green Party representatives in Parliament - a first for France.

The decision arrived just as work was about to begin in the Saône and Doubs valleys. The process of buying 3,700 hectares (9,000 acres) along the Saône and Doubs rivers for the canal works has been halted. The approximately 1,000 hectares already purchased by project authorities Compagnie Nationale du Rhône (CNR) and the State will be either returned to the former owners or put up for sale.

The Rhine-Rhône canal had been postponed many times by successive governments hesitant to invest very large amounts of public money (up to US\$9 billion, according to latest estimates) into a scheme whose economic viability had been shown by several studies to be doubtful. But the previous government decided in 1996 to go ahead with the canal. The project would have turned the Saône and Doubs rivers in eastern France into a canal permitting year-round navigation for multi-barge convoys. The goal was to link the Rhône to the Rhine, notably the port of Rotterdam at the mouth of the Rhine (North Sea) to that of Marseilles on the delta of the Rhône (Mediterranean). However, studies show that between Rotterdam and Marseilles, the sea route by Gibraltar is actually faster: the project's 24 locks, in addition to numerous locks already on the Rhône and Rhine, would have considerably slowed traffic.

For several years, environmentalists united in the "Saône-Doubs Vivants - Sundgau Vivant" coalition, supported by WWF-France, campaigned against the project, arguing that 215 kilometers of the Saône and Doubs rivers, with their beautiful landscapes, rich flora and fauna and high-quality waters, would be totally destroyed. A massive popular movement also arose against the project. The last demonstration gathered more than 10,000 people in Montbéliard - a town located on the Doubs river which would have suffered great damage from the canal - on March 27th.

The coalition is now calling for a deeper reflection on the transport of goods in France, embodied by a coherent, comprehensive transport policy that gives priority to restoring and using the existing railway network. It should be noted that restoring the lines between Dijon and Mulhouse would cost approximately \$45 million, as opposed to \$9 billion for the canal between the same towns.

The cancellation of the Rhine-Rhône canal is a blow to the TransEuropean Transport Network (TEN), a European policy which aims to transform many European rivers into wide-gauge inland waterways. This decision, which comes after the defeat by river activists of a scheme of navigation dams on Germany's Elbe River last September; the postponement of the channelization of the last free-flowing section in Germany of the Danube river last fall, and the publication of the bad economic results of the Rhine-Main-Danube canal, which destroyed the Altmühl valley, could mean the beginning of the end for projects aiming at adapting rivers to ships, and not ships to rivers in Europe.

*The authors are with European Rivers Network (ERN). ERN has disseminated information about the Rhine-Rhône canal campaign throughout Europe. The group's web page has more information (<http://www.rivernet.org>). ERN is coordinating the "Living Elbe" campaign with Deutsche Umwelt Hilfe (DUH).*



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## **Okavango Delta Chiefs Rally to Oppose Namibian Pipeline Project**

*by Steve Rothert*

More than 50 chiefs and community leaders from the Okavango Delta recently called on nongovernmental organizations and the Government of Botswana to help them stop a proposed Namibian water pipeline project that would divert river water from the delta.

The pipeline would pump up to 120 million cubic meters annually from the Okavango River to Namibia's rapidly growing Central Area, which includes the capital Windhoek. The 250-kilometer-long pipeline could be completed around the turn of the century. An EIA on the project is being prepared now, and is expected to be completed by October.

Passionately citing their communities' dependence on the delta for water, food, transportation and livelihood, the chiefs unanimously opposed the pipeline plan at an emotionally charged meeting held in June in Maun, the district center for the Okavango Delta. The meeting was organized by a coalition of nongovernmental organizations called the Okavango Liaison Group (OLG), which was formed earlier this year by representatives of the Kalahari Conservation Society, Conservation International and the University of Botswana.

Since November of last year when a Namibian government delegation first introduced the pipeline proposal in Botswana, discussions about the project have been limited primarily to senior government officials and a small number of NGOs. Okavango Delta communities who will bear the brunt of any upstream water developments have not been included in the process by either country's government. Exclusion from such a decision-making process is an affront in Botswana, where the culture places great importance on consulting those who will be affected by a decision, traditionally through community meetings called *kgotlas*.

At the meeting, the chiefs emphasized the importance of public participation. "Although you have our unanimous support from us chiefs to help us stop this," Chief Phutego of Kasane told OLG participants, "you must first come to our villages and speak with our communities directly to get their support and hear what they have to say." In August the OLG will attend *kgotlas* in over 15 villages situated in and around the Delta to hear their concerns. The OLG will help develop a unified position for Delta communities on the pipeline that can be used to encourage the Botswana government to advocate for the

protection of the Delta. Also, the OLG plans to coordinate an independent review of the Environmental Impact Assessment on the pipeline, and will involve Delta communities in the analysis to ensure their concerns are addressed.

### **Dwindling Waters**

Many of the chiefs described how they have seen the Delta shrink over the last two decades. Chief Nxaku from Makalamabedi said, "Water from the Okavango used to overflow almost every year into the Boteti River, and used to flow past my village on its way to the Makgadikgadi Pans. We haven't seen water in the Boteti since 1983." Flow records for the Okavango River confirm Chief Nxaku's observations: in the past 50 years, the Okavango's annual volume of flow has decreased almost 20 percent.

The decreasing trend in river's reduced runoff points to one of the central issues in the debate about the pipeline: How much water does the Okavango Delta need to maintain critical ecosystem functions?

Pipeline proponents often point out that flows into the Delta can vary almost 10 billion cubic meters from year to year (from 7 to 16 billion), so it is already adapted to hydrological variation. But project opponents note that the pipeline could take water from the delta when it needs it most: during drought years. As proposed last year, the pipeline would divert between 20 and 120 million cubic meters only during crisis years. Environmentalists point out that "crisis" years for Namibia will most likely correspond to crisis years for the Delta as well, thereby compounding its impact on the Delta's ecology. Project opponents also fear that initial levels of diversion will likely increase dramatically as Namibia's demand for water grows.

### **Delta Study Needed**

Environmentalists throughout the region have urged Namibia to wait on its plans until the Okavango River Basin commission, [OKACOM](#), completes an integrated management plan for the river, which will address the question of ecological needs of the Okavango. Environmentalists in the region maintain the first step in setting management priorities for the Okavango and other shared rivers should be to determine what is required in terms of flows and other natural parameters to sustain healthy aquatic ecosystems, which are at a premium for people, plants and animals in this arid region. The perceived link between sound environmental management and sustainable development in this region remains tenuous, often subordinating environmental values to the goal of rapid economic development.

The concepts of instream flows and ecological needs have only recently found their way into discussions of water resource management in Southern Africa. This year, the Republic of South Africa adopted a new water policy that establishes as top priority the provision of water for domestic use, and as second priority defining and maintaining the quantity and quality of water needed to protect aquatic habitat. Once these needs have been filled, water can be allocated to industrial and agricultural uses. The rest of the region, however, remains far from embracing such a forward-looking approach.

Windhoek is a case study in how water needs are spiralling out of control in many parts of this arid region: according to the US State Department, although the city's growth is around six percent a year, its water use is expected to quadruple from current levels in the next 25 years. To fuel such growth,



Namibia is also reported to be considering a proposal to construct a 1,000-km pipeline to pump water from the Congo River to supply Windhoek. In June, President Sam Nujoma told *The Namibian*, "My vision for the future 15-30-year period is that we should make use of the Congo River for our future water needs," adding that the project should be managed by the 12-nation Southern African Development Community (SADC) regional trade bloc so that it can also benefit Botswana.

### **Emergency Status Ends**

The Namibian government advanced the Okavango pipeline proposal last year as an "emergency" project - to be completed by 1998 - when the nation's reservoirs dropped to less than 10 percent of capacity following several years of drought. Plentiful rains fell in Namibia this year, filling reservoirs to capacity and recharging many groundwater aquifers. The Namibian government now estimates that the Central Area has sufficient water for at least four years, even if little rain falls. As a result, the government confirmed recently that it no longer regards the Okavango pipeline as an emergency project, and extended its completion date to 2003. The Namibian Cabinet stressed, however, that it still considers the pipeline a "future emergency" project that should proceed nonetheless, and announced that a full feasibility study will soon begin.

The non-emergency status of the pipeline and the extension of the completion date will give NGOs and the Botswanan government a chance to thoroughly evaluate the potential impacts of the pipeline, and it will allow OKACOM to incorporate the project into its river basin management plan. Also, Namibia can now thoroughly explore alternatives to the pipeline without the acute threat of a water shortage. Finally, the delay opens a window for Okavango Delta communities to organize and participate in the process.

### **Better Alternatives**

Many in Botswana question whether Namibia has thoroughly considered all of its options before turning to international waters. According to water consultants in Windhoek, the answer appears to be no. The Okavango River pipeline idea was conceived in the 1970s, before much investigation into groundwater reserves or other water sources had been done. Namibia still has not conducted a thorough assessment of groundwater supplies, suggesting the decision to build the pipeline is not fully informed.

The government's 1993 Water Plan projects that water demand could quadruple from approximately 55 million cubic meters today to between 150 and 240 million cubic meters by 2020, possibly exceeding current supplies by 2003. The study indicates that the Central Area has a number of undeveloped sources of water that could meet demands for at least 10 years and forestall the need to tap the Okavango. Together, the various sources identified could supply a 95 percent safe yield of approximately 80 million cubic meters per year.

The water plan's list of potential sources does not address relative costs or environmental impacts of the various sources, but it does indicate that there are other options that could meet demand for some time. For example, eliminating the inefficiencies from the existing Eastern National Water Carrier system, and using the Windhoek Aquifer as an underground reservoir to reduce evaporation (a serious problem for open bodies of water in hot, dry climates) would yield more than 8 million cubic meters per year, which is more than half of what the proposed emergency pipeline would extract.

Perhaps the most appealing alternative on the list is desalination, which offers a virtually unlimited supply and relatively little environmental constraints. The problem seems to be the cost. According to government assessments, the cost of desalinating seawater is approximately \$N5/cubic meter - at the coast - compared to an estimate of \$N10/cubic meter of Okavango water delivered to Windhoek. The cost of pumping desalinated water over 350 km and up 1600 meters to Windhoek reportedly raises the cost to at least \$N12/cubic meter. Until the cost of water in Namibia increases significantly or the cost of the technology decreases, desalination will not offer an economically competitive alternative for Windhoek water supply. Recent advances in the technology being tried in South Africa and elsewhere could make this an economically competitive alternative in the near future.

The consideration of alternatives to the Okavango pipeline leads to a broader question that has been raised in discussions of water resources in Southern Africa: Should countries have to meet certain standards before tapping international waters and adversely impacting their neighbors? Such standards might include recycling a certain percentage of water consumed, implementing effective conservation and demand control measures and full utilization of economically feasible domestic sources. This approach would certainly go beyond any current international river basin agreements, but would help Southern African countries stretch their limited water supplies over the long road to economic development.

Before the pipeline proceeds, the Okavango Chiefs and the OLG are calling for full consideration of all the issues involved, including alternatives to the pipeline and impacts to the Delta and the communities that depend on it. As Chief Mwezi from Kauxwe said, "We understand that Namibia is a sovereign nation, and they have a right to do what they want, but we must convince them to take water from the Okavango only as a very last resort, and in a way that doesn't hurt the Delta. We are at their mercy."

*The author lives in Gaborone, Botswana.*

### **About OKACOM**

In 1994, Namibia, Angola and Botswana signed an agreement establishing the Permanent Okavango River Basin Commission, known as OKACOM, which consists of three representatives from each country who can appoint advisors on a permanent or ad hoc basis. The OKACOM agreement commits the countries to a number of principles to guide the management and use of the Okavango, including equitable allocation of Okavango water, sharing of information, sustainable development of the basin and environmental protection. These principles are to be implemented through a Global Environment Facility funded integrated management plan for the basin, which would be preceded by an environmental assessment.

In early July, OKACOM held a meeting in Windhoek to endorse the selection of Steve Crerar, a hydrologist from Windhoek, to lead the assessment and planning process, which is scheduled to begin by August and be completed by early 1998. Although the GEF project will include consultations with

Okavango basin stakeholders, there is provision for ongoing involvement by non-government entities.

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- See the [Southern Africa Campaigns Page](#) for more information.
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