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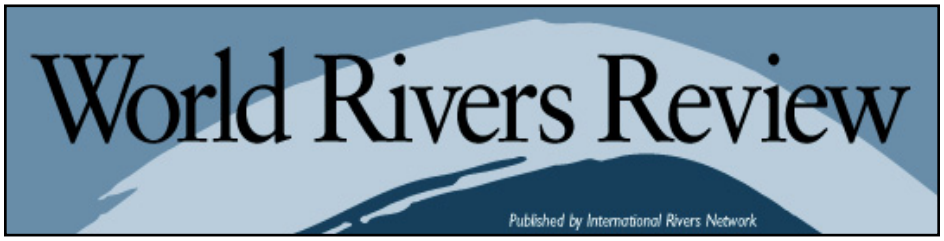

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California Flood Control System Springs Leaks

by Lori Pottinger

California's multi-billion-dollar flood control system - the most extensive in the world - suffered severe breakdowns in January. Levees along numerous rivers gave way, devastating rural communities along a 125-mile stretch of the Central Valley. The resulting floods caused nine deaths, an estimated $1.6 billion in damages and the inundation of some 300 square miles. At least 20,000 homes were damaged or destroyed and 48 of the state's 58 counties were declared disaster areas.

"This is one of the problems with engineered flood control systems," said Philip Williams, a civil engineer. "They encourage development in the most flood-prone areas. People think they are completely protected by the flood control system, but in truth such systems are inherently unreliable. Damage from floods in this country has actually gone up despite our huge investment in flood-control infrastructure."

An official in the state's flood control bureaucracy told *WRR*, "There are two kinds of levees: those that have broken and those that are going to break. After all, they're just packed dirt."

The floods occurred after a series of warm, tropical storms brought large amounts of water to already saturated soils. The resulting runoff varied in intensity around the state, according to the state's chief hydrologist: it set a new record at New Don Pedro Dam, where it was rated as a 180-year storm; at Friant Dam it was rated a 150-year storm, but at Folsom, where the runoff was similar to that of the big 1986 storm, it was only an 80-year event.

The high volume of runoff quickly filled the reservoirs of some flood-control dams to their legal limits, and water had to be rapidly released. In many cases, downstream levee systems were not designed to handle such huge amounts of water. In other places, levees failed because of poor siting, limited channel capacity or shoddy construction.

Doug Shields, a hydraulic engineer with the US Department of Agriculture and a specialist in river restoration, said, "If you want more capacity, you can build the levees higher or you can set them back. Setting them back creates a corridor that you can maintain in a semi-natural state which brings a number of environmental values. That's what I see as the real opportunity here." Shields also said that rebuilt levee systems "should be designed with a failure plan in mind, so that operators have some control over where it will fail."

The San Joaquin River had some of the state's most extensive flooding. Releases from Friant Dam were significantly higher than the downstream channel's capacity, causing numerous levees to break. Friant Dam has 170,000 acre-feet (AF) of flood control space in its 520,000 AF reservoir, which offers protection from a 50-year flood.

The *Los Angeles Times* (January 26, 1997) reports that the operators of Friant Dam may have been too slow to release water, waiting five days after the reservoir rose into the flood storage area "even as the dam became three-quarters full and the state's weather forcaster warned of a tropical storm." At the time of the storm's onset, the reservoir was at 449,000 AF, which the dam operators say indicates just an 8 percent encroachment into the flood space.

During the peak of the storm, 85,000 cubic feet per second (about 168,300 acre-feet in a day) poured into Friant Dam. "We used our whole flood space in one day," said Jeff McCracken of the US Bureau of Reclamation. Dam operators released 62,870 cfs from Friant during the peak of the storm's runoff, although downstream levees are only designed to handle 8,000 cfs. Levee breaks caused most of the damage downstream.

Perhaps more troubling than whether or not Friant Dam was managed according to regulations is the fact that three different people in the flood-management bureaucracy told this writer three different stories about the operational requirements for Friant Dam. The main source of confusion is over an upstream dam, which the operating manual for Friant says can be used to replace up to half of Friant's flood storage. The Army Corps of Engineers offered conflicting information, saying the upstream dam's storage area cannot be subtracted from Friant's but is "just one of many variables" used to calculate releases from Friant. Other variables include saturation of the soil and amount of water entering the channel from downstream sources. Human error in such a complex system is certainly possible, even in the best of circumstances.

Large Dam, Tiny Flood Space

Another area of major damage was below New Don Pedro Dam on the Stanislaus River, which was operated appropriately but which has the smallest flood-storage buffer in the state. New Don Pedro has just 17 percent of its two million AF reservoir reserved for flood storage. The average for reservoirs in watersheds above the Central Valley is 28 percent, according to the state Department of Water Resources, and the state's highest is now Folsom, at 68 percent. Dam operators had to release 50,000 cfs into a channel that can handle 15,000 cfs.

The high amount of flood damage in the communities below New Don Pedro was not due to levee problems, however, but because of extensive development in the flood plain. "The dam allows people to pretend that part of the flood plain is safe, high ground," said Ron Stork, a flood control specialist for the Sacramento group Friends of the River.

"The Army Corps has stated that New Don Pedro Dam was 'operated as intended' in this flood, and sadly, they're probably right," said Thomas Graff, a senior attorney with Environmental Defense Fund.

"Unbeknownst to most of the public, the reservoir operations manual for this dam and the constrained channel capacity downstream doomed homeowners adjacent to the Tuolumne River, who have only been provided with 50-year flood protection despite being immediately downstream of one of the state's largest reservoirs."

There was a ray of sunshine in the flood's aftermath: Folsom Dam upstream of the state capitol of Sacramento, which had nearly failed during a major storm ten years ago, worked very well during this event because increased public scrutiny led to improvements in its operation. The dam now has 670,000 AF devoted to flood storage or two-thirds of its reservoir - an increase of 200,000 AF compared to 1986. Levees downstream have been improved as well.

The proposed Auburn Dam - a billion-dollar flood control structure on the American River that was defeated in Congress last year - "would not have saved the people and property hit by flooding along the Feather, Bear, Consumnes, San Joaquin, Mokelumne, Stanislaus or Tuolumne rivers," said Ron Stork. Despite the evidence against it, a Sacramento legislator was renewing his campaign for the dam before the flood waters had even receded.

Environmental groups are calling for a review of the Central Valley's flood control plan. The groups, including Friends of the River and Environmental Defense Fund (EDF), suggest that such a review could consider the following options, among others:

- move back and rebuild levees to modern engineering standards;
- improve operations of existing dams;
- buy properties in critical high-hazard zones to reduce damages and help restore the floodplain's natural abilities to absorb runoff;
- encourage wise land-use planning in floodplains, reserving flood-prone lands for farmland, recharge basins and wetlands, and requiring changes to the building code to elevate buildings in high-hazard flood zones.

"It's important that any review of the current system be independent of all bureaucracies - federal, state and local - that currently have roles in providing flood protection in this state," said Graff of EDF.

At press time, the *San Francisco Chronicle* reported that despite the extensive damages from the flood, "developers and real estate lobbyists vowed to battle any effort by the Legislature to restrict construction in areas that face future inundation." The Legislature had asked various interest groups to comment on post-flood proposals to restrict some construction in hazardous flood zones. "The California Realtors Association would find restrictions on development repugnant," Stan Wieg, a lobbyist for the group, told legislators.

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A Golden Opportunity

by Philip Williams

California's recent floods wreaked havoc in many communities, but they also opened a unique opportunity to propose a new flood management solution - one that would provide greater hazard reduction, greater reliability and at lower cost than the flawed flood control system the state currently relies on. This solution, which fully integrates flood management with river and watershed management, would also enable the large scale restoration of habitat for wetlands, waterfowl and fish that have been largely destroyed by the construction of this same flood control system.

The rivers of California's Central Valley are constrained by the world's most comprehensive and highly engineered flood control system - and one that has been emulated in other parts of the world. Its complex of flood control dams, levees, and bypasses has been tested by major floods only twice since its completion in the 1970s: in 1986 and this year. These events showed significant inadequacies in the operation, maintenance and design of the system. Most serious was the misoperation of Folsom dam in 1986, which caused a near catastrophe for Sacramento; and the large spills from New Don Pedro and Friant dams in 1997, which created large flood waves that ruptured levees downstream.

The following are some of the flaws built into California's flood control system that increase its maintenance costs, unreliability and harm to ecosystems:

- Some levees have been built too close to the river channel, making them unreliable and costly to maintain, and producing higher flood stages than occurred naturally. Maintenance of such levees has destroyed essential riparian habitat along most of the Sacramento River.

- Levees significantly reduce the natural storage of flood waters within the floodplain. Elimination of floodplains destroys or disconnects floodplain wetlands from the river, destroying a key component of a watershed's ecosystem.

- At the time of the design of California's flood-control system, no consideration was given to the increase in flood damages likely incurred by people induced to develop in floodplain areas where the risks, while reduced, were still substantial.

- The system suffers from a basic operational conflict intrinsic to multipurpose reservoirs, which

store water for power and irrigation as well as floodwaters. The system's flood control benefits depend on these dams being operated exactly to plan during major floods. Subsequent experience has shown this to be impossible, in large part because water needs in dry California often win out. Many dams store irrigation water in the flood control space during the winter, limiting their effectiveness as flood control dams.

- The San Joaquin Valley dams are designed to release flood discharges so small that almost all incoming floodwater must be stored. This futile attempt to eliminate flood peaks in the lower river has allowed dense vegetation to choke the old river channel as well as encouraging development in the floodway.

- The design of the flood control system makes almost no provision for addressing the consequences of the inevitable extreme flood larger than the design flood or a flood from a dam failure that will overwhelm the system.

The January 1997 floods have reconfirmed that we need to change the objective from "controlling floods" to the more appropriate one of reducing flood hazards. In this strategy, structural flood control measures are very important, but are not the dominant tool in achieving societal goals. Land use controls, flood insurance, building codes, relocation, flood proofing, emergency preparedness, and public education are also important and effective tools. "Management" must replace "construction" as the most important activity to protect our floodplain infrastructure.

Some of the improvements that could be made to the existing flood control system would not only increase reliability and effectiveness, but also help restore riverine ecosystems that have suffered under the current system. These changes include setting back levees to recreate floodplain corridors and allow for an active, natural meander area for rivers; reconstructing levees to allow for vegetated toes instead of rip-rap; acquiring flood bypass land to convert to wetlands, which provide natural flood control, and changing reservoir operations to mimic natural seasonal flood patterns and reestablish natural riffles, pools and meanders.

The construction of the Central Valley's massive water control system caused major ecosystem declines and species extinctions that were only understood or acknowledged within the past two decades. New governmental initiatives are being formulated to restore fish, wildlife and wetlands. These initiatives focus on the restoration and management of flows and habitat in the river and estuary system. There is an almost perfect overlap between the measures needed for implementing an effective flood management strategy and those needed for meaningful restoration of the valley's fish and wildlife.

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Trio of Nations Supports Three Gorges Dam

by Patrick McCully

The government export credit agencies of Japan, Germany and Switzerland have all agreed in recent months to give financial assistance to companies seeking contracts on China's Three Gorges Dam. The decisions were made in the face of intensive lobbying against the project from environment and human rights groups. The banks will assist companies in their countries that are bidding to supply fourteen 700-megawatt turbines and generators in what is probably the world's largest single order for power generation equipment. The winning consortium is expected to be announced in mid-1997. Last year, the US Export-Import Bank decided against supporting the controversial project with export credits; US companies may bid on contracts for the dam, but will not receive government support.

Germany's Hermes-Bürgschaften was the first government export credit agency to offer substantial financial assistance to the Three Gorges Dam, whose 400-mile-long reservoir will displace more than one million people. The German decision was made in late August but only made public in mid-October - two days before a scheduled debate in the country's parliament on whether the agency should support Three Gorges. The details of the Hermes decision are shrouded in secrecy but it is believed to involve loan guarantees of up to $833 million to German engineering giant Siemens AG and turbine manufacturer Voith Hydro.

German advocacy groups and politicians from the opposition Social Democratic and Green parties reacted angrily to the Hermes decision and the secretive manner in which it was made. Barbara UnmüBig of the Bonn-based group World Economy Environment and Development (WEED) says that the decision was "shockingly hypocritical and deeply disappointing given that our government boasts that it is a leader in global environmental diplomacy."

Next to follow the German lead was the Swiss government agency Exportrisikogarantie (ERG), which announced on December 9 that it would offer loan guarantees of almost $300 million to Swiss companies ABB and Sulzer Escher-Wyss. As in Germany, the Swiss media reported extensively - and largely critically - on their government's support of the project. Swiss nongovernmental organizations placed a full-page advertisement in several newspapers that urged ERG not to support Three Gorges. The appeal was endorsed by 330 of the country's leading politicians, academics, artists, religious figures, trade unionists and environmental and human rights activists. According to Peter Bosshard of the NGO

Berne Declaration, ABB representatives met with every member of the Swiss government in the week before the decision. "Despite all the opposition," says Bosshard, "corporate interests carried the day."

Nine days later, on the eve of the deadline for bidding on the huge contract, the Japanese Export-Import Bank (Jexim) announced it would back a bid from a consortium led by Hitachi, Toshiba, Mitsubishi Heavy Industries and Mitsubishi Electric. If the Japanese consortium wins, Jexim would assist it with loans of up to US$620 million. The Japanese national news agency Kyodo reported that the Japanese government "had decided the project would not cause environmental damage after conducting local surveys."

Japanese campaigners against Three Gorges took some hope, however, from a Jexim statement that the agency could "reconsider this internal decision if environmental and human rights problems arise" and a promise that they would "monitor the situation." According to Saitoh Aya of Friends of the Earth - Japan, it is rare for Jexim to attach such conditions to their credits. Aya says he believes the conditions were attached as a result of domestic and international concerns over the project.

- See the Three Gorges Campaign Page for more information.

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Asian Development Bank Studies More Mekong Dams

by Patrick McCully

The Asian Development Bank (ADB) has come under fire from environmental and social justice groups recently for funding a study of hydropower development on three river basins in Laos, Cambodia and Vietnam. The study, approved by the ADB in August, is intended to "ensure optimum utilization of the [Greater Mekong] subregion's hydropower potential" through a "sustainable and environmentally acceptable hydropower development plan for the Se Kong-Se San and Nam Theun river basins." Critics of the study say that it is being carried out with the pre-determined conclusion that numerous dams on these basins are "acceptable" and is being done not to find out whether more dams should be built, but in what order they should be built.

The Se Kong and Se San rivers rise in the mountains of central Vietnam. The Se Kong flows southwest through southern Laos before entering Cambodia. The Se San flows from Vietnam into northeast Cambodia and then joins the Se Kong just before both rivers flow into the Mekong. These two rivers contribute more than ten percent of the Mekong's flow in central Cambodia. The Nam Theun River flows through central Laos from the Vietnamese border into the Mekong.

Some 26 potential dam sites have been identified in previous studies of the Se Kong-Se San basin. Two of these dams - Yali Falls in Vietnam and Houay Ho in Laos - are currently under construction; work is set to begin soon on another three. Four dams are already being built or are under detailed study on the Nam Theun. The ADB study will prepare terms of reference for feasibility studies on at least six more dams in these basins.

In a letter to the ADB, 15 NGOs from Asia, North America and Australia note that no assessments have yet been done of the cumulative ecological and social impacts of the dams on these basins and very little information is available describing the impacts or economic justification of the individual projects. "Instead of pushing ahead with the process of building yet more dams in these basins," the groups write, "we believe the ADB should undertake the long-term process of gathering and analysing data on the impacts of the projects which are already underway or scheduled to begin soon." The letter goes on to state that "no further projects should be proposed on these basins until a competent and honest assessment based on empirical evidence of the impacts of the dams already being built on these basins is done and made publicly available."

The ADB has granted half a million dollars for the study, with a further $2 million from the French government being chanelled through the ADB. The Bangkok-based Mekong River Commission - widely criticized by environmentalists for its promotion of hydropower and its lack of openness to public scrutiny - is coordinating the 20-month-long study which will be carried out by consultants from UK engineering firm Sir William Halcrow and Partners, in association with Electric Power Development Co. International of Japan and MK Centennial of the US. EPDC International led a 1993 study financed by the Japanese government which identified many of the dam sites on the Se Kong and Se San that the ADB study will now investigate in more detail.

Predictable Outcome

Based on their past experience of the dam building process, critics predict that the consultants will conclude that six or more dams on these basins are indeed "sustainable and environmentally acceptable." After the study is finished, the NGO letter to the ADB states, "pre-feasibility and then feasibility studies will be written followed by environmental impact assessments (all by dam industry consultants who experience has shown to be heavily biased in their assessments of dam viability)." The NGOs predict "with reasonable certainty" that these studies will then conclude that the proposed dams should be built and that any predicted adverse social and environmental impacts will be "acceptable" or "not serious" and can be "mitigated." The engineering consultants who conclude that the dams should be built, claim the critics of the study, are likely to bid for contracts on dam construction.

In a reply to the NGOs' letter, James Rockett of the ADB's Energy Division West stated that "we do not believe there is any vested interest involved since the Bank has not decided to engage the same consultant, or for that matter, any further consultant, for further studies." Rockett also claimed that, contrary to the NGOs assertions, the ADB study will assess "the cumulative impacts of basin-wide development." Rockett added that hydropower projects "can demonstrate enhanced sustainability as they use a renewable resource to generate energy while giving rise to no regional or global pollution effects."

NGOs say he misses the point. "The ADB is pushing hydro while willfully neglecting the environmental costs of the schemes," said Gráinne Ryder from Canadian group Probe International, one of the signatories of the letter to the ADB. "It is well known that hydropower dams can seriously contaminate river water, reduce biodiversity and lead to emissions of greenhouse gases. In any case, it is up to the people who live along the rivers of the Mekong to decide what kind of development is 'sustainable' and what kind of energy is clean, not the ADB."

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France Moves to Channelize the Rhône

by Marie Arnould & Roberto Epple

In November 1996, French Prime Minister Alain Juppé authorized Compagnie Nationale du Rhône (CNR) to begin buying land along the course planned for the Rhine-Rhône Canal, a project that is part of the huge TransEuropean Network (TEN) plan which proposes channelizing the last European wild rivers to permit year-round navigation for enormous multi-barge convoys. The French government's controversial decision clearly indicates its intent to move forward with the once-canceled project whose ecological impact and economic viability have generated a strong opposition movement and aroused questions within the administration itself.

The CNR hopes to buy the necessary 3,700 hectares along the Doubs and Saône rivers in northeastern France before the 20-year-old government approval for the project expires in June 1998. To speed the process and avoid the need for compulsory purchases, an unprecedented agreement has been signed which will award farmers an added premium for selling their land: farmers who sell and agree to retire will be granted US$2,000 per hectare in addition to the price of the land itself. The company also plans to spend $42 million to set up farmers elsewhere who do not take the retirement option.

In June 1996, 15,000 people demonstrated in Besançon - a town located on the Doubs River which would suffer great damages if the canal were built - to protest the massive project, which would straighten and dredge 169 kilometers of the Doubs River (a tributary of the Saône) and part of the Saône itself (which flows into the Rhône river) to permit year-round navigation for wide-gauge barges and multi-barge convoys. Building the canal would entail destroying and re-building 102 bridges, chopping the river into 23 reaches separated by 24 locks, and constructing 15 dams with mobile sluice gates. Results of a poll conducted in the fall by the Ministry of the Environment to assess riverside residents' opinion revealed widespread opposition to the project in the areas involved in the canal.

The goal is to link the Rhône to the Rhine through the regions of Burgundy, Franche-Comté and Alsace and, eventually, the Mediterranean to the North Sea and the Black Sea via the Danube River. Project authorities hope to have the entire project completed by 2010.

Results of a poll conducted in the fall by the Ministry of the Environment to assess riverside residents' opinion revealed widespread opposition to the project in the areas involved in the canal.

Environmentalists believe that the engineering works will irreparably damage a river system famous for splendid landscapes, the quality of its waters and a rich fauna and flora. They also warn that turning an ecologically complex river system into an engineered canal will worsen floods and downgrade water quality. "The waterway will replace a complex system, capable of self-regulation, with a simplified one that is more fragile and therefore more vulnerable, with all the consequences this implies on the water resource in terms of quantity and quality," said Monique Coulet, a hydrobiologist and former researcher with France's National Scientific Research Center.

The Rhine-Rhône canal is only a small part of the TEN plan, a huge European transportation scheme that has serious environmental implications for riverine ecosystems. Devised in the 1980s by the European Union, the TEN aims at building 70,000 km of new railways, 15,000 km of new freeways, 270 airports and other major infrastructure works throughout Europe. Its directive to "improve" waterways to permit year-round navigation for 110-185-meter-long convoys of barge trains would cause lasting and widespread harm to European river systems.

The Danube, Po, Elbe, Oder and Doubs are just some of the rivers that could be channelized by the scheme. Estimates for the overall TEN scheme have been placed at ECU 400 billion (approximately US $286 billion). Ten percent of the cost would be covered by the European Union and the rest shared by the individual countries with loans from multilateral development agencies such as the European Investment Bank.

Because of the Rhine-Rhône canal's high costs and what have been called overly optimistic estimates of revenue-producing traffic, critics question its economic viability. Recent estimates put the cost at $4 billion, but the cost could rise to $9 billion when value added taxes (VAT) and long-term interest are taken into account. Preliminary studies by CNR concerning the project's economic viability have been criticized. "The figures [in the CNR study] cannot be seriously considered due to imperfections of the methodology and overestimation of canal traffic," noted the General Council of Public Works Engineering.

"The costs of the canal are huge, and it would offer few advantages to the communities affected by it," said Alain Bonnafous, university professor and vice-president of the National Transports Council. "Its socio-economic profitability is simply disastrous compared to a great many alternative projects."

The high cost of these projects may the saving grace for Europe's rivers. In many European countries where economic crisis rages, voices are rising to demand the money be used in better ways. In France, the will of the government to build the project may not be sufficient to achieve the grandiose Rhine-Rhône canal.

The authors are with European Rivers Network (ERN). ERN is supporting a campaign to buy land on the course of the Rhine-Rhône canal to force the CNR into complicated compulsory purchases. Contact ERN at its main office: ERN, c/o SOS Loire Vivante, 8 rue Crozatier 43000, Le Puy, France; Phone: (+33) 471 02 08 14; Fax (+33) 471 02 60 99; email: ern@rivernet.org; on the World Wide Web: www.rivernet.org.

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Drought Ravages Europe

by Aaron Gladman

Droughts in southern Europe are becoming more frequent and are lasting longer, according to a report released in early 1996 by Medalus, a research group funded by the European Commission. The five year research project by over forty European scientists established a viable projection of climatic change in the region that predicts an estimated decrease in rainfall in the Mediterranean region of up to 30 percent by the year 2030. *New Scientist* magazine (July 1996) reports that the trend toward reduced rainfall results in massive vegetation loss, which in turn triggers soil erosion. In parts of Spain and Italy, annual soil loss exceeds 250 tons per hectare. The UN Food and Agriculture Organization (FAO) cautioned in May of 1996 that "the sustainability of Mediterranean agriculture appears questionable unless urgent and drastic measures are taken." In Spain, which has the highest per capita water demand in Europe and one of the lowest rainfalls - and which uses two-thirds of its water supply to irrigate eroding croplands - the government has proposed a US$30 billion development scheme to build 200 dams and divert water to drier areas from its wetter regions in the north.

But John Thornes of Medalus warns that this issue should not be addressed from a development standpoint. Says Thornes, "water supply problems cannot be solved by building larger reservoirs. There are not the sites; there isn't the capital; and there are grave environmental impacts." The Greek government's proposed US$2 billion River Acheloos diversion project, Europe's largest water engineering scheme, is being criticized because it could dry up an important wetland at the mouth of the River Acheloos. According to *New Scientist*, almost two-thirds of Spain's inland wetlands have dried up since 1965. Large parts of Spain's Doñana National Park, the largest natural wetland in southwest Europe, have disappeared since 1990 due to drought and the extraction of groundwater.

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Hydrologists Condemn Hidrovia Environmental Studies

by Glenn Switkes

In an important development in the planned Paraguay-Paraná Hidrovia industrial waterway, a panel of experts on river hydrology has seriously questioned the conclusions of the project's environmental impact studies. The hydrologists' review was at the request of the agencies that funded the study, the Inter-American Development Bank (the IDB is the private-sector lending agency of the World Bank) and United Nations Development Programme (UNDP).

In a letter made public in January, the group of five hydrologists from the US and Argentina state that "the evidence presented has failed to provide clear proof that the impacts are indeed negligible, as the Consultants have asserted," and recommend that "more in-depth technical, economic and environmental impact analyses and ecosystem monitoring programs will be required if the Hidrovia project is to be carried out without unduly risking ecosystem damage."

The review panel called the hydrological analyses of the engineering consultants "simplistic at best". They added that the analyses "could not possibly depict the complex interactions between surface and ground water, their spatial and temporal variability, and the interactions thereof between river levels, stream bank ground water storage, extent of inundation of the flood plain, and effects on the flora and fauna, whose richness and variety characterize the Pantanal."

Much public concern has focused on the project's impacts on the extensive wetlands along the Paraguay River. A study by Dr. Steven Hamilton of the Kellogg Biological Station in Michigan found that even a small drop in the level of the Paraguay River caused by deepening and widening the river channel could dry up large areas of the Pantanal, the world's largest remaining wetlands, in turn adversely affecting plant and animal life and biodiversity. "Even after 20 months and $11 million, the CIH [Intergovernmtnal Committe on the Hidrovia] has still not been able to demonstrate that the Hidrovia can be built without irreversible ecological and social impacts," says Alcides Faria of the Brazilian environmental group ECOA.

The Hidrovia project has drawn widespread criticism from environmentalists and scientists, as well as indigenous people and fisherfolk living along the Paraguay and Paraná rivers. It was recently disclosed that water supplies for the one million residents of the Paraguayan capital, Asunción, could be seriously

harmed by plans to explode rock outcrops in the Paraguay River just upstream of the intake for the city's water system.

Significantly, the hydrologists have proposed a less devastating alternative than that favored by the consultants, in which fewer alterations would be carried out, allowing for halts in heavy river traffic during temporary low-water periods.

"This is an important proposal which fits the objective of adapting the boats for the river, rather than vice versa," said Faria.

The study has been delivered to the IDB and UNDP who will now decide whether or not to approve it. The Inter-Governmental Committee on the Hidrovia insists that construction of the Hidrovia will begin in May.

- See the Hidrovia Campaign Page for more information.

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Dam Operation Changed to Protect Farmers

by Aaron Gladman

Sistema Economico Social (SES), a cooperative organization of 14 communities from southern San Vincente Province in El Salvador, has called on the El Salvador government and local dam operators to stop unannounced dam releases which routinely devastate downstream farmland. According to the group, downstream communities along the Lempa River suffer during "every winter of every year from flooding produced by the irresponsible opening of the floodgates of the dams operated by the Executive Hydroelectric Commission of the Lempa River (CEL)."

The flooding has alway come during the peak of the rainy season - just before the harvest of the summer crops - preceded only by a brief radio announcement as the floodgates are opened. The releases cause the Lempa to inundate fields on both sides of the river, destroying the valley's large corn and cashew crops and killing livestock. Due to the flooding, local communities have been unable to pay their debts on the government-owned lands that they cultivate. In 1995, losses were estimated at over US$2 million.

The cooperative, along with opposition leaders in El Salvador and international faith-based solidarity groups in the US, have demanded better administration and maintenance of the hydroelectric system on the Lempa River and a restructuring and forgiving of agricultural debts for local communities. With aid from Oxfam, USAID, and SHARE, it has organized a relief effort and has provided emergency aid to farmers to pay for replanting their flooded fields.

The government and the CEL have responded to the grievances by implementing several new policies, and as a result there was minimal flooding in the 1996 season. Radio contact between the dams and villages was arranged ahead of time, allowing villagers time to remove livestock from the fields. The operation of the dams has been improved: instead of letting reservoirs fill to capacity and then also releasing water at flood levels, the CEL has started to monitor and regulate lake levels more closely, thus maintaining moderate flows throughout the year. Maximum release levels have been decreased from 3,000 to 1,000 cubic meters/minute. In July 1996, the Salvadoran National Legislature accepted a proposal that 70% of the agrarian debt be assumed by the Government of El Salvador. The SES now plans to pressure the dam operators to dredge behind the dams. The hope is to remove silt deposited by excessive deforestation upstream, thereby increasing reservoir storage capacity.

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A Brief History of Japanese Flood Control

With the Meiji restoration in 1868, Japan began to turn its back on its past, rejecting traditional knowledge about river management in favor of western industrial technology. The centuries-old traditional river management techniques, which had sustained both a dense farming population and abundant river and estuarine fisheries, were replaced by a river engineering ideology based on the notion that maximum public benefits could be acheived by controlling floods. As a result of the ascendancy of the Ministry of Construction after World War II , today almost every river in Japan has now been embanked, channelized and dammed, creating an emerging ecological crisis due to the wholesale elimination of wetlands, floodplains and estuaries. Here, ***Dr. Takashi Okuma****, Professor of Civil Engineering at Japan's Niigata University, compares the new ways with the old.*

From nature's point of view, flooding and the associated downstream movement of sand and earth are the natural workings of the river forming alluvial valley floodplains. Generally, floodplains offer favorable living conditions for human existence because water is easily available, the land is suitable for cultivation, irrigation is easy and navigation is available. The irony is that due to the very geographic characteristics that are a blessing to their inhabitants, alluvial valley plains are subject to frequent flooding. Without flooding, there could be no sand and earth brought down to enrich the land, so that these areas would not provide favorable conditions for settlement.

Rivers have been a mixed blessing to humankind, and that is why we have tried to tame them with technology. Our efforts, however, have created a new problem: we have been too successful, and have significantly disrupted the cycling of materials by rivers and damaged their ecosystems. Due to enormous dams, many rivers no longer flow naturally. Some rivers have gone dry and many banks are covered with concrete dikes. In short, many rivers have been turned into cold, uninteresting ditches detached from our lives.

In the old days of the Edo era (1603-1868), people knew how to coexist with rivers. For example, by accepting occasional, inevitable flooding, they intentionally allowed the water to overflow in sections where relatively little damage would be done. In this way, overflow was avoided at locations where flooding could collapse the levee and cause great damage. Forest belts were laid along rivers to further

reduce flood damage. In these buffer zones, special types of soil were employed as construction material while the surfaces of the levees were also carefully designed. When high water overflowed through it, the forest belt weakened the force of the flow and stopped debris, gravel, and large-particle sand and earth. As a result, the overflow, once out of the forest, contained only fine sediment and was slow moving. Although farmland was submerged, farmers in the Edo Era welcomed a flood if it occurred only about once a decade because the sediments it left enriched their fields.

To cope with possible house flooding, houses with elevated floors were built on mounds and evacuation boats kept available for emergency. Such a combination of measures to minimize flood damage were commonly adopted in many parts of the country in the Edo Era and can be considered a highly-developed form of culture born out of the necessity to live with rivers which people depended upon but which sometimes threatened their existence.

The Engineering Era Dawns

In the middle Meiji Era (1868-1912), modern civil engineering techniques were introduced to Japan, making it possible to attempt to control rivers that could not have been controlled and to develop hitherto undevelopable floodplains. This in turn prompted an explosive increase in the numbers of people moving from relatively safe areas to those more subject to flooding.

Over time, a modern industrial culture evolved that demanded regular, scheduled commuting and production regardless of the fluctuations of the activities of nature. This gives rise to a social attitude intolerant of even small-scale floods. These changes changed people's perception of natural disasters.

This attitude of zero tolerance for floods came to demand equal protection from floods irrespective of the geographical differences found along differents stretches of rivers. The result was that concrete dikes of identical height and strength were constructed all the way to the upper reaches of streams regardless of the differences in natural conditions. Ironically, this egalitarian approach, when taken to the extreme, brought about a new inequality by increasing the flood flow and thus the damage in the lower reaches. This led to the building of even higher levees to accommodate the design flood flow, which in turn encouraged channelization in the upper reaches, thus creating a vicious cycle of ever increasing the design flood flow up and down the river. We are now reaching the point where it cannot be controlled in the lower reaches. Thus there is a new inequality where some people get flood protection at the expense of others even though great effort has been made to protect all.

Since the mid-Meiji Era, the main flood control measures have been to build high and large levees to contain flood flow in river channels. Thus, many flood-free years followed in some areas where floods had occurred almost yearly in the Edo Era. Accordingly, land development has been conducted based on the assumption that there will be no flood damage. This policy, however, means that hardly any measures have been taken against the possible consequences of the rivers overflowing, causing increased devastation. Furthermore, due to the numerous dams and debris barriers built in the upper reaches, the circulation of sand and earth has been increasingly disrupted, resulting in an insufficient supply of sand and earth downstream. This has contributed to lowering river beds and coastal erosion near the mouths of rivers.

The situation in Japan means that floodplains and their ecosystems have all but disappeared. Rivers are not rivers any more, as they have been deprived of some of the fundamental functions and essential characteristics they once possessed. With their relationship to rivers severed, people cannot continue to develop their culture through intimate interactions with rivers. On the other hand, it is still impossible to control very large floods of magnitudes that may strike every several centuries. We may be certain that such a flood, should it occur, would prove disastrous.

Lessons from the Past

Is there any way to restore the lost functions and characteristics of rivers? There is, provided we are willing to tolerate floods to a certain extent. It would be essential for us to accept the fact that we are part of nature and to put up with some inconveniences as the price to pay. It sometimes seems as though it may be virtually impossible for us to do so as we are so used to modern convenience.

The present situation warrants the revival of the Edo philosophy of river management and the acceptance of a certain level of overflowing. Flood control and river improvement should be based on the knowledge of nature and the limitations of technology, and the willingness to coexist with rivers. If this policy is implemented, flooding would be more frequent in some areas. People would have to recognize the inherent inequality in flood damage due to the differences in geographical location and accept a certain amount of overflow.

House flooring would need to be elevated, the basements water-proofed, and flood damage insurance introduced as practical measures to minimize damage. The construction of retarding basins and permeable pavements should also be promoted along the entire system of each river. At the same time, the maximum size of flood flow to be contained in the channel should be decided while taking measures to make the overflow runs gently and be returned to the channel. Implementation of all the above would require the establishment of a system in which those concerned, however far apart they may live along the same river, can negotiate and iron out the differences of opinions and interests in a civilized manner. Were this plan to be a reality, assistance of the local government's engineers would be essential. This is where these engineers should devote all their energies and skills.

One feasible way to implement the above policy would be to adaptively apply the flood prevention forest belt popularized in the Edo Era. Fortunately, we already have large levees; flood control would be complete if these belts were laid covering the levees. One of the biggest hurdles would be securing land to create the forest belts. The land for the inner side of the levee could be secured by relocating fallow fields alongside the river; the land for the outer side could also be secured by utilizing part of the height allowance of the levee for handling the planned high water flow. In this way, the current capacity of the channel could still be maintained. (Tall trees outside the levees, if uprooted and washed away, might be caught by bridge piers; some appropriate measures should be taken considering the root depth and the possible flow velocity.)

Considerable attention has been paid to the semi-natural river engineering method--a method that attempts to recreate natural river channels. In this respect, the flood restraining forest belt may be the ultimate semi-natural river engineering method as it provides a corridor of a natural habitat connecting the forest and the sea, making the river more natural, and improving the riverside scenery. It also

demonstrates that all the remaining forest belts should be conserved and efforts taken to restore them where they have been lost.

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Namibian Pipeline Project Heats Up

by Lori Pottinger

A Namibian delegation toured neighboring Botswana in mid-December to discuss its plan to build a 250-kilometer-long pipeline to tap the Okavango River, which feeds one of the world's most spectacular and least disturbed wetlands. This would be the first major diversion of the river's waters, which has its headwaters in Angola and eventually disappears into the sands of the Kalahari desert, where it provides a rare oasis in one of the world's harshest environments.

"We have to look for new resources to answer the growing demand for water because our dams are empty," said Richard Fry, Namibia's deputy permanent secretary of Water Affairs, who headed the delegation. "We have to conciliate our need and your fears," he told officials of the Botswana wildlife service and government officials.

Namibia has been affected by a severe, long-running drought. Most of its rivers have run dry and reservoirs in the central area were only eight percent full in December; they were expected to be dry by April unless significant rains arrived.

According to *The Namibian* (October 18, 1996), the pipeline would divert some 20 million cubic metres of water annually and only "in times of serious water shortages." At present, however, there is no multinational agreement on water allocation from the river, making this claim difficult to ensure.

But many in Botswana are urging Namibia to try other alternatives before taking water from the Okavango. At the recent public meetings with the Namibian delegation, Moremi Sekwale, the head of the Botswana delegation to Okavango River Basin Commission (Okacom), suggested that Namibia raise its water rates to help reduce demand. He noted that arid Botswana, with the same size population as Namibia, consumes half as much water per year. Okacom is comprised of representatives from Angola, Namibia and Botswana to jointly manage the river system.

Namibia's climate ranges from arid to hyper-arid, with a mean annual rainfall of 250 millimeters and a potential evaporation rate of more than 10 times that. The pipeline would help forestall water shortages in the city of Windhoek, which has already undertaken a number of water-conservation strategies and water storage projects to avert disaster. Despite the efforts, water consumption continues to grow.

Although the city's growth is around six percent a year, water use is expected to quadruple from current levels in the next 25 years, according to the US State Department.

An environmental impact assessment (EIA) is being undertaken and is expected to be completed in March. *The Namibian* reports that the Okavango River is at an all-time low, "which will enable scientists to study the impact of extracting water on the river and delta in very dry conditions."

Crisis Planning

The idea of the pipeline first surfaced in a 1973 water plan. According to engineer Piet Heyns, director of resource management at Namibia's Department of Water Affairs, the plan was re-evaluated in 1993, at which time it was decided that the link to the Okavango River would be needed by the year 2003. Now Namibia says the plan must be moved forward to thwart a water crisis.

Okacom's Sekwale has said that Botswana cannot stop Namibia from drawing water from the Okavango. "According to the 1994 Okacom agreement and Agenda 21 of the Rio UN Conference on Environment and Development, Namibia is entitled to use the water on its territory," reports *The Namibian* (Jan. 13, 1997). "According to Sekwale, these international agreements, together with the international law commission draft articles on the law of the non-navigational uses of international watercourses, set out four conditions to be met by the proposing country: that the use of shared waters should be equitable and reasonable; that there should be no
alternatives; and that there be no harm to neighboring countries.

If sufficient rains do not fall by April, Namibia will seek a "no objection" statement from Botswana to design the system. Construction of the pipeline would start after October 1997 and take one year to complete. According to wire service stories from South African Press Association (SAPA), the Chinese government has pledged US$283,000 toward the pipeline project. Namibian President Sam Nujoma also appealed to the German government in June for soft loans on the project.

Conservationists fear the effect of the project on the ecology of the delta, which supports a wide variety of game and more than 200 species of birds--and increasingly, tourism. "The delta is the source of livelihood for the ordinary people and the tourism industry," said Modisa Mothoagae, head of the Hotel and Tourism Association of Botswana. Since the Botswana government stepped up its promotion of the tourism industry in 1989, the sector's contribution to the economy has risen 27.5 percent, and now accounts for just over three percent of Gross Domestic Product. The Okavango Delta region accounts for 80 percent of the nation's tourism.

A local environmentalist who has extensively studied the Okavango Delta has written, "This ecosystem is so sensitive that even relatively minor past dredging projects in the lower reaches of the delta have resulted in the desiccation of stream courses, and some channels cleared over 30 years ago still show no sign of recovery. The limit at which upstream water reduction would result in loss of wetland is not known, nor does any credible model exist yet to predict the ratio of wetland loss to reduction of flow."

Four years ago, the Botswana government was forced to scrap a plan to extract water flowing out of the delta to supply the mining town of Orapa. Local communities and nongovernmental groups opposed the

project on environmental grounds. An independent assessment of that project by IUCN revealed that there were better alternatives to the plan, concluding that the costs of the project had been underestimated and its benefits overestimated.

- See the Southern African Campaigns Page for more information.

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News Briefs

SPEAKING OUT

MALAYSIA: Representatives of the communities to be evicted to make way for the Bakun Dam issued a statement on December 15 condemning the resettlement process and calling on the government to review its decision to build the dam. Among the conclusions of the Bakun Region People's Committee were that the area of replacement land offered to them was "absolutely inadequate," that their current lands and crops have not been fully surveyed and so they may not receive compensation for these assets, and that they should not have to pay for houses at the resettlement sites as is currently planned. The committee also stated that people wished to remain living on their customary lands which "symbolize our links to our past and future and should not be seen as purely an economic resource." They protested the total lack of a "proper consultation process" and complained that "the views and concerns raised by our people have never been seriously considered." The committee condemned the repeated claims made by the dam authorities that all opposition to Bakun is from "outside instigators," stating that such claims are "not only an insult to our intelligence but also a lame excuse to ignore our concerns and views."

- See the Bakun Campaign page for more information.

BRAZIL: On November 7th, two Xavante indigenous chiefs travelled from the Rios das Mortes, which the Brazilian government plans to alter to build the Tocantins-Araguaia Hidrovia, another in a series of plans to transform the major rivers of South America into shipping canals (see page XX for an update on the Paraguay-Paraná Hidrovia. The following excerpts a letter to the Brazilian president signed by leaders of all Xavante villages:

"We are of the Xavante nation of Mato Grosso, from the Areoes and Pimentel reserves, on the banks of the Rio das Mortes. This is where the Xavante nation has its roots, we have lived in this place for a long time. We have taken care of and controlled the Rio das Mortes for a long time and we have defended it against invaders, fishermen, gold miners, and lumber cutters. We have fed ourselves from the River and its lakes for many, many years ... If this Hidrovia is to be constructed, it will be the end of our animals, it will cause great damage to the environment, it will ruin an important part of the food of our people, fish and turtles. It will do away with the homes of many animals, dolphins, river otters, cayman, and others.

"We want all work on the Rio das Mortes to be eliminated; we don't want signs, we don't want buoys, we don't want dynamite, we don't want the river to be ruined, the lakes, the fish, the turtles, we don't want toxic substances, we don't want the hidrovia, Mr. President. We are ready to fight united as Xavantes in any way we can. We ask for help from all friends of the Xavante people to stop the Hidrovia."

- See the Hidrovia Campaign page for more information.

MINING

DOMINICA: The development of a proposed copper mine on this Caribbean island has been postponed, after a grassroots mobilization effort in Dominica's capital and Australia convinced the Dominican parliament that the project would meet widespread opposition. Dominicans found out about the proposed open-cut mine, to be developed by Australian mining giant Broken Hill Proprietary (BHP), only after mining legislation drafted by BHP sailed through Parliament in a day last May. BHP representatives hoped to seal negotiations for the Dominican mine in September 1996, but left empty-handed after a two-week protest effort involving some 21 Dominican groups forced the government to reconsider. The controversial company, Australia's largest, recently settled out of court to compensate landowners for damages from its Ok Tedi mine in Papua New Guinea, which dumps 80,000 tons of mine tailings (rock waste) into the Fly and Ok Tedi Rivers every day. *-project underground*

BOLIVIA: A mines-tailings dam ruptured in September, spilling 235,000 tons of polluted mining waste into the Yana Machi River. The Compania Minera del Sur (Comsur) mine, owned by the president of Bolivia, released arsenic and cyanide into the river. The Washington, DC group Mineral Policy Center reports that in recent years, at least 66 tailings dams around the world have failed or had serious problems.

The Yana Machi is a tributary to the Pilcomayo River, which runs to Paraguay and Argentina. More than 8,000 indigenous Mataco and Chiriguano peoples live along the Bolivian stretch of the Pilcomayo and harvest its fish. The head of the government's Natural Resources department called the effects of the spill minimal, but the Environmental Defense League, the leading Bolivian NGO, accused the government and the mining company of downplaying the incident. A government committee investigating the environmental effects of mining in western Bolivia, where at least 39 mines dump pollutants into local streams and rivers, has found whole watersheds badly contaminated in the region. -*project underground*

BIODIVERSITY

NORTH AMERICA: US nongovernmental groups have enlisted an unusual ally to protect the San Pedro River. The Southwest Center for Biological Diversity, with legal help from Earthlaw, is using the North American Free Trade Agreement (NAFTA) to obtain international protection for the river, which

flows from northern Mexico into the Gila River in Arizona. NAFTA's Secretariat of the Commission for Environmental Cooperation in January ordered the US Environmental Protection Agency to respond to the groups' petition charging that the US government has refused to enforce its own environmental laws. This is the first time the US has been ordered to respond to a NAFTA environmental charge. Five previous petitions on a range of issues failed.

The petition seeks sanctions against the US for failing to obey its own National Environmental Protection Act by allowing the expansion of the US Army's Fort Huachuca, which is sucking the San Pedro River dry. A second petition requests a study of the effects of development and water pumping on the river's ecosystems and "to recognize the River's importance to millions of migrating neotropical birds as well as many rare breeding birds."

The San Pedro River has been designated as one of America's most threatened rivers by American Rivers, one the world's Eight Last Great Places by the Nature Conservancy, one the world's Birding Hot Spots by Birding Magazine, and a Globally Important Birding Area by the American Bird Conservancy. It is Arizona's last undammed river, and supports the largest remaining riparian forest in the Southwest. Nearly 500 species of animals call the watershed forests home. Hydrologists predict it will be dry within 10 years if current level of water withdrawals continue. - *Kieran Suckling*
The text of the petitions can be found on the Earthlaw homepage: www.earthlaw.org.

AUSTRALIA: The Australian lungfish has survived as a species for over 400 million years - it has seen the dinosaurs take their last steps and humans their first. This fish, which can breath air through its one lung, is officially protected from fishing, and is in line for nomination for protection under both the Endangered Species Protection Act and the Convention on International Trade in Endangered Species (CITES). Now it is being threatened by a proposed dam on the Burnett River in Queensland.

Dr. John Wourms of Clemson University in South Carolina calls the Australian lungfish is one of "the two most important species of fish for biologists to study in terms of evolution." Conservationists say that the Walla Weir will destroy critical spawning sites and restrict migration of the rare fish. Government scientists and Queensland's Department of Natural Resources (DNR) say the weir poses no significant threat to the lungfish. The project is supported by local sugar cane farmers--a crop that uses high quantities of water.

Although a government-sponsored study revealed a large adult population reproducing effectively, the real concern, she says, is how eggs and young fish will survive in the altered habitat contends Dr. Anne Kemp at the University of Queensland in Brisbane, who has studied the fish for 20 years. Says Kemp, "lungfish require waterside vegetation both for spawning and for survival of juveniles - vegetation which cannot survive the fluctuating water levels caused by weirs." She doubts that the intended use of the weir would allow for the special management necessary to support vegetation or the lungfish. According to Pam Soper of the Wide Bay Burnett Conservation Council, the weir will minimally increase water-supply reliability for farmers. She has called on the government to help farmers convert to more efficient trickle irrigation practices, which would cut use by 30-50 percent and would "remove the need for construction of a costly weir." Work on the weir is expected to start after the wet season, in April 1997. - *Aaron Gladman*

TROUBLED WATERS

UK: An ambitious scheme to pipe water from the Severn River in Wales to London is now being considered by Britain's Environment Agency. *New Scientist* (August 3, 1996) reports that the project would pipe up to 775 million liters of water per day over 350 kilometers, possibly introducing a whole series of ecological problems for the Thames. "Studies [on the project] concluded that a major transfer of flow from the Severn to the Thames might cause algal blooms and contribute to the rapid spread of fish diseases and parasites," the magazine reports. The change in flow regimes is also expected to alter fisheries. The project has been revived in response to a series of droughts in England.

US: Secretary of the Interior Bruce Babbitt has warned Southern California water officials to curb their use of Colorado River water or face federal intervention. In a speech to the Colorado River Water Users Association in Las Vegas, Babbitt said California needs to come up with a conservation plan within a year. The state's entire 4.4 million acre-foot Colorado River entitlement goes to Southern California, where it is battled over by the region's urban and agricultural interests. This allotment supplies more than 70 percent of the area's current needs, and is one of its least expensive water sources. The other six states dependent on Colorado River water - Arizona, Nevada, Colorado, Utah, Wyoming and New Mexico - have historically not used their allocated shares, allowing California to take more. But the West's surging population has put increasing demands on the river, whose waters are already overallocated beyond its natural flow, and now they are demanding that California's excessive use be curbed.

Babbitt's announcement came after a court decision that may also strip Los Angeles of 13 percent of the water it pipes from the Owens Valley. "We hope these changes will not put undue pressure on other California water resources," said Deborah Moore of the Environmental Defense Fund. "There needs to be a comprehensive solution for Southern California's water use that is sensitive to other critical ecosystems." - *Aaron Gladman*

CHINA: More than half of China's rivers and lakes are seriously contaminated, with more than 25,000 miles of waterways too polluted for fishing, according to the *Guangming Daily*. Aquatic life has been wiped out along 1,500 miles of rivers and streams, the newspaper quoted the Water Ministry. The pollution - primarily from factories, cities and pesticides from farms - extends to groundwater as well.

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SHORTS

According to data compiled by the Deutches Windenergie Institut (DEWI) in Wilhelmshaven, Germany's total installed wind-generating capacity reached 1,546 MW at the end of 1996. Despite the "slow down" in German development in 1996, 428 MW were installed in 1996, and 500 MW in 1995. (One megawatt supplies an average of 1,000 houses in the US.) For comparison, 400 MW were installed during the peak of California wind development in 1985. Private industry analysts estimate that there are 1,497 MW of wind capacity operating in California, nearly 50 MW less than that now installed in Germany. Installed wind capacity in Germany is only 50 MWs shy of total installed capacity in the entire United States, a nation with 22 times the land area four times the population, and only one-tenth the population density. At the present growth rate, Germany will surpass the entireUnited States sometime during the first quarter of 1997. *-Paul Gipe*

In an effort to reduce carbon dioxide (CO2) emissions by 20 percent, Denmark's Environment and Energy Minister has released a national energy plan which would require state-regulated power companies to increase their level of renewables from 8 percent to 12 percent by 2005. The plan, Energy 21, also proposes that subsidies to encourage energy efficiency be put in place and the tax system be restructured to reduce transportation emissions and increase fuel efficiency. In addition, Denmark's parliament has recommended a CO2 reduction target of 50 percent (the goal is nonbinding). To achieve this reduction, renewables would make up more than a third of Denmark's energy mix by 2030. Late last year, a member of parliament released a plan to increase Denmark's "unacceptably low" wind energy capacity. Under that plan, 80 to 100 MW of new wind capacity would be installed each year through 2005.

A new training lab in renewable energy technology will greatly increase Namibia's technical capacity in solar power. The Windhoek Vocational Training Center, with a full complement of photovoltaic panels, water heating systems and a wind-powered battery charger, will be used to train local technicians as part of a government-backed electrification program. The project has backing from the US group Renewable Energy for African Development (REFAD), the US Department of Energy and USAID.

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Campaign Notebook: Burma

Although nearly all of IRN's work is focused on rivers, we also occasionally help others do work that makes a strong connection between the environment and human rights. Recently, we have worked on behalf of Nigerian activists fighting to save their forest - and watershed - from logging; helped establish the 50 Years Is Enough coalition, which is a network of groups working to reform the World Bank; and given a jump-start to Project Underground, a group that monitors extractive industries such as mining and gas. The following is a report from Pam Wellner, whose work on issues in Burma is a project of IRN.

Burma is ruled by an illegal military regime called the State Law and Order Restoration Council (SLORC). In Burma's 1990 elections, more than 82 percent of the parliament seats were voted in under the democracy party, the National League for Democracy (NLD), led by Aung San Suu Kyi. SLORC nullified the elections, refused the NLD power and placed most of its representatives - including Ms. Suu Kyi - under arrest.

Since 1988, SLORC has engaged in a steadfast practice of human rights violations such as arbitrary executions, forced labor, torture, rape, forced relocation and suppression of freedom of speech against its own citizens. It has been universally condemned by the US State Department and Congress, the European Parliament, UN Human Rights Commission, the International Labor Organization, Amnesty International and Human Rights Watch.

SLORC maintains its power by selling off the country's resources at a furious rate. Oil reserves provide large sums of hard currency, which is used to buy armaments to suppress the democracy movement and ethnic nationalities, not foreign enemies. Burma, the world's largest supplier of heroin, has increased production under SLORC's control. Sixty percent of the illicit heroin in the US comes from Burma.

The "Free Burma - No Petro-dollars for SLORC" campaign was spearheaded by a call for help from ethnic nationalities living in the Tenasserim division of Burma where foreign oil companies are developing gas pipeline projects. The Karen, Mon and Tavoy Peoples are the victims of human rights abuses such as forced relocation, forced labor, pillaging, rape and torture by SLORC troops securing the pipeline area.

The campaign primarily focuses on two different gas pipeline projects, one operated by Total (France)

and Unocal (USA), and the other by Texaco (USA), Nippon Oil (Japan), Premier Oil (UK) in the southern Burma Tenasserim watershed. The pipeline area will pass through some of mainland Southeast Asia's last intact rainforests. This important watershed, which is drained by the Tenasserim River, is also the habitat for large rare animals such as rhinoceros, tiger, elephants and many endemic plant and animal species.

The campaign's objective is to escalate public attention and pressure on these oil companies so that they withdraw their operations and investments from Burma until a genuine democratic government is in place. The campaign is part of the Free Burma Coalition, which pulls together the largest single student movement today with environmental, human rights, religious and labor groups. The Free Burma Coalition has been successful in pressuring companies such Eddie Bauer, Columbia Sportswear, Apple Computer, Motorola and Heineken to withdraw their businesses from Burma. In January, after an extensive grassroots effort, Pepsi announced its complete disinvestment from Burma.

Aung San Suu Kyi, a 1992 Nobel Peace Prize Laureate, now free from house arrest, has asked that economic sanctions be implemented against the SLORC regime. In support of Burma's democracy movement and ethnic nationalities, the No Petro-dollars for SLORC campaign urges US companies to disinvest from Burma until a genuine democratic government is in place.

- Visit the Free Burma! web site for more information.

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Making Waves

A new South African group, Save the Vaal Environment (SAVE), is trying to stop a proposed strip mine along the banks of the Vaal River, an important water supply for the semiarid country. The mine would destroy the 1,800 hectare Rietspruit wetland -- a proclaimed nature reserve that supports some 240 species of birds and 15 mammals.

SAVE reports that the mine's developer, SASOL - a large South African petrochemical and synfuels company - would redirect the Rietspruit (a tributary of the Vaal), which would cut off the flow into the wetlands, and build 30m high berms along both sides of the creek and along the river banks. Mining activities would "alter the subsurface rock and its attendant water regimes permanently," SAVE says. Like all wetlands, this one serves as a natural filter for runoff that ends up in the river as well as an important part of the natural flood-control system. Although the Vaal itself suffers from pollution problems already, the Rietspruit is one of its few unpolluted tributaries and each year contributes an estimated two million cubic meters of clean water into the river system.
The large number of birds that nest in the wetlands will leave as blasting in the mine progresses, the fish will desert the polluted waters and the area will become sterile and stagnant." The company plans to "rehabilitate and revegetate" the area once mining is done in 20 years, but no company has ever recreated a successful wetland over a former strip mine.

The 800-hectare mine would in places be just 350 meters from the Vaal River. The 65 m deep mine would create an enormous amount of coal dust pollution hazards. The mine will produce up to four million tons of coal per year by the third year of operation.

SAVE is working through legal channels to prevent the mine from moving forward. "A permit for river diversion is required from Water Affairs for the proposed diversion of the Rietspruit, and Minister Asmal has warned Sasol that he will not allow the quality of Vaal water to be adversely impacted," the group notes. In addition, the area is zoned as a nature area in the 1982 Guide Plan for the Vaal River Complex. SAVE and other groups are taking action to have the Rietspruit wetlands declared a Protected Natural Environment.

"This will be of benefit to all as there are many people who will be affected by this mine who are dependent on the river for their livelihood, well-being and recreation, not to mention the needs of the future generations," said Kathy Hennessey of SAVE. "The ambiance and quality of the river will be lost

forever if the mine is allowed to desecrate the very banks of the Vaal."

For more information: SAVE, P O Box 14629, ZUURFONTEIN 1912 South Africa; email: save@save.org.za or visit their Web site: http://www.save.org.za.

- See also the Southern Africa Campaigns Page for more information.

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Guatemala Dam Massacre Acknowledged by Bank

by Juliette Majot

The World Bank did not know that the residents of the resettlement community of Rio Negro in Guatemala had been massacred prior to approval of a second loan for the Chixoy Dam, according to a recent Bank memo. The memo was written by a special investigative team sent by Bank president James Wolfensohn at the urging of the groups Witness for Peace and International Rivers Network. (See *WRR,* June 1996.)

"In 1983, a supervision mission went to the filled reservoir and visited the resettled communities. During the trip it noticed that the temporary accommodations at Rio Negro (in which the residents of Rio Negro had been temporarily resettled) had been burned. The mission was told that the people from Rio Negro had fled into the hills and were afraid to settle in Pacux. However, the mission was not told that what happened was related to any opposition to resettlement. The mission understood that this violence was the result of the general insurgency-counterinsurgency struggle that was occurring at the time," the Bank memo says. The memo does not address the quesion of why the Bank continued lending to a government it knew was carrying out a "scorched earth" policy.

According to research by Witness for Peace, nearly 400 Guatemalan Indians, most of them women and children, were murdered in the area of the Chixoy Dam in a series of massacres in 1980 and 1982. A forty-page report published by Witness for Peace in early 1996 investigated the connection between the dam project and the massacres of residents in Rio Negro who opposed the resettlement necessary to make way for the dam.

The Bank report does not deny that opposition to the dam could have been a contributing factor in the massacres of which it later learned, nor does the Bank's president. "What happened is not questioned," says James Wolfensohn in a letter to Witness for Peace and IRN. "In 1982, women and children from Rio Negro were brutally murdered by civil patrols from a neighboring village. Why they were murdered is less certain. Some people attributed the deaths to counterinsurgency efforts, others to the fact that the people of Rio Negro were politically organized, and some to the fact they were opposed to resettlement. Others saw a confluence between these forces."

"The Bank's ignorance of the massacres, if genuine, is simply inexcusable," says Steven Bennett,

executive director of Witness for Peace. While praising the Bank for launching the 1996 investigation and for urging the Guatemalan government to make good on promises related to outstanding resettlement conditions, Bennett criticized the Bank for failing to investigate the massacres and pending resettlement issues as soon as the Bank staff heard of the problems in 1983.

Wolfensohn writes that many commitments made to the relocated people of the Chixoy Reservoir area have yet to be met. "Although resettled families have received houses and houselots, and schools and health services are in place, titles have not yet been transferred and in some cases agricultural land has not been received. Those worst off are in Pacux, where the people displaced from Rio Negro settled, although some problems also remain unresolved in other communities resettled under the Project." According to Wolfensohn, the Bank has discussed the outstanding issues with the government of Guatemala, which has "confirmed a willingness to take the necessary action, and we will assist his process."

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