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International Rivers Network

Last time updated Thursday, 12-May-2005 18:07:17 MDT

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Volume 13, Number 4 / August 1998

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World Rivers Review
Published by International Rivers Network
Volume 13, Number 4 / August 1998

Activists Unite to Decommission Dams

by Lori Pottinger

A new coalition of environmental and social activist groups from seven countries in North America, Europe, Australia and Asia have pledged to make river restoration and dam decommissioning a priority global campaign. The group, called "Living Rivers: The International Coalition for the Restoration of Rivers and Communities Affected by Dams," will focus on restoring rivers and the well-being of communities which depend on them by working to drain reservoirs, remove dams and change the operating patterns of dams.

The coalition came into being at a July workshop on dam decommissioning held in California. Workshop participants are involved in dozens of dam-decommissioning efforts, from fishing villages in Thailand to the headwaters of France's Loire River to the heavily dammed Snake River in the northwestern United States. "Instead of just defending rivers from bad projects, we're promoting a new vision for rivers - living rivers," said Phil Williams, President of IRN.

The coalition's founding declaration notes that "Worldwide rivers are degraded by hundreds of thousands of dams, which have flooded huge areas of the world's most beautiful and ecologically rich habitats and the lands and homes of tens of millions of people The promised benefits of many dam projects have never been realized, and their adverse effects are more serious than predicted."

The group agrees that, for many rivers, the best option for restoration is dam "decommissioning" - defined as anything from merely stopping electricity generation to totally removing a dam and restoring the river to its pre-dam state. While dam removal is a costly and challenging proposition, in some cases it will prove to be the most economically and ecologically sound alternative. The coalition will focus its attention on dams which have reached the end of their functional life, are unsafe, or whose maintenance or mitigation costs exceed the benefits to be gained by their operation.

Workshop attendee Shripad Dharmadhikary, an activist with India's Narmada Bachao Andolan (NBA), said, "We have stopped work on the Sardar Sarovar Dam on the Narmada River for the past three and a

half years. We are working to lessen the impacts of dams by changing the way they are operated. The next logical step is to remove those that have been built, or get as close to removal as possible, to try to simulate the natural river." The NBA is perhaps the world's largest dam-fighting organization, and has led a popular revolt against dams on the Narmada River for 13 years.

Wendy Wilson, of Idaho Rivers United, another workshop participant, believes dam-removal campaigners will need "the can-do optimism that built these projects in the first place." She sees the new coalition as a positive force that will "bring a lot of spirit to the environmental movement, with its message of hope. We *can* take out fish-killing and community-dividing dams and promote sound water management and river restoration."

The activists at the workshop vowed to help extend the coalition beyond the 18 groups currently signed on to the group's founding declaration (see page 7 for declaration). Living Rivers' first efforts will be developing case studies on successful dam decommissioning efforts and on river restoration. It will also work to ensure that the newly formed World Commission on Dams (WCD) assesses the issue of dam decommissioning in depth.

The World Commission on Dams, founded February of this year, has a two-year mandate to review the development effectiveness of large dams around the world. The WCD is also charged with developing standards, criteria and guidelines to advise future decision-making on dams. The commission is chaired by Professor Kader Asmal, Minister of Water Affairs and Forestry of South Africa. When the WCD was established, NGOs pressed to have decommissioning added to the group's mandate. The WCD's mandated goals are: " to review the development effectiveness of dams and assess alternatives for water resources and energy development, and to develop internationally accepted standards, guidelines and criteria for decision-making in the planning, design, construction, monitoring operation and decommissioning of dams."

The workshop was the first time that some of the world's most active dam-decommissioning campaigners had been brought together to discuss how to unify and expand their efforts. When the group was asked why anyone outside the coalition should support their efforts at dam removal, flip charts were soon filled with a steady flow of ideas. "Because it makes economic sense" topped the list, followed by "public safety," "to restore fish migrations, farmlands, watersheds and water quality," "to restore the rights of downstream communities and reservoir communities who lost lands," and "because alternatives are now available."

The activists acknowledge that the task at hand will not be easy. Participants talked of ingrained notions about harnessing nature and the difficulty of winning over people who have never known an undammed river. "We need to take down two dams, one in people's heads and one on the river," said Roberto Epple, head of the European Rivers Network. "The real dams will be easier to take down than those in the head," he added. Epple was the conference's only activist to have witnessed the dynamiting of a large dam (see page 6 for story).

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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WebProducer

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Volume 13, Number 4 / August 1998

The High Cost of Keeping US Dams Safe

Dam safety is one of the key reasons driving many dam decommissioning campaigns. A March 1998 report by the American Society of Civil Engineers (ASCE) estimates that it will take $1 billion to rehabilitate the 2,100 US dams identified as unsafe. But according to a national dam-safety program, the study significantly underestimates the price tag for maintaining the safety of the nation's 95,000 dams. These high costs are fueling a nationwide movement to remove particularly unsafe dams that no longer serve a useful purpose.

Fixing unsafe dams is only part of the nation's dam safety problem, notes Martin McCann, consulting professor of civil and environmental engineering at Stanford University and director of the National Performance of Dams Program (NPDP). The NPDP puts the real cost for effectively managing the risks that dams represent at about $1 billion per year for the next 20 years. McCann says the ASCE study ignored the cost of ongoing maintenance and repair for existing dams to ensure that they do not become unsafe; implementation of emergency action plans at dangerous dams; and other costs.

"Either we make the investments required to keep our nation's dams safe, or we will pay the price in dam failures," said McCann. "By 2020, more than 85 percent of our dams will be more than 50 years old, generally considered to be the design life of a dam."

For more information, contact the National Performance of Dams Program, Department of Civil and Environmental Engineering (650)723-9323;. Fax: 650 723-8398; e-mail: npdp@ce.stanford.edu

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1847 Berkeley Way
Berkeley, CA 94703 USA
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email: irn@irn.org

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Commentary

Reviving Rivers

by Philip Williams

Up until a few years ago, most river activists still regarded dams as permanent features of the landscape. This meant that most river restoration campaigns focused on treating the symptoms rather than looking for a cure for dam-inflicted harm to fisheries, wetlands, estuaries and communities. Now, as it is becoming more apparent that there is no feasible technical fix for mitigating most of the impacts caused by dams, popular support for decommissioning dams is growing. This is especially true in the US, where some 75,000 dams clog rivers and the era of dam-building has all but ended. River activists are mobilizing to decommission more and more obsolete dams throughout the country in hopes of restoring rivers to their former glory. To take advantage of this momentum, IRN recently brought together some key river activists to discuss the growing number of decommissioning campaigns, and the potential for building a movement around this last, best hope for the world's rivers.

Although the fight over decommissioning has only just started, activists have already produced a road map for where we are headed, as evidenced by the group's positive and forceful Walker Creek Declaration (see cover story).

The potential power of this growing movement is revealed not just in its own hopeful message, but in the hasty formation of an opposition movement. Dam decommissioning activists were a bit surprised by the sudden formation of special interest groups dedicated to *preserving* dams and reservoirs they had targeted for decommissioning. At first it seemed like black humor that an organization called "The Committee to Save Lake Powell" had come together in response to the first efforts to decommission Glen Canyon Dam - the largest dam in the US, and a major culprit in the declining health of the Colorado River. (Note that this special interest group defines itself not as pro-dam but as pro "lake.") A new set of tactics will arise to meet this unique challenge.

There are other signs of the popularity and potential strength of the campaign to decommission dams.

The US Secretary of the Interior has been touring the country and personally assisting in the demolition of obsolete structures, stating that "dams are not like the pyramids of Egypt that stand for eternity" (see opposite page). Most significantly, the powerful western water lobby and the politicians they direct are now running scared, terrified of the "domino effect" on their own pet dams. Unwittingly or not they have now placed dam decommissioning at the center stage of the US environmental agenda by attempting to include legislation in the Presidents' environmental program that would preclude the decommissioning of dams without Congressional approval. The legislation was labeled a "mugging" by the *New York Times*, in an editorial that derided Republican "free market" politicians' attempts to protect taxpayer subsidies of hydro, barging and irrigation interests.

Twenty years ago, the nuclear lobby's efforts to build large numbers of nuclear power plants was fought to a standstill, because of the cost, risk and harmful ecological effects of the technology. Once this battle was won, the anti-nuke movement turned their energies to decommissioning existing plants. As these plants aged they became more unsafe and more expensive to maintain. In some instances plants were shut down, but in most cases as they reach the end of their life span they are being demolished and not replaced. The case with large dams is similar: as dams age, they are becoming more and more unsafe, their reservoirs are filling with sediment, and alternative sources of power and water are being found to replace them. The cost of rebuilding most of these dams could never be justified.

The decommissioning movement's powerful message - that rivers can be freed of their concrete prisons - serves not just to give the dam builders a well-deserved scare. More importantly, it inspires communities and colleagues around the world who are desperately fighting to protect their communities and river valleys from large, destructive dam projects. It tells them that in countries like the US and France that for years have promoted dam technology, mistakes were made and values have changed.

By decommissioning dams, fisheries can recover, reservoir refugees can get their lands back and floodplain agriculture can be restored. Practically this means that the dam fighting movement is now going on the offensive, challenging the dam lobby to justify the waste, expense, risks and subsidies inherent in making the decision not to decommission a dam. It is a message of hope.

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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Bruce Babbitt Takes a Sledgehammer to US Dams

Secretary of the Interior's Dam-Busting Tour Sets Tone for New Era for US Rivers

The following remarks by US Interior Secretary Bruce Babbitt describe his recent "Sledgehammer tour," in which he helped remove a number of dams around the US. The speech was given at the Ecological Society of America on August 4, 1998 in Baltimore, Maryland.

Usually my trips to rivers involve a canoe and paddle, or flyfishing rod and reel. More recently I arrive with sledgehammer in hand, to celebrate the destruction of dams.

I suspect this breaks with tradition. Six decades ago, President Franklin Delano Roosevelt and his Interior Secretary Harold Ickes toured the country to dedicate dams, new dams, powerful dams, including four of the largest dams in the history of civilization. They built dams for barge traffic, for electricity, for irrigation, for drinking water, for flood control. For most of this century, politicians have eagerly rushed in, amidst cheering crowds, to claim credit for the construction of 75,000 dams all across America. Think about that number. That means we have been building, on average, one large dam a day, every single day, since the Declaration of Independence. Many of these dams have became monuments, expected to last forever.
You could say forever just got a lot shorter.

Starting last June 17, I hoisted a sledgehammer to mark the removal of four dams, opening 160 miles of the Menominee River flowing between Wisconsin and Michigan. In September, I visited the two Elwha River dams which the Administration plans to remove to restore one of the fabled chinook salmon runs of the river. Then on December 17, I took my sledgehammer to punch open the 55-year-old, 260-foot Quaker Neck Dam on the Neuse River, opening 925 miles of fish spawning habitat. And in July I took the first crack at breaking up McPherrin Dam to restore chinook slamon to Butte Creek and, a day later, used the sledgehammer to breach Oregon's Bear Creek Dam.

Every stop on this dam-busting tour attracts enormous local, regional and national attention. I believe that huge public interest reflects a deep, widespread understanding that America overshot the mark in

our dam building frenzy. In this century, dams that were clearly justified for their economic value gradually gave way to projects built with excessive taxpayer subsidies, then justified by dubious cost/ benefit projections.

The public is now learning that we have paid a steadily accumulating price for these projects, in the form of fish spawning runs destroyed, downstream rivers altered by changes in temperature, unnatural nutrient load and seasonal flows, wedges of sediment piling up behind structures, and delta wetlands degraded by lack of fresh water and saltwater intrusion. Rivers are always on the move and their inhabitants know no boundaries; salmon and shad do not read maps, only streams.

The clang of the sledge hammer is one of the oldest sounds known to man. Yet now, at the end of the 20th century, we are using it to ring in an entirely new era of conservation history, moving beyond preservation or protection towards a deeper, more complex movement - the affirmative act of restoration.

Beyond Preservation

Restoration grows out of the same stewardship impulse as preservation, but pushes beyond, as one might renovate an old, neglected farm to inhabit once again. The coming age of restoration requires the active involvement of the citizens who live on the entire watershed. Most of all it requires a creative act; we must see not only what is, but envision what can be. It requires us to reach back into our history in order to grasp the future in which we might live.

Restoration invites us to understand how the natural world - with its complex storms, fires, forests, watersheds and wildlife - functions as a whole. And the best unit to measure that whole - how it is more than the sum of its parts - is the river that runs through us. For that river reflects the condition of every single acre of the whole, integrated watershed. Thirty six centuries ago, Emperor Yu of China advised "To protect your rivers, protect your mountains."

That same rule applies today. To restore our aquatic ecosystems, look beyond the water's edge out onto the land that borders it. What happens on that land inevitably is reflected in our rivers.

But even protecting mountains, we discover, goes only so far. I doubt that Emperor Yu, for all his wisdom, could foresee the construction of Three Gorges Dam or what it would do to the life of that river. And lest we condemn China too quickly, I should point out that we in America have been slow to recognize the ecological costs of dams. And slower still to envision watershed restoration through dam removal.

I began to reflect on these issues over the course of many days and nights spent in the Grand Canyon over the last half century. I hiked and boated and camped beside the Colorado River before Glen Canyon was built in the 1960s. In those years it was a wild, unpredictable, brown, sediment-laden stream flooding into the early summer, then settling down in the winter. The gates of Glen Canyon were closed in 1963. Today, you see an ice cold, Jell-O-green river, manipulated up and down, rising and falling on a

daily cycle, flushed with the regularity, and predictability, of a giant toilet.

Over time, as I floated down the river, I saw trees on talus slopes wither and die for lack of water. I saw sandbars - once covered with yarrow, willow and cottonwood - disappear. I saw once plentiful native fish driven back to the brink of survival in only a few isolated tributaries.

It may seem hard to comprehend now that, at the time, no one even considered the possibility of these dramatic changes. At the time Glen Canyon was built, we were still thinking of dams as stand alone projects that, lamentably, flooded out nice scenery upstream - but without consequences for the entire river system. And the Grand Canyon is only one of thousands of examples.

Nowhere has the impact of dams been more visible than on aquatic life. We once believed that freshwater flowing to the sea was "wasted." By trying to hold it back as long as possible, we blocked out anadromous fisheries from their ancient spawning grounds. In the 19th century, from Maine to the Chesapeake on down to Florida, in the course of damming rivers, we virtually destroyed the rich Atlantic salmon, shad, striped bass, herring and sturgeon as they made their way inland from the Atlantic.

And in this century, with our massive projects up and down the Pacific-bound rivers, we have repeated this process of destruction, virtually decimating the great salmon and steelhead runs of the northwest, by continuing to build dams clear up into the 1970s. This year, we learn that roughly one third of all fish, two thirds of all crayfish, and three quarters of the bivalve freshwater mussels in America are rare or threatened with extinction.

Let's give the economists their due: We seem to value something only when it becomes rare. The loss of fisheries that we once took for granted has led to a new urgency demanding ways we can replenish them. Every single dam to which I brought my sledgehammer was removed for the benefit of one or more endangered aquatic species. Yet despite this progress there are still - if we use established figures - 74,993 dams in America, blocking 600,000 miles of what had once been free flowing rivers.

But as we contemplate future ceremonies involving dams, here are some considerations:

- Dams are not America's answer to the pyramids of Egypt. We did not build them for religious purposes and they do not consecrate our values (even if some are named after Presidents). Dams do, in fact, outlive their function. When they do, some should go.
- There also comes a point in the life of a dam where we can get the same benefits in other ways. On Butte Creek, irrigation farmers could replace McPherrin Dam and three others with an irrigation pump and siphon. Quaker Neck Dam, which stored water for power generators, could be replaced with a different cooling system.
- Moreover, in some cases the price for the benefits is simply too high; the dam has grown too expensive relative to the loss of fish. Owners of dams coming out on the Menominee found that taking a holistic approach to the entire watershed would save them time, money and energy. Some could be phased out, while others reoperated with screens, fish passage and drawdowns.

But all these conditions rest on the values and the scientific understanding of the larger community. Who, besides nature, decides whether a dam stands or falls?

One recent column made a reference to "Babbitt, the nation's dam-remover-in-chief" as if I were some Roman emperor giving thumbs up or down. The truth is I have not brought my sledgehammer to a single dam that was not approved for removal by consensus of the inhabitants of the watershed. Each community made a thoughtful, deliberative choice in how they could restore their river. Many of these consensus-based decisions are brought about by democratic, voluntary watershed councils that are cropping up all over the country.

Larger dams pose more complex issues, for there are more, and bigger, economic stakeholders. Entire industries, the price of electricity for millions of people, water storage for cities. We are rapidly reaching a consensus with Congress to remove the dams at Elwha and Glines Canyon. The debate over four dams on the Snake River will surely continue for years. Yet even when a community decides that a dam should remain, it may discover progressive new ways to operate it that restore some of the ecological damage.

So what can you do as citizens and scientists to shape this restoration movement? What you can do as ecologists is research and examine and document the benefits that might be accrued by restoration of the aquatic ecosystem by removal or reoperation of a given dam in the watershed you may be involved in. We have plenty of powerful stakeholders willing to reassert the known, traditional benefits of dams - irrigation, hydropower, urban water authorities, engineers. But the process of putting a value on the native life intrinsic to watersheds and ecosystems is something new, and the degree to which you can do so goes a long way.

There is another way of expressing this: My parents' generation gloried in the construction of dams across America's rivers. My generation saw how those rivers were changed, deformed, killed by dams. Your generation must help decide if, how and where those dams stand or fall.

I am reminded of Ecclesiastes: One generation passeth away, and another generation cometh: but the earth abideth always All the rivers runneth to the sea, yet the sea is not full; to the place where the rivers flow, there they flow again.

A beautiful passage, but now haunting, for it is no longer true. I think back to my beloved Colorado River: once one of the mightiest rivers in America, it no longer makes it to the sea. That is a shame. As our generation passes, the toughest decisions rest firmly in your hands.

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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Indigenous People, Environmentalists Gear Up to Fight Proposed Dam in Honduras

by Monti Aguirre

The news of a new hydroelectric dam, the planned Patuca II project, is stirring controversy in Honduras. The Central American nation is still reeling from the costs of El Cajón Dam, a 14-year-old project that produces much less power than it was designed to and left a raft of social problems in its wake.

Because Patuca II could have serious social, environmental and economic impacts, environmentalists organized a public forum so that people who would be directly affected by it could meet face-to-face with dam proponents. The result was the Patuca II Forum, which brought together indigenous people, environmental NGOs, government officials and engineering companies. The June 9 forum, held in the capital city of Tegucigalpa, was organized by the newly formed National Environmental Committee, comprised of 25 NGOs.

Patuca II is planned for the Patuca River, which is fed by the Guayape and Guayambre rivers. The 105-meter-high dam would create a 45 square-kilometer reservoir and is expected to generate 270 megawatts of power. The estimated cost of the project is $500 million, and operations are set to begin in 2004. The project is being promoted by the Panda Patuca Power Company, a consortium formed by the companies Harza Engineering of Chicago and Panda Energy, Dallas; and the Honduran investment group Lovable.

Project plans include construction of a road 57 kilometers into Patuca National Park. The road worries indigenous peoples, who fear it will facilitate invasions of the adjacent Tawahka Indigenous Reserve and Miskito native lands. "We are concerned about a stampede of colonization coming into the area, and the deforestation that it will cause," said Benjamín Morales, president of the Miskito organization Asla Takanka (MASTA).

"We also foresee cultural problems as gunmen, corruption, alcoholism and prostitution arrive," said Efraín Gonzáles, a representative of the local government of the Miskito village of Wampusirpe.

The Tawahka (population 950) and Miskito (pop. 30,000) communities, both located downstream from

the dam site, are alarmed by news of the dam project. Many of the people have never seen a dam and do not know what impacts the project could have. According to Elvira Aguero, Secretary General of the Indigenous Federation of the Tawahkas, "Our culture is to travel on the river in canoes and go fish. But when the river dries up, what are we going to do?"

The dam's impacts on farming are also worrisome, especially during times of drought. "The most central issue for us is our land. Our subsistence is based on agriculture, and the river washes over and fertilizes the land. If a dam is built, the nutrients are not going to come down and our land will become poorer," said Efraín Gonzáles.

At the June forum, indigenous participants cricitized the project's lack of a clear public participation process. "We don't want any lies, we want true popular consultation," said Efraín Gonzáles.

The Indigenous Federation of the Tawahkas, MASTA and the Asang Launa Association met earlier this year and issued the Ahuas Declaration (see box). The groups joined to form the Patuca II Critical Platform to monitor the development of the project, and to voice their concerns.

Environmental Damage

Although the Environmental Impact Assessment (EIA) will not be completed until January 1999, numerous environmental problems have been raised by the National Environmental Committee. Patuca National Park is a main link for neighboring natural areas, which are part of the Mesoamerican Biodiversity Corridor. The Corridor extends from Mexico to Panama. Downstream, the Patuca River limits the Rio Plátano Biosphere Reserve, which might also be impacted by the dam. The Patuca National Park is home to the harpy eagle, tapirs, aguti paca, several varieties of tiger cats, wild pigs and deer. The passage of the cuyamel, fish of great significance in the Tawahkas' origin stories and which is in danger of extinction, would be interrupted by the dam.

Sedimentation may be one of the biggest technical problems facing the Patuca II dam project. Upstream from the dam site, where colonization has spread in recent years, both banks of the river have been extensively deforested. There is a great possibility that sedimentation will reduce the dam's lifespan.

Besides Patuca II, there are plans for three other dams on the Patuca River - the Patuca I, IIA and III dam projects. The only document released by the project consortium so far, an action plan, refers only to Patuca II, but local sources said there is a study on the overall scheme that has not been publically released. The cumulative environmental impacts for the four dams have reportedly not been studied.

Financing for this project is expected to come from private investors. A brochure from the Consortium states that they will seek funding from the International Finance Corporation of the World Bank, and from the Inter-American Development Bank.

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Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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United Against Patuca Dam

The Ahuas Declaration

The following is an abbreviated version of the Ahuas Declaration, which details why local people and NGOs are working to stop Honduras' Patuca Dam project.

May 24, 1998

We, the representatives of local communities and organizations of indigenous people of La Mosquitia, together with municipal governments, churches, national sustainable development organizations, following an analysis of the plans and procedures related to the proposed construction of the Patuca II hydroelectric dam, declare the following:

- That the Panda Patuca Power Company and governmental authorities are promoting the development of the Patuca II hydroelectric at an accelerated pace, without the required procedural transparency and without having appropriately consulted with potentially affected people
- That, to date, steps of the process taken to bring this project forward have violated international treaties and national laws
- That the Constitution of the Republic of Honduras obligates the State to protect and conserve indigenous peoples and their cultures
- That the indigenous peoples of the region have a way of life closely bound to the environment and natural resources
- That the [region] represents the largest continuous tract of forest in Central America, and that the government of Honduras has entered into international agreements for its protection, would be divided in two should the dam be constructed
- That the World Bank is being mentioned as a source of financing for the Patuca II project as well as for the protection of the Mesoamerican Biological Corridor, and as such constitutes an internal contradiction of the policies of this institution
- That the construction of hydroelectric dams elsewhere in pristine tropical forests, their associated road construction and the arrival of large numbers of workers have given rise to intercultural conflicts, the social disintegration of local indigenous communities, and the colonization of the forests by agricultural, ranching and forestry interests. These actions have resulted in the destruction of indigenous peoples, their ancestral territory and biodiversity
- That there exist alternative energy conservation and generation possibilities to meet the national electrical

demand

- That the majority of the energy that would be produced by the project would not meet national demand but rather would be exported to [create] profits for multinational companies
- That the Patuca II project does not represent a long term solution to the national energy situation while its negative consequences on the affected communities would be permanent and irreversible
- That the protection of cultural and natural resources represent a vital national interest
- That we live in a country governed by laws.

THEREFORE: We demand that the Panda Patuca Power Company and the governmental authorities act with transparency and respect national laws on indigenous and tribal peoples.

We demand an independent, objective, and ample Environmental Impact Assessment that includes the effective participation of our communities in its design, execution and evaluation stages, considering not only the first but also the second phase of the Patuca II project.

We call upon the World Bank to investigate and resolve the contradictions it might incur by financing the Patuca II project.

We call upon the organizations of the Honduran society and of the international community to join us in the defense of indigenous peoples and of natural resources that are considered part of the world's heritage and threatened by the intentions to develop the Patuca II Dam.

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When Push Comes to Shove on the Biobío

by Aleta Brown

A David and Goliath struggle is playing out in the upper reaches of Chile's Biobío River. Members of the small but determined indigenous Pehuenche population are standing up to the huge utility, Endesa, which is building dams in their communities.

On July 30, 100 Pehuenche people and their supporters attempted to block construction on the US$500 million Ralco Dam in the upper Biobío. Entering from a side road, the protesters formed a human chain to block trucks that were trying to work on the 10-km-long road to the dam site. The protest heated up when 35 local police officers, including a riot squad, tried to disperse the crowd with tear gas. The protesters threw the canisters back. In the end, four people were arrested and charged with public disorder, including Cristian Opaso of the Grupo de Acción por el Biobío (GABB), and Augustin Correa, a Pehuenche active in the struggle.

The unrest at the dam site forced Endesa and government officials to agree to meet with affected people on August 12. As a result of the meeting, Planning Minister German Quintana ordered Endesa to stop further work at the construction site until the dispute can be resolved. Despite this, 30 Pehuenche protestors continue to guard the bridge leading to the dam site.

Conadi, the governmental agency responsible for protecting Chile's indigenous population, had earlier petitioned Endesa to suspend all work in the area, but Endesa refused and construction continued. According to Chile's 1993 Indigenous Law, Endesa cannot begin construction without written consent from the 400 Pehuenches who would be resettled to fill the dam's 13-square-mile (3,400 ha) reservoir. The law states that indigenous land cannot be sold, only traded, and that 100 percent of all families involved must agree to the move. The upper Biobío was formally declared an indigenous area in March, 1997.

As with many development projects, the community is divided over the issue. There are those who support the project, believing it will improve their situation, while others remain steadfastly opposed.

Nine families have said they will never trade their land for any price. Nicolasa Quintremán, whose family has owned and lived on the same land for 500 years, says, "The only way I'll leave here is dead."

Although Endesa has managed to obtain written consent from at least half of the families, many of these are reportedly trying to contest their contracts. According to *Christian Science Monitor* (May 21, 1998), Endesa told the families that they would receive compensation such as animals and farm equipment, but the families have yet to see such items. CONADI has been looking into the alleged discrepancies of the barter contracts. Also, according to a United Press International (UPI) story, an internal report by Conadi confirms that some of the families may have been coerced by Endesa into signing the contracts. The UPI story alleges that Endesa told the families that, because the company had already received all needed permits, they had no choice but to sign. A Pehuenche man who signed told Conadi representatives, "We don't have any alternative. They are going to flood our land and we are not fish."

Political Power Play

On the eve of a critical Conadi vote concerning Ralco Dam, President Eduardo Frei fired Domingo Namuncura, the head of the Conadi. The vote concerned the legality of land swap contracts which Endesa had negotiated with the Peheunche. Namuncura concluded that the contracts had been unfairly negotiated and that the land offered the Pehuenche would not sustain their culture and lifestyle. His vote, when added to that of the eight indigenous people on the Conadi council, would have torpedoed the project.

In his resignation letter to President Frei, Namuncura wrote, "Conadi's review of the land swap contracts, in strict accordance with the Indigenous Law and our own regulations, found that the contracts could not be approved because they did not comply with a series of requirements regarding their conception and execution. The Indigenous Law demands respect for indigenous culture Indigenous lands are to be protected so that they are used appropriately and so that ecological balances are maintained. There is no doubt that the Ralco Dam project will have a tremendous impact on the indigenous people living there This is why the procedures used by Endesa in relation to Pehuenche families and communities merit Conadi's utmost scrutiny, and have been shown to be lacking with respect to the property offered as compensation and with respect to mitigation of social and cultural factors."

President Frei - a staunch supporter of the project and a hydraulic engineer - could not have expected the rally of support for the Pehuenches that followed. Marching from Santiago to Valparaiso, 70 Mapuches (Chile's largest indigenous group) insisted that the country's Human Rights Commission travel to the Upper Biobío and assess the situation. The Communist Party of Chile has also pledged its support. Hugo Inostroza, the Communist Party Secretary, says that the Ralco Dam will cause the "cultural ethnocide" of the Pehuenche. In all, the six dams planned for the Biobío River would force the relocation of 1,000 Pehuenches, a full 20 percent of the survivors of this ancient culture. Endesa has announced that they will start full construction of Ralco in early 1999.

This is not the first struggle for land rights faced by the Pehuenche. The Pehuenches are descendants of

the mounted warriors who held back Spanish conquest for 200 years. According to anthropologist Theodore Downing, the Pehuenche people held 54 million hectares in the last century but their land has now been reduced to seven reservations with a total of 30,000 hectares. The river and the land are interwoven into their spiritual and cultural beliefs, and though most adult Pehuenche are considered illiterate, they read and understand the language of the river, the Piñon pines, and the river valley that has been at the core of their spiritual and physical home for centuries.

The Indigenous Law and the determination of some Pehuenches are not Endesa's only obstacles. A lawsuit against Endesa has been filed at the Sixth Civil Court in Santiago. The plaintiffs claim that the Environmental Impact Assessment (EIA) for Ralco should be declared null and void because the procedure for implementing the EIA did not comply with established guidelines. The lawsuit against Endesa is also supported by three members of the Parliament.

Chances are, Endesa won't give up the fight easily. The company and its shareholders have much to gain from this project . A representative of Endesa told GABB that, "We have until the year 2002 [the year the reservoir would fill] to solve the issue of the lands of the Pehuenche."

The hydro-development of the Biobío River began with the 450-MW Pangue Dam. Built and operated by Pangue S.A., the Pangue Dam was financed with the help of a US$150 million loan from the International Finance Corporation, the World Bank's private sector arm. The IFC's and Endesa's poor handling of the project's social issues prompted two investigations which revealed human rights abuses associated with the project. One investigations were done by the Committee for Human Rights of the American Anthropological Association and the International Federation of Human Rights. Both reports were highly critical of IFC and Endesa.

Aside from displacing 600 people, the 570-MW Ralco Dam and its reservoir will threaten at least 50 species of mammal and aquatic life dependent on the river; increase access to logging; subject 1,400 hectares of denuded reservoir banks to erosion and landslides; decrease downstream flow during low water periods and seriously impact downstream aquatic life and irrigation practices.

Chile's intermittent drought is also a cause of concern. With precipitation levels at 50 percent below average this year, reservoirs in the south - where much of Chile's hydropower comes from - are only half full. From 1988 through 1990, Chile experienced a severe drought which forced Endesa to purchase outside electricity to satisfy supply contracts. In its 1996 economic prospectus, Endesa states, "There can be no assurance that a period of severe and sustained drought will not adversely affect the Company's results of operations."

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

International Rivers Network

WebProducer

World Rivers Review
Published by International Rivers Network
Volume 13, Number 4 / August 1998

Loire Dam Dismantled for Salmon

by Roberto Epple

The Saint-Etienne-du-Vigan Dam on the Upper Allier River, the main tributary of the Loire River, came down in a flash of dynamite and smoke on June 24. It is the first time in France that a dam operated by the French state-owned electricity utility Electricité de France has been destroyed in an effort to restore salmon habitat.

Located near the headwaters of the Allier River, the Saint-Etienne-du-Vigan Dam sterilized 70 acres of the basin's best salmon spawning grounds. Before this 44-foot-high dam was built in the late-nineteenth century, the surrounding villages produced approximately 10 tons of salmon per year, which contributed heavily to the local economy. The dam produced just 35 MW per year - enough for some 35,000 houses.

In late 1997, the dam reservoir was emptied when a flood occurred and washed out the accumulated silt in the reservoir. Studies found low levels of pollution in the reservoir sediments. The cost of the demolition is an estimated US$2.3 million, including $1.2 million to replace taxes formerly paid by the utility. This money will go for measures to improve the habitat and local tourism infrastructure.

The decision to remove the dam was taken in 1994, when the "Plan Loire Grandeur Nature" was launched by the French government. This program, spurred by widespread opposition coordinated by the Loire Vivante network to a series of projected dams on the Loire river basin, planned several measures to save the remaining salmon population of the Loire basin, including demolition of another dam on the Loire basin, construction of a hatchery on the Upper Allier, suspension of all fishing and elimination of other obstacles to salmon migration.

The other dam to be dismantled is the Maisons-Rouges, on the Vienne river, another tributary of the Loire river. The process has been slowed by the opposition of local politicians but the current French government has now scheduled 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: the works will begin next September.

The goal of the program to restore salmon population on the Loire basin is to have 6,000 adults return to the Loire estuary in 10 years. In the 19th century, approximately 100,000 Atlantic salmon would make the annual journey to their spawning grounds in the headwaters of France's 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 1997, only 389 salmon were counted on the middle Allier River, the sole tributary in the Loire basin where salmon still return to spawn. Dams were the main cause for the spectacular drop in the salmon population. Young smelts 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 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 large European rivers; it is the only salmon remaining salmon species in Europe which is able to swim upriver for such long distances (more than 600 miles).

For more information contact:

European Rivers Network
Roberto A. EPPLE Executive Director,
e-mail : ern@rivernet.org
website: http://www.rivernet.org

Main & West European Office:
8 Rue Crozatier
43000 Le Puy
France
Tel +33 (0) 471 02-0814
Fax +33 (0) 471 02-6099

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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WebProducer

World Rivers Review

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Volume 13, Number 4 / August 1998

Walker Creek Declaration

The following is the founding statement of Living Rivers: The International Coalition for the Restoration of Rivers and Communities Affected by Dams. See cover story for more information about this new coalition.

July 25, 1998

WHEREAS:

Free-flowing, living rivers are an essential, life-giving feature of our natural and human environment. They fulfill a multitude of ecological, economic, spiritual, cultural and aesthetic needs and wants.

Worldwide, these invaluable rivers are now degraded by hundreds of thousands of dams, which have flooded huge areas of the world's most beautiful and ecologically rich habitats and the homes and lands of tens of millions of people. Dams have impoverished countless communities which were dependent on the bounty of free-flowing rivers and riverside lands, and endangered public health.

Dams have blocked flows of nutrients and sediments and the passage of fish and other aquatic lifeforms. Dams have contaminated river water. Dams have eliminated essential natural flooding regimes thereby degrading the ecosystems, farmlands and fisheries which depend on floods. And dams have caused the decline and extinction of riverine species and the ecological degradation of estuaries and coastlines.

Many dams provide services for society, including the generation of electricity, the storage and diversion of water, flood protection, navigation and flat-water recreation. But we now know that these services come at a high economic, ecological and social cost and often can be met in other less damaging ways. We also have learned that costs and benefits of dams are unequally shared - those who reap the rewards are rarely those who must bear the costs.

After decades of experience, we now know that the promised benefits of many dam projects have never been realized, and their adverse effects are more serious than predicted. Trying to recreate artificially the

complex natural cycles and functions of undammed rivers has proven to be far more difficult than was once thought. Efforts to mitigate the adverse effects of dams have often proven expensive and ineffective.

The knowledge learned over the past decades has led to the continuing improvement of standards for planning, designing, and operating dams. This has included social and environmental impact assessments, access to information, public participation in decision-making, and periodic re-evaluation of a dam's impacts and operations.

Many existing dams would never have been built if they had had to comply with current best-practice planning principles, procedures and standards. Some are illegal because they were constructed in violation of existing laws, or because required environmental mitigation and social compensation measures were never implemented.

Many dams are now obsolete. Many have reached the end of their functional life span and no longer serve a purpose that justifies their negative impacts. Many are unsafe, threatening the lives of millions of people, as well as property, fish and wildlife.

For many dams the cost of maintenance and of environmental and social mitigation exceeds the benefits to be gained from dam operation. The cost of removing dams is in many cases proving less than the cost of continuing to operate them, even without taking full account of the social and ecological benefits of dam removal.

A movement is now growing around the world which recognizes the vital importance of living rivers. People are calling for major changes in the operating patterns of dams to lessen their negative impacts, the decommissioning and removal of obsolete and dangerous dams, the restoration of rivers and the provision of reparations for past damages suffered by riverine communities affected by dams.

THEREFORE:

We now establish Living Rivers, an international coalition for the restoration of rivers and communities affected by dams, by means of dam reoperation, decommissioning or removal.

Independent and transparent evaluations must be carried out periodically to identify which dams should continue in operation, which should have their operations altered to mitigate adverse impacts, and which should be decommissioned or removed. The continued existence and operation of individual dams must be justified on the grounds of ecological and social impacts, economics and safety.

Decommissioning plans must be prepared for all dams, whether existing, planned or under construction. These plans should include dam removal and river, reservoir zone and floodplain restoration. The plans should also include mechanisms for raising the funds needed to pay for decommissioning.

Dam owners and the beneficiaries of dams must be held responsible for the costs of mitigating the impacts of their continuing operation, of reparations for past damages, and where relevant of decommissioning or removing the dams. Funding mechanisms must be established to pay for decommissioning abandoned dams or for dams where the owner has insufficient financial resources. International agencies which have financed dams should share the responsibility for their decommissioning or removal.

Rigorous dam safety standards must be developed and enforced, including the preparation and publication of flood inundation maps and emergency evacuation plans, and the purchase of liability insurance. The safety records of dams must be made public. The costs of implementing improved dam safety standards should be borne by dam owners and beneficiaries and, where relevant, international funding agencies.

Scientific, engineering and sociological research and education on dam decommissioning must be promoted by governments and dam agencies.

Watershed management and energy plans must be developed in a participatory and transparent manner. Watershed management plans should integrate sustainable agriculture and fisheries, urban planning, flood management, water supply and environmental restoration. Regional energy services plans should incorporate demand-side management and the most environmentally benign and cost-effective forms of generation.

Dams have had huge negative impacts on rivers and river communities - removing dams is an economically, technically, socially and environmentally viable and sensible option for reversing these impacts and restoring living rivers. Investment in living river systems will produce substantial benefits for our human and natural communities, today and tomorrow.

Let our rivers live!

ENDORSED BY:

American Rivers, USA

Assembly of the Poor, Thailand

European Rivers Network, France/Europe

Florida Defenders of the Environment, USA

Friends of the Earth, USA; Friends of the Eel River, USA

Glen Canyon Institute, USA

International Rivers Network, USA

John Muir Project, Earth Island Institute, USA

Lets Help the River Movement, Russia

Narmada Bachao Andolan, India

Pedder 2000, Australia

River Alliance of Wisconsin, USA

Save Our Wild Salmon Coalition, USA

SOS Loire Vivante, France; Water Watch of Oregon, USA

Wildlife Fund Thailand

Zeleny Svit - Green World, Ukraine

The declarration has subsequently been endorsed by a number of other groups around the world.

1847 Berkeley Way
Berkeley, CA 94703 USA
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fax (510) 848-1008
email: irn@irn.org

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World Rivers Review
Published by International Rivers Network
Volume 13, Number 4 / August 1998

Teaching Children Their Ecological Address with River of Words

Program Combines Environmental and Arts Education

by Pamela Michael

The water under my feet moving fast to the street
flowing fast to the Anacostia, with all the trash,
sheds and puddles all in bubbles through the sewer
into the river, fast, fast, all the trash flowing right past
with all that I see and all that I saw I knew cleaning
the river would be a bore, we got together as a
team and started to clean, I looked around and
thought it was a dream I never thought the river would
get this clean, fast to the street water sheds under your feet.

-Ann Shackelford, Grade 8, Washington, DC, Stuart Hobson Middle School
(1998 ROW Winner)

Ann Shackelford has a good understanding about how her urban, polluted watershed works. She, along with thousands of other schoolchildren, has been exploring watersheds and their importance to our lives through art and poetry, science and history, field trips and river clean-ups.

Most children aren't as aware of their place in the watershed as is Ann. A recent survey showed that while US children could identify over a thousand corporate logos, few could recognize or name more than a handful of the plants that grew in their own neighborhoods. In many modern societies like the US, people have lost their fundamental understanding of the natural world, their sense of connection and belonging to a particular place.

To help counter this disturbing trend, the River of Words (ROW) Project was developed by poets, educators, artists and environmental activists. The program includes an innovative curriculum model that combines environmental and arts education, and an annual poetry and art contest, open to children

ages 5-19.

ROW blends science, cultural and natural history and the arts. It helps children discover their "ecological address" by exploring and interpreting their local watersheds. River of Words' curriculum suggests that the natural self-sustaining strategies found in our own ecosystems offer a useful model for reclaiming our lost landscapes and our places in them. Good environmental education teaches not only about the relationship between people and nature, but about people's relationship to each other - about community.

ROW's primary community is that of teachers and students. The strength and success of River of Words in its first three years rests in the creative and innovative ways the project has been implemented by educators in 42 states and 10 countries (so far!). In most cases, River of Words is a school-based program, usually initiated by one or two teachers who enlist others in planning.

In California, Terri Glass, a poet and biologist who works with the state-wide California Poets in the Schools program, has brought local poets and naturalists into elementary and middle schools to bring the ROW curriculum to life. "River of Words has changed the emphasis and style of my teaching," she says. "I focus on the local environment now, with the children using hands-on experience to collect metaphor, imagery and sound. The contest excites kids, and ROW has been a driving force in the schools for truly interdisciplinary work."

In Georgia, an inventive environmental educator with the Georgia Department of Natural Resources, Petey Giroux, has administered a state River of Words program for the last two years. Teachers throughout the state are provided with the 50-page ROW Teacher's Guide, to which Ms. Giroux has added watershed-specific maps, locally oriented reading lists and other information. State prizes are awarded and publicized, and a traveling exhibit of ROW poetry and art is on constant display at schools, libraries, fairs and conferences throughout the south.

Describing how Georgia teachers are integrating River of Words into their teaching, Giroux adds, "Most teachers use nature journals to record what they learn as they walk with students on campus or out by a river. They look and see how water moves across their school campus and note erosion and runoff. They are learning about nearby creeks and streams and where their water goes after it leaves the school. They are learning to do visual assessments and pick up litter to protect the water. Some groups are adopting a stream to protect and monitor. They write in their journals and create poetry or draw pictures."

Ms. Giroux brought River of Words to Georgia on her own initiative, and immediately involved the state Parent Teachers Association and local environmental and arts organizations in the planning and outreach. "River of Words works because it involves the senses, which helps students remember what they learn. It is very personal and allows students to learn to appreciate the water in their backyards and school yards."

Sharing Knowledge

Community support is another important component of River of Words. Not only does the project leverage existing resources in support of education, it gives students' creativity and concerns recognition, and engages the broader community in schools and learning. When River of Words art and poetry is displayed in libraries, at local events or businesses, it educates the entire community about watershed issues, and spreads the passion, inspiration and heartfelt concerns of the student creators. As pioneering environmental educator John Elder has said, "the beginning of education, as of an environmental conscience, is love."

Every city, town or village has a wealth of often underutilized expertise and energy - an elder who can identify animal tracks, a farmer who dowses for water, bird watchers, experts in the local ecology, a local history buff - who might welcome the chance to work with local schools or park districts and share their knowledge and experience. In ROW's first three years, hundreds of people have become involved in enriching the educational experience of the young people in their communities.

In Utah, for example, creative writing teacher Pat Russell (ROW's 1997 Teacher of the Year) has made the natural world her classroom for the past two years by holding a series of River of Words workshops for high school students in the foothills surrounding Salt Lake City. Local writers, bird watchers, artists, photographers and poets recruited from the community lead students in small workshops that blended ecology and art. Some of the outdoor classes offered included Writing Your Way Into & Out of the Woods, Reading the Landscape, Signatures on the Land: Animal Behavior and Tracking, Sketching in a Biological Context, and The Outdoors as a Backdrop for Human Drama.

Students spent two days on snowshoes exploring the desolate magic of winter. They were encouraged to open their senses - to note the wind direction, the texture of the snow, the sound of rustling branches. The poetry and art generated by this creative and extensive implementation of River of Words has been consistently extraordinary, clearly demonstrating the power of the arts and nature for inspiring students' best work.

Student response to the Salt Lake City workshops was so enthusiastic that the school district is expanding the program. One student, in evaluating the experience, wrote, "Drawing nature made me look closely at its real beauty. In order to sketch a tree or the water I had to look carefully at it and its surroundings in order to understand it. Trying to draw the tree I had to notice the bird tracks on the snow below and the bent branch covering the nest. By having me draw, my teacher helped me see." Another student wrote: "The most interesting thing I learned was how important it is to choose a place to call home and then write from that place Hopefully, someday I will get an invitation to attend River of Words again - this time as an instructor."

The Best of All Worlds

Environmental education is, by nature (pun intended!), interdisciplinary. While there is much lip service paid these days to the educational value of interdisciplinary teaching, in practice it is often difficult to implement because of administrative constraints, compartmentalized attitudes and teaching methods,

and all the other pitfalls that any collaborative effort must face. River of Words attempts to break down these barriers by providing avenues of cooperation that engage the entire community. By bringing together science, humanities, language arts and social science teachers with community resource people to help children explore and interpret their watershed, the curriculum promotes local participation, cooperation and awareness.

The melding of art and science is not only a powerful combination, but a logical one: both disciplines are based on observation and experimentation. Indeed, some skills taught only in the arts are as important to science as they are to art. The careful articulation of the natural world that River of Words' "Watershed Explorer" curriculum encourages, and the metaphors children create from meticulous observation, all serve to clarify scientific phenomena and to connect students to their surroundings in very profound ways. By studying their particular watershed and the art and literature it has inspired, students can discover their place in a wider community and learn about their geographical history, weather patterns, flora and fauna, indigenous cultural traditions, the history of local migration and commerce - in short, their ecological address.

The arts teach us to fine tune our senses, draw us into relationship with the earth and with each other, and evoke our deepest emotions. In this way will watersheds and home grounds be celebrated, revered, intimately understood, and ultimately preserved.

Understanding the pattern of relationships between land, water, vegetation, wildlife and human settlement is the basic core from which all learning flows. This subtle and deeply resonant wisdom of place is what River of Words is trying to teach our children and ourselves. We invite you to join us.

River of Words is co-sponsored by International Rivers Network, former United States Poet Laureate Robert Hass (ROW's co-founder), and The Library of Congress Center for the Book.

"The care of rivers is not a question of rivers, but of the human heart."
Tanaka Shozo, pioneering Japanese conservationist

DETAILS:
The next ROW contest deadline is February 15. Please visit IRN's web site for more information and entry forms: www.irn.org.

The Teacher's Guide has been translated into French and (partially) into German.

River of Words offers limited teacher training workshops in the US (and one, so far, in Asia). They are usually conducted in conjunction with water quality monitoring instruction. For more information on training workshops, visit our website.

ROW is actively seeking international partners to implement the program in their regions and to adapt the curriculum model to their own needs. Please contact Pamela Michael for more

information:
email: pamelam@irn.org
phone: 510.848.1155.

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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WebProducer

World Rivers Review
Published by International Rivers Network
Volume 13, Number 4 / August 1998

Three Gorges Dam Not the Answer to China's Floods

by Doris Shen

Halfway through this year's disastrous flood season in Southern China, the death toll is estimated to be in the tens of thousands. More than 22 million acres of farmland and nearly 5.6 million homes have been destroyed, amounting to at least US$10 billion in economic losses. Drinking water contaminated by sewage has caused outbreaks of dysentery and cholera. At press time, the government had still not released figures on many people have died, and foreign journalists have been denied permission to visit flood-stricken areas.

On August 2, the Chairman of the Three Gorges Development Corporation, Lu Youmei, declared, "The flood this year has again proven that it is correct to have the Three Gorges Project as soon as possible. If the Three Gorges Project had already been completed, the problems of flood control would have already been solved."

Project critics, however, say that the authorities are seriously overstating the dam's flood control benefits. They point out that the Three Gorges Dam could even worsen flooding in certain areas and that China would make better use of the billions of dollars being spent on the dam by investing it in maintaining the 30,000 kilometers of dikes along the 1,000-mile-long Yangtze River and its tributaries. Money should also be spent on the upkeep of overflow lakes along the middle and lower Yangtze, which can hold three times as much water as the Three Gorges reservoir is planned to impound.

Beijing journalist Dai Qing, the project's most outspoken critic, says, "The areas most affected by the floods are in the lower-middle and lower reaches of the Yangtze. The Three Gorges Project will not help control floods in these regions. Waters in these areas also come from the Li, Yuan, Zi, Qing and Xiang rivers. In fact, because the Three Gorges Dam is absorbing such massive amounts of public funds - 60 billion yuan (US$7.3 billion) has been allocated to the project this year alone - the central and local governments cannot spare money for necessary strengthening of embankments."

Professor Huang Wanli, who held various positions in China's water resources bureaucracy and teaches

hydrology at Qinghua University, expressed the following concerns about the project in a recent interview from Beijing with IRN:

> "The Three Gorges project will bring few benefits of flood protection in the lower reaches of the Yangtze. It will also have many adverse impacts. In the present peak flooding season, in order to protect the coffer dam at the dam construction site, flood water has to be discharged at a maximum capacity. This puts tremendous pressure on the lower reach to battle flooding. The flooding season in the Yangtze valley normally lasts one to two months. If the river banks in Hubei Province are not strong enough to resist several months of flood pressure at high water levels, a likely solution would be to break the banks and flood some selected areas in order to discharge water People who have devoted so much work to the [Three Gorges] Project and have spent money will try anything to defend their project. I hope that there will be a public discussion so that I can elaborate on my concerns. The sooner the dam project is canceled, the better."

Deforestation Leads to Flooding

This year's floods are considered the worst in 44 years. One reason the flooding has intensified is because of soil erosion from intensive agriculture and deforestation in the watershed. "The river really needs a new strategy," said Andy Xie, an economist with Morgan Stanley/Hong Kong, in an August 13 article in The Far Eastern Economic Review. "How you deal with silt accumulation is fundamental to flood control. The more silt you have, the more you have to build up your embankments."

China watcher Lester Brown of the Worldwatch Institute in Washington, DC, described the manmade damage to the watershed: "The Yangtze River basin, which originates in the Tibetan plateau, has lost 85 percent of its original forest cover. The forests that once absorbed and held huge quantities of monsoon rainfall, which then percolate slowly into the ground, are now largely gone."

A *China Youth Daily* report from February of this year warned that most of the dikes and dams built in the 1950s and '60s have been neglected and "could collapse with catastrophic consequences." The same report warned that there could be a repeat of the August 1975 disaster when 230,000 people died in Henan province after the collapse of the Banqiao and Shimantan dams during a typhoon.

Sedimentation will also be a major problem for the Three Gorges Dam. The heavily silted river could, critics believe, dramatically shorten the life of the dam - and possibly weight down the dam wall to the point of collapse. Such a dam failure would endanger 100 million people downstream.

1847 Berkeley Way
Berkeley, CA 94703 USA
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fax (510) 848-1008
email: irn@irn.org

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World Rivers Review
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Volume 13, Number 4 / August 1998

Economic Crisis Casts Further Doubt on Viability of Lao Dams

by Aviva Imhof

The Electricity Generating Authority of Thailand will defer purchases of electricity from several multi-billion dollar projects in Laos, citing the slowdown in Thailand's power demand. Last June, EGAT announced that the commissioning dates of four privately funded hydropower projects - Nam Theun 2, Xe Pian-Xe Namnoy, Nam Ngum 2 and Nam Ngum 3 - will be postponed by two years, to 2006.

The regional economic crisis, now expected to be more severe and protracted than originally anticipated, has greatly reduced Thailand's demand for power. In February, EGAT revised the country's peak power demand for fiscal 1998 to a "very low case" forecast. It seems that even this was optimistic. Thailand's actual demand for the period October 1997-March 1998 was below EGAT's very low case scenario in every month except December.

EGAT has already adjusted its power demand projections once in the past year to account for the economic slowdown. But since that time, predictions have become even more dire, with Thailand's economy now expected to contract by eight percent during 1998, and by a further one percent during 1999. Some analysts are predicting a 10-year recession, similar to the decade-long recession following Latin America's debt crisis in the 1980s. As a result, EGAT is apparently working on another revision of its Power Development Plan.

This does not auger well for Laos' plans to sell 3,000 megawatts of power to Thailand by 2006, most of it to be generated from private hydropower projects. Already, Laos is well behind projections for power sales to Thailand.

By 2000, despite the substantial human and financial resources poured into encouraging hydro development in Laos, Laos will be selling only around 467 MW of power to Thailand, a far cry from the 1,500 MW of new power sales predicted in 1993. Instead of predicted hydropower earnings of up to $350 million annually by 2000, Laos will most likely be earning no more than $40 million annually.

It has also been reported that private developers are having difficulties attracting commercial financing due to Laos' high political and economic risks, particularly given the availability of cheaper alternatives in Thailand.

In the newly completed Nam Theun 2 Study of Alternatives, hydropower consultants Lahmeyer and Worley justified the project by stating that "the cheapest form of generation for Thailand is gas-fired, but not enough gas can be imported in the short to medium term, in spite of contracts and MOU's [memorandum of understanding] with Malaysia, Myanmar, Vietnam, Oman and Indonesia." But because of the downturn in power demand, gas availability is not a problem for Thailand, at least for the foreseeable future. In May 1998 Thailand abandoned an MOU with Oman to buy up to 2.2 million tons of liquefied natural gas. In July 1998, Indonesia conceded that its plans to develop the giant Natuna gas field are no longer feasible because of low demand in Asia and the falling price of natural gas throughout the region.

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email: irn@irn.org

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Volume 13, Number 4 / August 1998

Amazon Indians Blockade Road to Protest Powerline

In late July, 1,200 indigenous people blockaded the only road linking Venezuela and Brazil to protest construction of a powerline running through their lands. The power line would carry electricity from Guri Dam to Boa Vista, Roraima. The protest, by people from Venezuela's Imataca and Gran Sabana regions, began on July 27 and was still running at press time. Protestors say the project, which crosses 120 km. of indigenous lands, is proceeding without proper environmental studies or consultation with impacted communities.

The indigenous people also are demanding that the Venezuelan government legally recognize and respect the boundaries of their ancestral lands. Specifically, the indigenous peoples are demanding that construction work on the power line be halted immediately and that the Supreme Court nullifies Decree 1850. This Decree, which was passed last April, opens up 40 percent of the 9 million-acre Imataca rainforest reserve to large-scale gold mining and logging. In addition to the protests, the Indigenous and environmental groups have filed two lawsuits, one challenging the Decree and the other, challenging the construction of the power line through 120 kilometers of indigenous territory.

The construction of the transmission line is destroying large areas of forests and lands which indigenous peoples rely on for their livelihood. The 690-kilometer length of the line will include a 100-foot-wide service corridor and hundreds of access roads (one at every kilometer). Altogether, the power line project will affect more than 15,000 people in 30 communities of Pemon, Karina, Akawaio, and Arawako Indians. The electrification of the region will open up the fragile ecosystems of the Conaima National Park (home of Angel Falls, reportedly the world's tallest waterfall) and the Imataca rainforest to large-scale mining, tourism, and logging. The first customer of the power is the Placer Dome gold mine at Las Cristinas. In early August, the Andean Development Corporation (CAF) approved a $55 million financing package to the Brazilian Government for the construction costs.

For more information:

Jose Luis Gonzalez
Indigenous Federation of Bolivar
Tel: +58.85.25730

Fax: +58.85.26786
email: fieb@telcel.net.ve

or

Atossa Soltani
Amazon Watch
Tel: +1.310.456.1340
email: asoltani@igc.org
Web site: www.amazonwatch.org

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

International Rivers Network

WebProducer

World Rivers Review
Published by International Rivers Network
Volume 13, Number 4 / August 1998

NEWS BRIEFS

ALTERNATIVES

WIND ENERGY: The global wind energy industry set a record for new installed generating capacity in 1997, the American Wind Energy Association (AWEA) said earlier this year. At least 1,520 megawatts (MW) of additional capacity were installed last year, the trade group said, easily eclipsing the previous record of 1,291 MW installed in 1995. The rate of growth appeared likely to maintain wind's position as the world's fastest growing energy source.

During the year, Germany established itself as the world's leader in installed capacity, passing the US at mid-year. Germany became the first nation to pass 2,000 MW of installed wind capacity, owing to wind-friendly domestic legislation. Denmark topped 1,000 MW, providing 7 percent of that nation's electrical needs. Overall, Northern and Western Europe accounted for more than 75 percent of the total capacity installed during the year. By contrast, the US wind market was essentially stagnant, with only an additional 11 MW installed, due in part to ongoing uncertainties over utility restructuring.

India, the fastest-growing market for wind in 1995 and 1996, slowed to a near-standstill in 1997, largely because of an economic slowdown which led to tight credit conditions. Wind projects in India also have in many cases performed poorly due to use of technologies ill-suited to India's low-wind regimes, poor project design and operation, and other problems. In response, the Indian government is now moving away from tax credits for investment in wind (which can be easily abused) toward tax credits for actual electricity production from wind. In China, progress is slow due in part to the Chinese government's demand for high subsidies for wind projects from foreign vendors.

WAVE POWER: Creating energy from ocean waves is now economically viable and is drawing increased attention from power authorities in Britain, among other places, according to New Scientist (May 16, 1998). The magazine reports that the average cost of wave power is now 10 times lower than it was in 1982 - the year that the British government controversially canceled its wave-power research program in 1982. The British government's leading advisor on wave power has shown that three of the six devices currently available to produce power from waves are now capable of producing power that is economically competitive, and one device produces power that is one-third cheaper than coal. New

Scientist reports that the British government is now seriously considering including wave power as part of its goal to reduce carbon emissions by 10 percent by the year 2010.

SOLAR POWER: Sales of solar cells expanded more than 40 percent in 1997, according to a new report from the Washington, DC-based Worldwatch Institute. Solar power is now the world's second fastest growing energy source, growing on average 16 percent per year since 1990. "World solar markets are growing at ten times the rate of the oil industry, whose sales have expanded at just 1.4 percent per year since 1990, " say the report's authors, Christopher Flavin and Molly O'Meara. "Solar energy may now join computers and telecommunications as a leading growth industry in the 21st century." The roughly 800 megawatts of solar power capacity now in place is sufficient to run 40 million 20-watt radios, but still represents less than 1 percent of global power supplies. But as governments move to implement the Kyoto Protocol on climate change and replace fossil fuels, solar power is poised to benefit.

Already, new technologies are lowering the cost of manufacturing solar cells. Scientists believe that such technologies can cut solar cell costs from $4,000 per kilowatt today to $1,000 in the next decade, which would make them a competitive source of electricity in many parts of the world, the authors report. Solar electric systems can also increase the reliability of the power supply in cities that are over-dependent on either a single source of power that can fail (such as hydropower in drought-stricken areas or power from long-distance transmission lines).

A growing portion of the world's solar cells is going to meet the needs of ordinary households, according to Worldwatch. Some 500,000 homeowners are now generating their own power. For the 2 billion people worldwide who are not yet connected to power lines, solar energy is often the most affordable way to get electricity. "In the longer run, solar power has the potential to become a major contributor to the world's energy supplies," the authors write. "A 1998 study by Royal Dutch Shell concludes that solar and other renewable energy sources could supply half the world's energy by the middle of the next century."

The full report will be published in the September 1998 edition of World Watch. For more information, visit the Worldwatch web site: http://www.worldwatch.

UPDATES

SWAZILAND: Chiefs in the northwestern Komati area complained to the government in July because families in more than 100 homesteads have been told they must be relocated to make way for the 105-meter-high Maguga Dam, according to news reports. Originally the government had said only 44 homesteads would be moved. Swazi Agriculture Minister Chief Dambuza Lukhele assured residents they will be sufficiently compensated. The dam is being built by the Komati Basin Water Authority, and is a joint venture between South Africa and Swaziland. The Development Bank of Southern Africa

(DBSA) is one of the funders of the Komati River Basin Project. Maguga Dam will cost an estimated R900-million and is expected to be completed by 2001. Maguga is one of seven dams in the bi-national Komati Basin Water Authority scheme; the first, the R490-million Driekoppies Dam, was completed in early July.

South African Water Affairs Minister Kader Asmal said his department is committed to a new water pricing structure that will see established white farmers absorbing more of the cost of the new Driekoppies Dam, according to a July issue of the South African SANLAM agri-economic newsletter. Asmal said that the established white farmers will be responsible for operation and maintenance costs, as well as part of the repayments of the capital costs of the dam. The farmers will benefit from "higher assurance of [water] supply" for the 20,000 hectares already developed. Any future water pricing or agricultural subsidies or investment will be "specifically targeted to develop farmers who in the previous era were neglected," Asmal said.

A June 1998 US Department of Commerce bulletin notes business opportunities for US firms on the Komati basin project: "It is likely that the [Swaziland's] water and soil resources will be a major engine for future growth. Already steps have been taken toward development of the Komati Dam Basin and there is likely to be future opportunities in the Usutu River Basin system. Catchment at the Komati Dam will begin in the year 2000 and planners will be looking for investors in 1998 to take up plots from the 5,000 hectares available for cultivation - most likely sugar and citrus fruit." The US Department of Commerce reports that the Swazi sugar industry is "composed primarily of large firms with predominantly foreign ownership Good rains in recent years augur for increased sugar production In the long run, substantial growth in Swaziland's agriculture sector is unlikely the future of Swazi agriculture looks dim without an increase in available land and water resources."

FIJI: At press time, a group of tribal landowners armed only with 10-foot-long bamboo spears had held off the Fijian army for weeks while occupying the Monasavu Dam site. The villagers have sworn to fight to the death for proper compensation for lands that were taken from them when the project began 15 years ago, according to The Guardian (July 13, 1998). The dam supplies 90 percent of the tropical island's electricity. The project was supported by the World Bank, which lent more than $30 million for the scheme in 1978-80.

Chief Adrea Vasuitoga, who represents some 3,500 people in the area, said: "We have the spirit, we have the clan, we have the power. We can beat the gun. We are going to fight with spears, axes and clubs if necessary to defend our rights."
The villagers, led by Chief Vasuitoga, are demanding US$16 million in compensation. A few thousand people were displaced by the project and have not received compensation; and 50 villages remain unconnected to the power supply.

Government officials insist that compensation funds were "invested" and that chiefs agreed to this. A government committee was expected to review their claims and make a cash offer. Comments attributed to Prime Minister Sitiveni Rabuka, inflamed matters further. Fiji's Sunday Times quoted the prime

minister as saying, "They've waited for years. I do not see why they can't wait a little more."

TROUBLED WATERS

AFRICA: Burkina Faso has refuted the claim that construction of dams on tributaries of the Volta River has contributed to the low levels of the Akasombo Dam reservoir, reports Hydropower and Dams (#2, 1998). Akasombo's power generation has dropped to less than half its capacity due to low reservoir levels in recent years. Ghana is almost totally dependent on the huge dam, which inundated four percent of the nation when it was built in the 1960s. The state-owned power authority has been forced to import costly power from outside sources to avert blackouts, but households currently receive electricity only every other day, according to International Power and Dam Construction (March 1998). Ghana's Ministry of Energy has stated that Burkina Faso's construction of four new dams for power and irrigation has reduced the river's flow into Akosombo, resulting in a loss of about 30 megawatts of power. But Burkina Faso officials say regional droughts are the cause, and that the upstream dams account for less than 0.9 percent of Akasombo's storage capacity. The officials also said the new dams were built according to "principals of international law relating to management of common resources."

NAMIBIA: The power output of the Ruacana hydropower station on the Kunene River dropped by 29 percent in the past year, reports The Namibian (August 10). Power output at the dam, which is upstream of the proposed Epupa Dam, dropped from 854 million units in 1996 to 610 million in 1997, NamPower's latest annual report reveals. NamPower Managing Director Leake Hangala, in the corporation's 1997 annual report, attributed the reduction in power generated to the devastating drought which affected the flow of the Kunene. "The reduction in units generated at Ruacana resulted in a 22.4 per cent increase of power imported from Eskom, South Africa.

VIETNAM: Because it depends on hydropower for 80 percent of its electricity supply, Vietnam experienced severe power shortages in May following several months of drought in the northern provinces. The country's biggest hydro plant at Hoa Binh was forced to reduce its output because water levels in the reservoir fell below the 80 meter dead-water mark. Power was cut for three to four hours a day in Ho Chi Minh City, Hanoi, and 25 other cities and provinces. When the rains did come in mid-June, water levels at the reservoir rose to the breaking point. Authorities were forced to open the floodgates, threatening down-river communities. The government announced in May that because of the energy shortages it would fast-track the $230 million, 259-MW Se San 3 hydropower plant in the south of the country.

1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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SHORTS

Ireland has failed to enact laws that keep petroleum products and heavy metals out of the country's groundwater. Now, the European Commission has decided to apply to the European Court of Justice against Ireland for this failure. The European Commission charges Ireland with "failing to adopt all the necessary legislation to give effect to the European Union's Groundwater Directive on the protection of groundwater against pollution caused by hazardous substances." The directive aims to prevent the pollution of groundwater from certain dangerous substances. For some substances such as mineral oils and hydrocarbons, member states must prohibit all direct discharges.

At least five people died and over 100,000 people were forced to evacuate their homes in early August after a dam burst in East Kalimantan. Heavy rains toppled the 741-acre Benanga dam, located near the Indonesian town of North Samarinda, flooding some 7,000 hectares of land. A police officer, Second Sergeant Bajuri, said that the evacuees had to leave their houses which were under more than eight feet of water and were now being accommodated in relatives' houses as well as five temporary shelters. "The waters have now slightly receded, about 30 cm in North Samarinda and about 10 cm in the southwestern part," Bajuri said. He added that about a tenth of the town's some 292 square miles were affected by the flood, but he could not give details on what had been done to repair the damaged dam. It would take about a week before the necessary repairs could be made to the dam, he added.

Heavy runoff from melting glaciers swelled a dam reservoir to the bursting point in early July, killing at least 43 people in Uzbekistan and destroying six villages in the Central Asian region. The dam, on the Kuban-Kel lake which forms the border between the former Soviet republics of Uzbekistan and Kyrgyzstan, collapsed after a sudden thaw melted glaciers and produced flooding in two rivers.

IRN
International Rivers Network
1847 Berkeley Way
Berkeley, CA 94703 USA
phone (510) 848-1155
fax (510) 848-1008
email: irn@irn.org

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