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*International Rivers Network*

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Volume 11, Number 1 / April 1996

## *Special Issue: Focus On Alternatives*

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## **Funding Fracas Develops Over US Support for Three Gorges**

Like a bad movie with a never-ending run, China's Three Gorges Dam is now being featured in boardrooms around the world in its bid for financial and technical support. The most recent screening is at the United States' Export-Import Bank, where the powers that be are currently debating whether or not to enter into the risky business of providing export credits for the project.

In a frequently postponed decision, the Ex-Im Bank will vote in early May on whether to provide the credits to US companies vying for contracts on Three Gorges. The US firms Caterpillar Inc., Rotec and Voith Hydro have been lobbying their members of congress to urge Ex-Im to allow the loans. The decision will occur in the wake of strong recommendations against providing financial support for the project from the US National Security Council.

In 1995, the National Security Council completed a 14-month interagency review which recommended that Ex-Im decline requests for deals associated with Three Gorges due to significant environmental, social, economic and legal concerns about the project. Two years earlier, the US Bureau of Reclamation withdrew direct involvement in the project, stating that its aims were "no longer consistent with Reclamation's mission."

As an independent institution, the Ex-Im Bank is not obligated to follow recommendations by other government agencies regarding countries in which it is allowed to do business. (It is, however, restricted from working on projects in "legislatively prohibited" countries like Cuba, Laos and North Korea.) The bank's acting president, Martin Kamarck, has said, "The last thing that we want to be perceived to be is an instrument of US foreign policy."

But the National Security Council raised questions about Three Gorges' social and environmental problems, and the advisability of helping US businesses seeking contracts on the controversial project.

"It would hardly be in the national interest for the Ex-Im Bank to ignore the recommendations of the National Security Council and the wisdom of the US Bureau of Reclamation," said Owen Lammers, executive director of International Rivers Network.

Suspicious of corporate lobbying of Congress for Ex-Im Bank support, 18 congress members wrote a letter opposing US support for the project. "If completed, the Three Gorges project would cause the most extensive environmental and social destruction of any dam project in history," the letter states. "We do

not feel this boondoggle deserves the support of American taxpayer dollars."

Responding to the opposition, a house member from Caterpillar's home state circulated a letter in congress titled, "Don't kill US jobs!" Rep. Donald Manzullo wrote, "The [Three Gorges] is the largest earth moving project in the world Many American firms eagerly await the decision of Ex-Im to provide financing for the deals associated with this important project. \$1 billion in US exports and 19,000 American jobs are at stake."

Setting aside the issue of whether or not US businesses should be subsidized to work on such a destructive project, the dam may not even work properly as designed and could therefore be a financial disaster for China. Sedimentation deposited in the reservoir by the muddy Yangtze could greatly reduce the dam's ability to control floods and generate electricity. The Chinese government claims that a special design for sediment flushing will eliminate problems, but experts aren't sure that the design can work.

Dr. Luna Leopold, a member of the US National Academy of Sciences and an expert in the sedimentation of large dams, described the potential for disaster in a letter to Ex-Im. Specifically, the dam's design "is practically untested in the world and never before tested in such a large structure. Projections of controlling sedimentation within the reservoir are subject to significant uncertainties." Sedimentation rates can be extremely variable, he states, and it is difficult to predict with any accuracy the rate of sediment accumulation in a reservoir. Leopold notes that in 230 of China's major dams, "sediment deposit has become a significant problem, resulting in a combined loss of 14 percent of the total storage capacity."

In conclusion, Leopold wrote, "These uncertainties lead to the conclusion that significant fiscal forecasts that presume to support the financial benefits expected may be in error and that investing in the project would be unwise."

The project's many other problems continue to grow. The final cost on the partially completed dam keeps ratcheting up (current estimates put it at US\$30-50 billion, up from \$12 billion in 1993), as does the number of people to be dislocated (now believed to be at least 1.3 million). The reservoir would inundate 350 miles of a canyon that has been a centerpiece of Chinese art, history and culture for thousands of years, and destroy the habitat of an undetermined number of endangered species and other wildlife.

The Canadian NGO Probe International reports that political risks associated with the massive project are growing, and may eventually even prevent the dam from being completed. "High level opposition to the dam within the Chinese Communist Party and Chinese scientific community, though not aired publicly, is growing," says Patricia Adams, Executive Director of Probe. Chinese journalist Dai Qing, whose reporting on the dam put her in jail in 1989, told Adams, "The Three Gorges project has become the focal point of a high level power play, comparable to the struggle over how to handle the massacre at Tiananmen Square."

- See the [Three Gorges Campaign](#) page for more information.



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## A Better Way

**al-ter'-na-tive:** 1. The choice between two mutually exclusive possibilities. 2. Existing outside traditional or established institutions or systems. 3. Espousing or reflecting values that are different from those of the establishment.

It's easy to fill the pages of *World Rivers Review* with stories about what we are against. In fact, there's rarely enough space for all the news about the world's ill-conceived river projects and the progress being made against them. But every now and again, it's important to reiterate what we are *for*. Herein, then, you'll find a series of articles on alternative means to attain some of the benefits ascribed to dams, from the production of energy to the provision of water. Each of these articles describes ways to meet these basic human needs without dislocating people from their communities, inundating arable land, displacing wildlife or any of the host of other problems that beset large dams. They describe approaches that can be managed by communities themselves, thus making them socially sustainable as well as environmentally sane.

Alternative approaches need all the good words they can get, given the hydro-industry's dogged determination to perpetuate the myth of The Good Big Dam around the world. After decades of packaging its product as a multipurpose marvel, the industry is now selling the "unsung benefits" of big dams. At a recent US hydro-industry conference, the two major themes of the event were how to sell hydro to a skeptical US public and, barring resounding success there, how to find work elsewhere in the world.

"We need to estimate hydro's 'unsung benefits' and do a better job of communicating them to the public," said Chuck McGowin of the Electric Power Research Institute. His list included water supply, navigation, flood control, recreation, whitewater rafting (the irony was unintentional), and, vaguely, "the environment." Another speaker unearthed a few of hydro's more absurd "unsung benefits," listing all kinds of reservoir-dependent businesses like bait shops and gas stations that could generate income for local communities.

There are many compelling arguments on the side of alternatives to large dams, and we will continue to sing their many benefits until they are no longer perceived as "alternative." And that day is, we believe, drawing nearer. Although progress has been slow, the news is on the whole good:

- Investment in alternative energy sources is rising as prices of equipment come down and the technology improves;

- The growing trend toward private financing of power projects is helping debunk the myth of "cheap power" so long promoted by the hydro-industry. Private investors, frightened of the many risks of big hydro projects, are bringing to light the true costs and real risks of building and operating big dams;
- Profligate countries like the US are taking energy- and water-conservation ever more seriously.

So what exactly do we mean by alternatives? The short answer is, it depends on the proposed project it would replace. Usually, it means a way to supply power or water in a way that doesn't cause environmental or social harm. But sometimes, the only sustainable alternative to a destructive river project is no project at all. In the case of flood control, for instance, a healthy watershed and appropriate land use in the floodplain eliminates the need for a dam.

Clearly, this is a big topic covering a wide range of issues. Given the restrictions on space in WRR, our "Focus on Alternatives" will need to be an ongoing feature. Ideas for future articles include alternatives to large-scale irrigation projects, more detailed articles on renewable energy, and news stories from around the world on alternative approaches to water and power. Thankfully, we're less constricted in our other publications: an ever-growing library of project-specific working papers, technical reports, action alerts and dossiers keeps river activists informed with in-depth reports on specific campaigns. Our library of resources will soon include a working paper on alternative hydro, as opposed to alternatives *to* hydro. The paper will examine what elements are required to make a project work environmentally, socially and economically, and will be available from our Berkeley office in July.

*-Lori Pottinger*



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## **Pak Mun Dam Destroys Fishing Communities**

The Pak Mun Dam in Thailand has badly damaged native fisheries, leaving whole villages without livelihoods and disrupting communities along the Mun River. But the fisheries-for-power tradeoff is acceptable to the chief executive of the Mekong River Commission, as long as fishing families are compensated. "If government compensates their long-term fish production, then I think the fishermen are not in a position to discuss this issue," Yasunobu Matoba told the *Asian Wall Street Journal* in March.

The livelihoods of local fishers began to shrink as fish populations began to drop dramatically when construction on Pak Mun Dam began in 1991. By the time the dam was completed in 1994, the fisheries had all but disappeared. People who depended on the fish for income and food were forced to seek work in the cities, tearing apart families and communities.

Since the dam's construction, approximately 50 percent of villagers in 53 affected villages have moved to urban areas. There, women are often forced into prostitution, while men seek jobs as laborers. Official compensation for the World Bank-funded project cannot solve the social disruption, and its attempts to offset economic hardships have been weak.

Affected fishing families receive a one-time package of 90,000 baht (US\$3,600) per family, in annual installments over three years. The last in a series of meetings to identify fishermen not yet compensated for their loss of livelihoods was held February 15 in Hua Haew village. More than seventy fishermen from the village came forward at the meeting to request compensation. Approximately 2,500 fishers from 53 villages have now demanded compensation.

### **Compensation Not Enough**

Although these families are just now registering for compensation, many families that have already received the compensation package were less than satisfied. A common theme heard in villages along the Mun River was that the compensation was insufficient to support an entire family trying to develop a new livelihood. Villagers expressed their unhappiness over the situation, but many seemed resigned to their fate. They know they will not be offered more money, and what they want most money can't buy - p; the healthy and productive fishery they had before the dam was built.

Although the World Bank and Thai authorities contend that the dam has not harmed the Mun River

fisheries to the extent that the villagers claim, it's hard to dispute reality. Even trying new equipment for the deeper, slower waters -p; as recommended by the fisheries department -p; doesn't seem to be helping.

The day before the compensation meeting, villagers in Tha Pae just downstream of the dam fished all day with a new large net and caught only four small fish. This was the day's catch for the whole village. The 100-meter net had cost them 8,000 baht. They sold the four fish for a total of 40 baht. Before Pak Mun Dam was built, the same fishermen using a net this size could have caught as many as 6-8 much larger fish worth 1,000 baht each in a day. A village fishing trap used to bring in fish worth an average of 500-600 baht a day. This past rainy season the village fishers made only 10 baht a day using the same trap.

### **Regional Effects**

When asked whether they had considered fishing elsewhere, perhaps traveling downstream to the Mekong River to fish, villagers explained that they have spoken with several villages downstream. The plight of fishermen is the same everywhere, even in villages on the Mekong downstream of its confluence with the Mun River. "No one ever came to say if the dam is built, there'll be these kinds of impacts," one man explained.

Survival in the Mun River villages has become a catch-as-catch-can affair. Some villagers are building wells and attempting to grow fruit trees. Others find occasional work driving trucks or travel south to find jobs cutting sugar cane.

For family members remaining in the villages, the newest generation of children is feeling the effects of the job-migration. Many children are being raised by single parents or grandparents. Families that used to earn enough from fishing to give their children a higher education can no longer ensure that their children attend school at all.

Fifty people had left Tha Pae for the city the day before this author visited the village. A man who remained behind said, "We are watching the village's future disappear with its young people. The only ones left are the really old, the really young, and those caring for them." Come next year, villagers expect there will be no one left in Tha Pae.

*-Rani Derasary*

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



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## **Lesotho Water Project Awash in Troubles**

In the drier parts of the world, water is a precious commodity and rights to it are coveted. So it is fair to assume that, in areas of little rainfall, it would take rather desperate circumstances to cause one nation to sell its water to another. Lesotho -p; equal in size to Belgium but with just 1/2 percent of its GNP -p; is one such place. Now the deal that Lesotho brokered -p; to dam its rivers and sell the water to South Africa for some US\$55 million a year -p; is misfiring. As is often the case with hurriedly planned water projects in meteorologically unpredictable arid regions, the hydrological estimates were wrong: there isn't enough water to fill all the planned dams, and as a result there is a lot less money for Lesotho.

The Lesotho Highlands Water Project, originally scheduled to be a series of dams to divert the tiny nation's rivers to fuel industrial growth in South Africa's Gauteng (formerly Transvaal) province, now appears to have been, quite literally, a pipe dream of over-eager engineers. The South African Water Affairs department said in December that "it could pull the plug on a large portion of the scheme after studies showed there was insufficient water to ensure its viability," reports *This Week in South Africa* (December 18-22, 1995). "Deputy Director General Paul Roberts said the department might have to halt its involvement after the first phase was completed."

In other words, everything except Katse Dam (now mostly complete) and Mohale Dam (now moving forward) "could be scrapped following research which showed the 1971 estimates underpinning the project were far off the mark."

Meanwhile, construction on Katse Dam (Phase 1A) continues apace, but programs to deal with its attendant social problems remain frustratingly slow. The most serious issue is the loss of arable land -p; by far the biggest obstacle to restoring the long-term livelihoods of project-affected people. Because only 10 percent of Lesotho's land is considered arable, available farmland is a rarity, and few who will be forcibly displaced will be offered equivalent replacement land.

It appears that those already displaced by Katse Dam will not receive a land-for-land option, according to a leaked October 1995 trip report by a World Bank supervision mission, which states that a land-for-land option "has been mooted for the 1A area." Instead, people have been promised 15 years of foodstuffs and an undetermined training program -p; a policy that faces growing resistance from those displaced by the project.

"Those of us who have lost our agricultural land are being promised only 15 years' supply of grains, when land would supply us for life," one oustee told representatives of the Highlands Church Action Group (HCAG) at a January public meeting. HCAG is a nongovernmental organization in Lesotho that is monitoring the treatment of people affected by the dam. An estimated 20,000 people will be affected by the first phase alone.

There are far-reaching implications to the loss of so much arable land in a place with so little of it. "Some of the best farmland in Lesotho will be flooded by Mohale Dam," said Korinna Horta, an economist with the Environmental Defense Fund in Washington, DC. "This is not just a problem for those who will lose their land to the dam, but a serious blow to Lesotho's food security."

According to the project authorities and the World Bank, those affected by the Katse Dam should find new sources of income following retraining at a center run by project authorities. But the training program has experienced serious difficulties: in addition to being poorly managed and five years' late in getting started, it also provides no guarantees, since retraining does not ensure employment. Lesotho's high unemployment and very low standard of living make the opportunity for finding decent jobs or entrepreneurial niches for all affected persons difficult at best.

Exactly what to train people to do has been a source of confusion as well. The consultants working on retraining have found it difficult to find new sources of income for the first 25 households to be relocated by Katse Dam. In a September 1995 report on income restoration by Training and Rural Development Consultants (TRDC), 15 of the 25 households were rated as "low to poor in terms of being able to run a sustainable income-generating activity from within the homestead. Even households showing high income-generating potential will be hard-pressed to develop sustainable income-generating niches."

The Bank's supervision mission sees problems on the horizon for local people relying on the training center's offerings. "It does not appear likely that it will be possible to restore all of the livelihoods that have been lost" through the Rural Development Center's programs, their report notes, adding, "it appears likely that there will be difficulties with weaning people off the short-term compensation which has been set up, which is in terms of grain and fodder distribution."

### **Earthquake Shakes Up Villages**

It's not just the project's consultants who find themselves on shaky ground. A moderate earthquake shortly after the reservoir began to fill in October damaged houses in villages near the reservoir and left behind a 1.5-kilometer-long crack in the area. Project engineers have said the quake was probably caused by the filling of the dam, a not uncommon occurrence.

The quake was relatively mild (3.5 on the Richter scale), but scientists say the tremors will increase as the dam fills to capacity. At press time, the dam was about 20 percent full with 350 million cubic meters of water, according to the news agency Deutsche Presse-Agentur.

Villager dissatisfaction with project authorities rose anew after the quake. Mr. Moejane Tente, who

presented a group statement for Mapeleng village, described his community's sentiments: "We lived in great fear while the tremors lasted. We anxiously awaited expert explanation to this phenomenon, only to discover that the so-called experts are equally puzzled by this crevice We cannot comprehend how we can stay alive here, when the tremors are assured to continue We therefore categorically request to be relocated to some other place we therefore move that LHDA assume the responsibility of relocating us."

*-Lori Pottinger*

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



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## Letters: An Open Forum

*Dr. Alan Rabinowitz is a conservation biologist who believes that a dam in the middle of prime habitat in Laos would improve the lot of the area's wildlife. His unconventional ideas were revealed in a letter to IRN's executive director, Owen Lammers, in February. Rabinowitz, of the New York-based Wildlife Conservation Society (WCS), has been a consultant for the project in question, the Nam Theun 2 Dam. This dam would flood significant portions of a premier wildlife habitat (the Nakai Plateau), displace 4,300 people and disrupt fisheries and agriculture along the Theun River, the fourth largest tributary of the Mekong. Rabinowitz's letter is excerpted here, along with Owen Lammers' response.*

There appears to be virtually no area on the plateau, and within the proposed inundation area in particular, which is still pristine habitat. Every area we have visited has been affected by varying levels of hunting, human settlement, livestock grazing, logging, or some form of forest degradation.

Current hunting pressures on the plateau, and in the National Biodiversity Conservation Area (NCBA) as a whole are extraordinarily severe. These pressures are in the form of unrestricted use of firearms and extensive trapping and snaring of everything from forest rodents to tigers. Although species density is still relatively high, the abundance of almost every bird and mammal species observed is dangerously low.

Given the current lack of funds, trained staff or long-term management planning for the protected area of Lao Peoples Democratic Republic (PDR), the steady decline of bird and animal abundance is likely to continue unchecked, leading to species extinctions in the area in the near future.

In the course of our wildlife surveys, WCS scientists have uncovered in the Nakai Nam Theun (NNT) NCBA important populations of new or recently discovered species. None of these species are restricted to the Nakai Plateau and, in fact, occur in greater numbers in the watershed area of NCBA, which would not be flooded. It is our greatest concern that these species, along with other important species such as tiger, clouded leopard and various primates, will eventually be extirpated from the entire NCBA unless some immediate action is taken to curtail hunting pressures and to provide some form of management and protection to the area.

My understanding of the agreement that has been reached between the Project Development Group and

World Bank is that, with initiation of this project, funds will be provided over at least the next 25 years for proper management of the NCBA. Without such funds, I and my colleagues see no hope for the long-term survival of much of the wildlife that still exists either on the plateau or in the NCBA as a whole.

As Director for Asia for WCS, I am giving my full support to the NT2 project as long as the World Bank remains involved and as long as the current plans for environmental protection and mitigation remain intact. After nearly 20 years of working in wildlife conservation and protected area management throughout different parts of the world, I view the currently proposed NT2 scheme as the only way at this point to help reverse the rapid decline of forests and wildlife in the Nakai Nam Theun National Biodiversity Conservation Area.

*Dr. Alan Rabinowitz*

### **Owen Lammers replies:**

IRN has spent ten years reviewing large-scale river development projects all over the world. Based on our experience with other projects, combined with the information available to us on NT2, we consider it an inherently risky investment for the Lao PDR. We believe the people of Laos will likely suffer as a result of NT2's negative impacts. Consequently, we are particularly troubled that an international conservation organization with the reputation of Wildlife Conservation Society is actively promoting NT2.

Perhaps most upsetting is that WCS is taking a firm stance before even completing its own studies. We fail to comprehend how such a position can be justified, especially given that other major players interested in NT2 remain skeptical and undecided. The World Bank, for example, has yet to even enter NT2 into its official project cycle, much less approve guarantees or financing.

IRN's sole role has been, and will remain, to address the validity and analysis of the information currently available, in an effort to assist potential stakeholders in formulating their own conclusions about this project.

### **Economics**

Hydropower has been identified as a critical component of the Lao PDR's economic development strategy, with NT2 playing a central role. IRN in turn believes that the Lao PDR should have the opportunity to assess its hydropower potential, and NT2 specifically, employing complete and independent information. Unfortunately, to date, this does not appear to have occurred.

Many governments in the developing world are reeling from debt burdens exacerbated by the poor economic performance and cost overruns of projects similar to NT2. The 1995 total cost estimate for NT2 was \$1.2 billion, which exceeds the Lao GNP. Recent World Bank studies have shown that dam projects average 30 percent cost overruns, and often exceed 100 percent. The costs of the mitigation and management plans for NT2 must also be added into the equation, hence the total price could easily approach \$1.5 billion.

The benefits of NT2 are being calculated based on inadequate hydrological data. Nevertheless, project promoters are assuming that the dam's turbines will operate at 81 percent capacity (plant factor) year-round. Such a plant factor is achieved by only a small minority of the world's hydroelectric projects. A plant factor of 60 percent is generally considered high.

Diverting water to generate electricity at NT2 will seriously impact the performance of the Nam Theun-Hinboun project currently under construction downstream. This has yet to be factored into the costs.

### **Environmental Impacts**

Regarding the Nakai Plateau, you state, "there is no indication that such an area still exists or would ever exist again, under present circumstances." This directly contradicts your organization's findings of only nine months ago:

"The proposed hydroproject would place a dam at the western edge of the Nakai Plateau which on current calculations would flood approximately one quarter of the Plateau's area (approximately 340 sq. km), including extensive pristine slow-flowing riverine habitat. The Plateau's wildlife communities are of exceptional international importance to biodiversity conservation."

"The loss of slow-flowing rivers and streams amounts to possibly 80 percent of this habitat type within the Nam Theun catchment. It will lead to a great reduction in internationally important populations [many] species." (*from Results of a Survey of the Terrestrial Wildlife in the Area to be Affected by the Proposed NT2 Hydroelectric Project*, The Wildlife Conservation Society, 1995)

Recent investigations of the inundation area and dam site reveal that although some logging is occurring, vast tracts of valuable habitat remain which are consistent with what WCS described in its report of last year.

Your own published position on dams and reservoirs of this type reveal further inconsistencies:

"Important riverine habitats, which include lowland forest, are wiped out by reservoirs. The idea that a reservoir will enhance wildlife habitat is, for most species, an absurd concept. Waterways have to be protected in their natural state if the wildlife in the surrounding forests is to survive." (*from Chasing the Dragon's Tail*, 1992)

Regarding funds for the protection of the Nakai Plateau, the World Bank and the dam are far from the only hope for providing conservation for the region. In fact, the dam proposal is deterring investment in conservation. Finally, while wildlife conservation may be a noble aim in itself, it has never been successfully achieved by excluding and disenfranchising local people and communities. The forced resettlement of people is among the most destructive aspects of dam development and has been well documented on many projects to date.

## World Bank Involvement

The World Bank has not yet accepted the NT2 Dam as a project. Acceptance of the project, if and when it occurs, in no way guarantees funding, but merely begins the formal appraisal process. In short, World Bank financing is a long way off, and far from certain.

IRN disagrees with your implication that World Bank involvement assures that the NNT NBCA will be protected. The World Bank is a bank, not a regulatory body. The World Bank has yet to be involved in a successful mitigation plan for a dam and reservoir project. Once the dam is completed, the Bank has little leverage to ensure any management plan is adhered to. Even if the Bank were to withdraw its guarantees following construction, the dam could still be completed, and damages incurred. If the government is truly interested in implementing a conservation management plan for the Nakai Plateau, it does not need the Bank to make it happen.

In conclusion, IRN is extremely disappointed and surprised that you have taken this promotional posture on the NT2 project, despite not only information which demonstrates inherent risks to the economy of the Lao PDR, but even your own findings and previous experience with dam projects, and the information currently being gathered in the form of additional studies.

We have also confirmed that WCS has not appropriately consulted affected people and NGOs in the inundation area, nor in the Lao PDR as a whole. Moreover, your studies past and present appear to be without the necessary processes required by the participation provisions of World Bank Operational Directive 4.01 Environmental Assessment. The willingness to take a position in the absence of any public support of the people affected stands in stark contrast to the most fundamental principles of sustainable development.

IRN urges you to end your promotion of this inherently risky project.

*As this issue went to press, IRN received an official response to Lammers' letter from John Robinson, Vice President and Director of WCS, stating that "WCS does not support the construction of the [NT2] dam" and "is neither a proponent or opponent" of the project. The letter continues: "As is clear from his letter to you, Alan Rabinowitz supports the NT2 Project **as it applies to biodiversity conservation**" (emphasis theirs).*

## [More Mekong Campaign Information](#)



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## **Groups Tell UNDP to End Support of Mekong River Commission**

In an April 15 letter to United Nations Development Programme (UNDP) Administrator James Speth, 29 nongovernmental organizations from 13 donor countries called on the organization to halt support for the Mekong River Commission (MRC). The letter, spearheaded by International Rivers Network, documents the MRC's resistance to public participation and open access to information -p; an unwillingness that makes the MRC incapable of fulfilling its objective of sustainable development.

The MRC, made up of representatives from four Mekong nations, is now formulating development plans for the world's tenth largest river that potentially include dozens of dams. UNDP has been one of the group's biggest outside supporters.

The NGO letter highlights major contradictions between what UNDP promotes and what the MRC is doing. According to statements by UNDP last year, "The programmes that UNDP supports in the water resources area should provide for participatory mechanisms to facilitate open debate by affected parties on alternative development plans and to involve affected communities and civil society in decision making."

But Yasunobu Matoba, the MRC's chief executive officer, has stated that "public participation is not the responsibility of the MRC, but that of its member countries," and that the MRC had "no plans" to incorporate public participation into its activities. According to Matoba, interested parties wishing to obtain documentation about MRC activities must "go to the embassies of the member countries or through the donors." When told that UNDP and other donors view public participation and transparency as integral components to sustainable development, Matoba said, "UNDP may be interested in these things, but the MRC is not."

The timing of the NGO letter was to coincide with a UNDP-sponsored workshop to discuss a basin-wide development plan for the Mekong River, to be held April 17-20. Last July, UNDP's Speth called the upcoming basin-wide workshop "an opportunity for Mekong commissioners to learn first hand about the experiences -p; both positive and negative -p; that other countries and regions in the world have had in the area of river basin development." Instead, the NGO letter points out, "the six main presenters are representatives of some of the world's most controversial large-scale river development projects, such as India's Sardar Sarovar Project or China's Three Gorges Dam."

NGO efforts to reshape the workshop met with resistance. UNDP's assistant administrator, Nay Htun, said, "it is not possible within the context of this one workshop, which is organized for and in consultation with the Mekong River Commission, to accommodate every group or individual which might have views on the basin development planning process."

*-Owen Lammers*

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



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## The Coming Energy Revolution

*Few societies or ecosystems have been unaffected by the explosion in energy consumption sparked by the industrial revolution. Big dams, nuclear power plants and the consumption of fossil fuels have all had appalling consequences. But alternatives to the development of massive and destructive energy sources are making inroads around the world. The following excerpt from the upcoming book [Silenced Rivers](#) by **Patrick McCully** (Zed Books, London, November 1996) describes how the ecological impacts of energy use could be drastically reduced even within the constraints of the current growth-oriented economic worldview.*

First, there is a huge amount of energy that can be saved before it is even used. The efficiency of electrical appliances and industrial processes has already improved by leaps and bounds since the oil shock of 1973. The "energy productivity" of the US -p; the amount of goods and services produced per unit of energy used -p; rose by 40 percent in the two decades after 1973; the energy productivity of Japan by 46 percent. Electricity demand growth in industrial countries as a whole slowed from eight percent per year in the 1960s, to an average of three percent since the 1970s.

One of the most effective ways of realizing the potential of energy efficiency is by changing the ways electrical utilities are regulated so that it becomes more profitable for them to meet additional demand with "negawatts" -p; saved electricity -p; rather than more megawatts. Under electricity "demand-side management" (DSM) programs, consumers are given subsidized energy-efficient light bulbs and household appliances. US utilities spent an estimated \$2.8 billion on efficiency measures in 1993, providing negawatts at an average cost of 2.1 cents per kilowatt-hour, half the cost of megawatts from the cheapest new power plants. DSM and other programs have helped California to keep its per capita electricity generation at the same level in 1992 as it was in 1979 -p; while it rose by nearly a fifth in the rest of the US.

The potential benefits in terms of money saved and ecological damage avoided through the implementation of DSM in less industrialized countries is huge. According to one estimate, greater efficiency could reduce electricity growth in these countries by a quarter over the next three decades, saving hundreds of billions of dollars. The Thai electricity utility launched a US\$189 million DSM scheme in 1991, which is projected to save 238 MW in peak power. This is only a fraction of the potential savings from DSM in Thailand: the International Institute of Energy Conservation estimates

that it could save 2000 MW at less than half the price of building power plants to produce this amount of electricity. The highly controversial Pak Mun Dam, by comparison, provides Thailand with an additional capacity of only 136 MW. A study of the Brazilian electricity industry found that DSM measures through to 2010 could save \$52 billion in avoided investment in 26,000 megawatts worth of new power plants -p; equal to the amount of power produced by more than two Itaipú dams or well over a hundred Balbinas.

### **Gas for Now**

Phasing out destructive energy technologies will mean bringing new electricity generating methods on-line. Wind and solar power at present appear to have by far the greatest technological and economic potential of any of the renewables. While these technologies are refined in the coming decades and their infrastructure put in place, natural gas is a relatively environmentally benign transition fuel.

Extracting and transporting natural gas is relatively easy, safe and non-destructive compared to other fossil fuels. Emissions from gas-fired power plants also compare very favorably to those from oil, diesel, or coal: carbon dioxide emissions from modern gas turbines can be 60 percent lower from those from coal plants, and nitrogen oxide emissions 90 percent less. Unlike other fossil fuels, burning gas gives off no sulphur or particulate emissions. Constructing a gas plant currently costs around \$700 per installed kilowatt -p; just over half as much as the average coal-fired power station, and compared to a cost of \$1,500-\$5,000 per kW for hydro. Gas plants can be built with surprising rapidity: a 1,875 MW combined cycle plant was completed in northeast England in 1992 just two-and-a-half years after construction started. A dam with a similar generating capacity would typically take a decade or more to build.

The efficiencies of scale which have conventionally favored huge power plants are changing with the commercialization of efficient gas turbines as small as one megawatt. These enable power generation to be decentralized, slashing electricity distribution losses, and allowing factories or communities to generate their own power. The huge cost overruns which invariably afflict large construction projects -p; especially dams -p; are obviated by increasing capacity incrementally with small, standardized gas plants.

The economic and environmental advantages of gas-fired electricity are currently fueling a rapid expansion in its use. Global gas production is growing at around twice the rate of growth in oil production. Global reserves appear sufficient to support a worldwide natural gas boom. The ultimate constraint on gas use -p; as on the use of other fossil fuels -p; may well not be scarce supplies but environmental concerns: when carbon-free renewable technologies are sufficiently developed, gas use may then be phased out.

### **The Renewables Are Coming**

Wind power is in the short term by far the most promising of the "new renewables." Technological advances have led the price of wind-generated electricity in favorable locations to plummet by more than half over the past decade. The cost of installing wind turbines fell to under \$1,200 a kilowatt by

1993, and forecasts indicate that this could tumble to under \$800/kW by the year 2000. In 1994, installed wind generating capacity around the world soared by 22 percent from the previous year, to reach a total of over 3,700 megawatts. More than 25,000 wind turbines are now producing electrical power. The bulk of the turbines are in northern Europe and the western US, but the industry is fast expanding into new areas. Global wind potential, even excluding environmentally sensitive landscapes, is roughly five times current global electricity use. According to various estimates, wind power could be producing 10-20 percent of the world's demand for electrical energy by the middle of the next century, even without significant advances in energy efficiency and conservation. The main constraint to wind power is that generation from even the best sites can be intermittent so that without efficient methods of storing electricity, utilities will need to have some form of back-up generation for unusually calm days. Another constraint to wind generation is that many of the windiest sites are far from the main sources of electricity demand.

If wind power is to become a major electricity producer, windfarms must be developed that benefit the communities in which they are installed. Otherwise they are likely to be resisted just as people oppose nuclear plants and dams near their homes today. An excellent example is provided by the different reactions to the recent surge in wind-farm development in Denmark and the UK. In the former, there were some 3,500 wind turbines installed by 1994, producing around three percent of Danish energy. These turbines are owned by cooperatives whose shares are typically restricted to local people. In the UK, however, where only some 400 turbines have been erected, the main economic beneficiaries of windfarms have been large landowners and corporations. This has spawned resentment, and a vocal anti-windpower lobby of landscape preservationists which has succeeded in slowing down windpower development. "If the new windmills -p; unlike those of earlier centuries -p; impose upon the landscape," says English environmentalist Simon Fairlie, "it is because they impose upon the community, rather than growing out of it."

## **Sun Power**

There are two main techniques for directly harnessing the energy of the sun to generate electricity: "solar thermal" systems, which use mirrors to concentrate sunlight to a temperature where it can convert water to steam, which is then used to generate electricity; and photovoltaic cells, which directly convert sunlight into electricity. There are three main configurations of solar thermal power plants: a parabolic dish that focuses light to a single point; parabolic troughs which focus light onto a liquid in a pipe; and an array of flat mirrors spread over several acres that reflect light onto a high central "power tower." Several solar thermal stations have been built in southern California and elsewhere, but they have so far proved relatively expensive and unreliable. The technology is fast advancing, however, and advocates believe that it will be competitive with gas generation by the end of the century. Two of the biggest energy corporations in the US, Enron and Amoco, expect to bring on line a 100 MW solar thermal plant in the Nevada desert by the end of 1996. The inherent drawbacks to solar thermal is that it is only suitable for very sunny climates, it requires another form of generation as a backup for cloudy days, and it does not have the flexibility of smallness shared by windmills and photovoltaics.

Photovoltaic cells (PVs) look much more promising than solar thermal as an energy source of global importance. They were first developed in the 1950s but their use was constrained by low efficiencies.

Recent advances, however, enable them to generate electricity even on overcast days and have brought costs down precipitously. The cost of one kilowatt of PV capacity plummeted from \$3 million in the 1950s, to \$4,000 in 1994 (1993 dollars). PV prices could easily fall another two-thirds by the end of the century. Sales of PVs rose by more than 15 percent in 1994, bringing total global solar cell installed capacity to more than 500 MW. Christopher Flavin and Nicholas Lenssen of the Worldwatch Institute believe that photovoltaics "could become one of the world's largest industries, as well as one of its most ubiquitous power sources."

The biggest market for PVs is currently in the rural areas of less industrialized countries -p; around a quarter of a million households in these areas now use solar cells for lighting, televisions and radios, and water pumps. According to a study by the World Bank's Industry and Energy Department, 20,000 Kenyan households were solar powered by 1993, and the rate at which rural households were installing solar panel systems was greater than the rate of increase of grid connections. Furthermore, PVs are not just suited to the sunny skies of the tropics: Switzerland has a program to install at least one PV system in each of the country's villages by the year 2000; and the Netherlands plans to install 250 MW of photovoltaics by 2010.

A great advantage of PVs is their flexibility -p; they are quick to install, come in a wide range of sizes which can easily be upgraded, and can be built into rooftops or any other surface facing the sun. Even windows can now be coated with transparent solar cells. The total solar glazing potential of the UK is estimated at 68,000 MW -p; equivalent to half the country's 1993 power supply. Buildings with solar cells can have "reverse meters" which enable them to use grid electricity on cloudy days, and then supply the grid with power when it is sunny.

Together, solar and wind power could provide the bulk of the world's electricity generation by the end of the next century.



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## **Down The Toilet**

### **Better Sewerage Systems Key to Sustainable Water Management**

Modern sewage systems, which have practically become a talisman for a society's degree of "civilization," not only use prodigious amounts of water but are quite costly to install (from \$150 to \$600 per user). The Rocky Mountain Institute calls the conventional toilet "one of the biggest water wasters in the home," and estimates that the average American family of four flushes 32,000 gallons down the toilet each year. In arid developing countries, the spread of flush toilets can lead to major inequities in the allocation of water by depleting limited freshwater supplies and then flushing wastes into local streams and rivers -p; often the only source of drinking water for river dwellers.

More than 90 percent of sewage in Asia, Africa and Latin America is untreated, causing 80 percent of the diseases in these regions, reducing usable water supplies and contributing to extreme losses of aquatic biodiversity. According to the World Health Organization, "Water and sanitation improvements can reduce the world's incidence of infant and child diarrhea by 25 percent and total infant and child mortality by more than 50 percent." In addition to promoting public health and preserving ecosystems, effective wastewater treatment can prevent economic losses in fishing and agriculture.

Despite enormous capital investments made during the United Nations-sponsored International Drinking Water Supply and Sanitation Decade (which began in 1980), by the early 1990s more than 1.3 billion people were still without access to safe water and 1.7 billion were without adequate sanitation facilities (about 80 percent of whom live in rural areas). Part of the reason the UN Decade failed in its promise to provide "universal access" to water and sanitation was the absence of local input in the design and implementation of projects and a lack of follow-up maintenance and monitoring.

According to John Niewoehner, project manager at Water for People in Denver, Colorado, the most important aspect of any sustainable system is that it is made from locally available materials based on a familiar set of values. "People have to build their own latrines," Niewoehner said. "If you build it for them, they will only have one, and when that one fills up they won't be motivated or even know how to build another one."

Researchers have learned the hard way about the need to be culturally sensitive when designing sanitation projects. For example, when American donors built bathroom stalls with short doors in Burkina Faso, women could not use them since it is culturally unacceptable for them to expose their legs. In Swaziland, Swai villagers refused the implementation of latrines in their community because they found it offensive to defecate indoors.

International institutions and non-governmental organizations are now looking toward more culturally and environmentally appropriate technologies complemented by hygiene education as more sustainable solutions to waste disposal. Systems that can be constructed locally, maintained by users, and accepted within the cultural framework have the highest chance of success.

### **Keeping Costs Down**

Recent advancements in low-cost wastewater treatment are putting nature to work. In hot climates, sewage can be treated in waste stabilization ponds through natural physical, chemical and biological processes energized by the sun. Another approach is using algae to convert nutrient-rich sewage into fertilizer or fish food; such systems cost half that of conventional treatment plants. Peter D. Rose of Rhodes University is currently developing a system for a village of up to 1,000 people in sub-Saharan Africa. Others have been constructed in the US.

These low-cost systems help preserve clean water, but they cannot eliminate the risks of diarrhea and other water-borne diseases on their own. "Plopping in pipes does not improve health," said Joy Barrett, a Water and Sanitation Specialist at the Peace Corps. "Any construction has to go hand in hand with hygiene education." Women in particular must be targeted as agents of change, since they are most often the teachers of children and the providers of food and water.

People who live on the growing outskirts of the world's cities increasingly suffer from lack of clean water and sanitation facilities. The constant influx of migrants from rural to urban areas are creating "peri-urban slums" where waste disposal is extremely difficult to control. "There are cheap solutions for smaller communities, but something like a wastewater lagoon would not be feasible for a town of one million," notes Niewoehner. Although underground sewerage systems function properly in most of the industrialized world, the expense is often beyond the capacity of municipal budgets in developing countries. Furthermore, international loans and credits have not adequately targeted the poor, promoted water conservation or pollution prevention, or incorporated the costs of operation, maintenance and monitoring.

Those working to develop appropriate systems believe that solutions to the world's growing water and sanitation crisis lie in incorporating local knowledge and values into technological alternatives, integrating long-term maintenance and monitoring, and concentrating on efficient, resource-conserving and cost-effective systems.

*Shayna Samuels completed the research for this story while working as an intern at Environmental Defense Fund in Oakland, California.*

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## **Solar Power Heats Up Under African Skies**

Renewable energy is finding its future in "grid-poor" countries, where the higher cost of the energy is less of an obstacle than the cost of bringing power lines to remote sites. Africa, with the world's lowest per-capita energy consumption in the world and a large rural population, is particularly ripe for decentralized renewables. While some African nations already have the capacity to install and service such systems -p; such as Kenya, where more households get their electricity from the sun than from the national grid, thus sustaining a large number of local technicians -p; others are farther behind.

Enter Renewable Energy for African Development (REFAD), a US nongovernmental organization whose aim is to develop locally initiated, commercially viable renewable energy programs. The group takes a two-pronged approach: it promotes the creation of credit programs that make renewable energy affordable and available to rural communities, and offers training to build local capacity in system design, installation, operation and maintenance. Although plans are to include all renewables in its programs, to date REFAD's projects have primarily been in solar power. The group is working in a growing number of African nations, with new projects in Botswana and Namibia starting this year.

The Namibian program will finance small solar systems for 100 homes in the first round, but could expand to many times that number. "We're working with the Ministry of Mines and Energy and a Namibian NGO," says Jamal Gore, staff director for REFAD. The Namibian government has set aside US\$769,000 for an expanded program should the pilot prove successful.

Namibian educators from technical training centers who attended REFAD's renewable energy course last summer in Cape Town have gone on to train a number of rural people in system installation and maintenance. "These two activities are coming together to ensure that there are income-generating benefits to this project and that there will always be someone around to maintain these systems," Gore notes.

REFAD is planning to start a nearly identical program in Botswana this year, and is working with a South African NGO and the energy ministry on a larger (2,500 home) pilot scheme that will pave the way for a program to reach an estimated 2.5 million off-grid households in the next decade. "We're also talking with interested parties in Lesotho and Malawi, and would like to explore opportunities throughout the continent where renewables represent the technology of choice for electrification," Gore says.

REFAD's 1996 training program will include renewable energy educators from a number of countries in

southern Africa (and especially from historically disadvantaged institutions in South Africa) as well as from some of the Historically Black Colleges and Universities in the US. As Gore says, "We want to build skills on both sides of the Atlantic."

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## US Town Kills Dam with Water Conservation

Conservation of water has for the last century meant building dams," wrote Marc Reisner in *Overtapped Oasis*, his 1990 book on water use in the western United States. But today in the US, decreasing government funds and increasing environmental awareness have conspired against a costly, environmentally destructive engineering approach to water management. Still, few communities have matched the water wisdom of Ashland, Oregon, which rejected a dam proposal in favor of conservation.

In 1981, Ashland learned that it might lose water rights from a local irrigation district. The amount of water at stake -p; 769 acre-feet per year (af/yr) -p; supplements the community's main water source, the reservoir of the Winburn Dam on Ashland Creek, which stores 800 af/yr. The city began the search for new sources of water.

The first consultant approached by Ashland suggested two alternatives: a pipeline from the Rogue River, or a second dam upstream from Winburn Dam. The price tag for either project was \$12 million -p; well beyond the means of the community of 20,000 residents.

"There's got to be a better way," said Dick Wanderscheid, the city's conservation manager. Wanderscheid approached the Public Works Department with a plan to find the missing water through conservation. "It was a hard sell," says Wanderscheid. "Conservation is a new concept for engineers. They're used to building dams."

Once Public Works was on board, Synergic Resources Corporation of Seattle put together a Demand-Side-Management (DSM) program for the city. The plan's conservation measures found savings of 500,000 gallons of water a day by the year 2000 -p; the same amount the new dam would have provided. But the plan's "found" water would cost just \$0.70/cubic foot (cfw), while water from the proposed dam was estimated at \$2.80/cfw. There were other selling points as well: the program could be phased in over time, it helped customers save money while using water more efficiently, and Ashland Creek would still flow freely above the existing dam.

Ashland's DSM program has four critical water-saving elements: The utility service performs system-leak detection and repair at customers' dwellings; showerheads are replaced with water-saving heads free of charge; a \$60 rebate is given when customers replace old toilets with low-flow toilets, and an incentive-based rate scale encourages conservation by charging more per gallon above a base number of gallons allotted per household.

The program was implemented in 1992 at the cost of \$825,000 -p; about one-twelfth the price of the dam. Ashland now saves 300,000 gallons a day. Wanderscheid says the other 200,000 will come as citizens replace their old toilets and showerheads. "People are willing to conserve," says Wanderscheid, "if you make it easy and you don't affect their standard of living."

*-Aleta M. Brown*



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