

WORLD RIVERS REVIEW

Published by International Rivers Vol. 26 / No. 2 June 2011

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The Long Road to River Recovery

By Elizabeth Brink

The most iconic dam-removal campaigns in the United States are advancing, slowly but surely. The lesson from these efforts is clear – the road to restoration is a long one. Still, many believe it's worth the wait, as the benefits are so great. In nearly all cases where dams have been removed, recovery of ecosystems and fisheries has been remarkably rapid.

There are 75,000 large dams blocking US rivers (and many thousands more small dams), and 85% of them are past their 50-year life expectancy. While between 50 and 100 small dams are being removed from US rivers every year, larger projects are rare, and the lead-up to removal can take decades. In the process, the science of dam removal is advancing leaps and bounds.

Here is an update on some of the key big-dam decommissioning efforts now underway.

The Big One

The Elwha River, which runs through Washington's Olympic National Park, once supported legendary runs of at least six species of Pacific salmon and steelhead. Dismantling the Elwha and Glines Canyon dams, which will start in a few months, will allow the river to flow freely for the first time in 100 years, and restore more than 70 miles of protected habitat in the river basin. The 64-meter-



Yurok elder Jimmy Jones was born after the Klamath Dams changed his tribe's way of life. His grandchildren will hopefully see the removal of the dams and the restoration of salmon. Photo: Bob Dawson © 2007

tall (210 feet) Glines Canyon Dam will be the biggest dam ever removed in the US.

In addition to their impact on fisheries and tribal rights, the dams do not generate enough power to justify their costs. What power they do generate can be replaced by alternative energy sources that are relatively inexpensive to dam owner Crown Zellerbach Corporation, and considerably less expensive for the Lower Elwha Klallam tribe, who have

involuntarily subsidized Crown by bearing the environmental costs of its dams for too long.

The decision to take out the two dams, both of which are in Olympic National Park, was taken 25 years ago. And that was after 25 more years of campaigning in earnest by the Lower Elwha Klallam Nation and conservation organizations. The tribe wanted the dams taken out since they were built nearly a century ago.

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World Rivers Review

Volume 26, Number 2
ISSN Number 0890 6211

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Commentary

WATCHING THE RIVER FLOW

Rivers are often called the planet's circulatory system. Like our body's circulation system, the planetary one doesn't work very well when it's clogged up.

Dams hold back not just water but silts and nutrients that replenish farmlands and build protective wetlands. They change the timing of floods, impacting species that have evolved in synch with natural flood cycles. Dams change the very riveriness of our waterways, in ways we can't always see but that the earth can certainly feel.

This issue of *World Rivers Review* focuses on how to maintain healthy flows in our rivers, for their health and our own. "A river's flow is its heartbeat," say the authors of a new report on how to maintain "environmental flows" (excerpted in this issue). And nothing messes with that heartbeat as quickly or dramatically as a big plug of concrete across a river's mainstream.

Our species is the heart disease of the world's rivers. We've clogged most of our major rivers with dams, bled them dry with water diversions, and given up all too many once-great rivers for dead once we've used them up. Healthy rivers are on the verge of being an endangered species. It's not too late to do something about it. The articles in this issue look at three ways to solve the problem of maintaining healthy river flows.

First, we need to protect remaining free-flowing rivers while we still have some to protect. On page 8, an Indian writer (and river activist) summarizes policy tools that have been successful in protecting free-flowing rivers around the globe.

Second, we must insist on minimum flows to support the basic ecosystem functions of dammed rivers. The authors of a new report on the topic share their recommendations on how to ensure environmental flow policies are actually implemented (page 6).

And finally, we must remove the worst dams to restore flows that support habitats, fisheries and other natural services lost to poorly planned dams. Our cover story reviews the latest highlights from the growing movement to remove dams and restore rivers in the United States.

If you need a graphic jolt to remind you of why we need a concerted effort to protect and restore river flows, turn to page 10. Here you'll find the photos of Radek Skrivaneck, who has documented the sad story of the Aral Sea in the former Soviet Union – perhaps the most iconic example of how a river's death affects human health and well being. Radek's haunting black and white photos show a dried-up community living in a dystopian land: their fish dead, their boats beached, their lives as dry as the toxic, dessicated lakebed they still call home. This is not a landscape that can be revived.

Protecting our rivers now is the health insurance policy we all need for a climate-challenged future. That's what the activists in Patagonia understand, as they protest a plan to dam their rivers and ship the hydropower across the country to Santiago. The recent decision to build five dams in Patagonia's mountain paradise brought out thousands over many days of protest, in a national effort to protect the region's free-flowing rivers (page 3). Similarly, the people in China's Nu River basin don't need convincing that a string of 13 dams will bring bad luck to their region (page 4). While Chinese citizens aren't as free to protest as Chileans, local activists and Nu River residents have managed to fend off damming in this biodiversity hotspot for years. Their latest challenge is a new plan for massive damming recently unleashed by China's energy planners.

We can take small comfort that rivers have a natural ability to self-heal. Over time, all of the efforts to engineer dynamic, powerful and unpredictable rivers will, inevitably, fail, and the river will have a chance to restore itself. As Richard Bangs, a former board member of International Rivers, wrote in his book *River Gods*, "Wild rivers are earth's renegades, defying gravity, dancing to their own tunes, resisting the authority of humans, always chipping away, and eventually always winning." We all win when rivers are allowed to flow free.

Lori Pottinger



Printed on 55% recycled, 30% post-consumer recycled waste paper with vegetable-based inks

MAKING WAVES

In the News

“The Mekong River has gotten a much-needed but temporary reprieve,” said Ame Trandem, Mekong campaigner for the International Rivers NGO. “A healthy Mekong River is central to sustainable development in the region, and simply too precious a resource to squander.”

“A River’s Fate: Battles Loom over the Mekong,” *Time Magazine* blog, 4/20/2011

“By highlighting the unresolved problems of the Three Gorges dam now, Premier Wen Jiabao, who has stopped destructive projects in the past, may be sending a shot across the bow of a zealous hydropower lobby which would be only too happy to forget about the lessons of the past,” said Peter Bosshard of International Rivers.”

“China warns of ‘urgent problems’ facing Three Gorges dam,”
UK *Guardian*, 5/20/2011

Dam Turbines: Return to Sender



Activists turn back turbines for Lower Subansiri Dam. Photo: UB Photos.

The Krishnak Mukti Sangram Samiti (KMSS), a farmers’ rights movement in India’s Assam State, and the All Assam Students Union have fought the Lower Subansiri Dam for many years. Since August 2010, they have prevented the project’s turbines from being delivered to the construction site. In early May, India’s state-owned dam builder, NHPC, tried to move the turbines to the construction site on three barges. Activists of the KMSS were on the alert and prevented the cargo from being unloaded in Sonitpur. On May 6, the transport company gave in and

Chile has seen days of protests over the approval of the Patagonia dams. Photo: Erwin Horment

Mass Protests Over Patagonia Dams

When the Environmental Impact Assessment for the HidroAysén project in Chile’s Patagonia region was approved on May 9, thousands of Chileans took to the streets immediately; they have been protesting every day since. Public opposition to the project in Chile is running at 60-70%, polls show. President Piñera’s State of the Union Speech was preceded by dam protests in 39 cities in Chile and 50 cities around the world. An estimated 50,000 people protested in Santiago on May 20, and 35,000 in Valparaíso, where the President gave his speech. Protests were also held in London, Berlin, Paris, Barcelona, Montreal, San Francisco, New York, Melbourne and Rome.

Even if the HidroAysén dams are not canceled, the project cannot move forward until the 2,300-km-long transmission line is approved, which will require the world’s longest clear-cut, affect thousands of people, and traverse geologically risky areas strewn with volcanoes and faults.

announced it would give up trying to get them to the dam site for now, and instead take them through Bangladesh to Calcutta for storage.

The 2000 MW Lower Subansiri Dam in northeast India will submerge a 47-kilometer stretch of the Subansiri River, a tributary of the Brahmaputra. The dams’ highly variable flows will have serious impacts on the livelihoods of downstream communities and the ecosystems, including the Kaziranga National Park, a UNESCO World Heritage site.

Double Threat on the Nu River

China Plans Dam Cascade in Earthquake Hotspot

By Katy Yan

"Tectonic movement in [China's] Three Parallel Rivers area is stronger than anywhere else in the world – how can they build a cascade of dams here?" – Sun Wenpeng, Beijing Research Institute of Uranium Geology

Two of China's senior geologists are raising serious concerns about the wisdom of a proposed dam cascade in the seismically active Nu River valley in Yunnan Province. The Nu River, one of three rivers that form the famed Three Parallel Rivers World Heritage Site, not only sits at the epicenter of China's seismic zone but is also the heart of China's cultural and biological diversity.

Known as China's Grand Canyon, the Nu River valley is also wracked by torrential storms that kill dozens of people each year. Despite the constant threat of landslides, life thrives in the valley. The Nu valley is dotted by hundreds of towns and villages, many of which are perched precariously on the mountainside.

However, the recently revived proposal for a 13-dam cascade on the Nu's mainstream threatens to tip the scales for this resilient valley. The cascade would displace 50,000 people and ruin one of China's most important biodiversity hotspots. In April, as I traveled in the footsteps of the two geologists, Sun Wenpeng and Xu Daoyi, passing countless landslides along the way, I realized just how dangerous and irrational building this cascade on the Nu mainstream would be.

Beijing's mixed signals

In a letter to China's premier, Wen Jiabao, earlier this year, geologists Sun and Xu said, "No fixed steel and concrete dam can withstand the shearing movement of the Nu River fault, nor can anyone prevent the huge mountainside collapses, landslides and mudslides that still happen on the banks of the river." According to Sun, dangerous slides are also increasing as a result of increased climate extremes, tectonic and seismic activity.

Debate over dams on the Nu River has been a focus of intense domestic and international debate ever since the dam cascade was first proposed in 2004. The dam plan spurred the Chinese environmental NGO movement, spawned unprecedented cooperation with international and neighboring groups in Burma and Thailand (the Nu is called the Salween in Burma), and became one of the nation's biggest river success stories when Premier Wen Jiabao announced *twice* that the project would be suspended.

Recently, however, the threat has reemerged in the form of China's new Five Year Plan, which pledges to increase hydropower capacity by 140 GW in the next five years – more hydropower than any one country currently has ever built – by damming the Nu, Jinsha and Upper Yangtze rivers. The huge hydro-boom is to supposedly help China meet its climate change targets, though there has been little discussion on how these dams might fuel further industrial production and pollution.

Since the geologists' letter, signals from Beijing have been mixed. In March, the Chinese government expressed concern about the dam projects: "We have to conduct thorough [research] on ecological and environmental factors, as well as on impacts on countries in the lower reaches of the river," said Bai Enpei, secretary of the Yunnan provincial committee of China's Communist Party. "Only after we fully consider all these factors, and are sure they can be properly dealt with, can we decide if we should start the project," he said.



A Mumian tree in a Nu River village. The Nu basin is China's most important biodiversity hotspot. Photo: Shen Xiaohui

However, the same media source that reported this, Xinhua News Agency, announced in May that Huadian Corporation, a state-owned entity, will move forward with plans to build the Nu River dams. At least two other dams on the upper Nu River in Tibet are in the pre-feasibility stage.

Voices from the ground

During my recent trip, I spoke with a number of local people who showed incredible courage in openly expressing their views on the project, which often run counter to the government's. I met a young man whose village would be submerged by one of the dams in the cascade. When I asked what he thought of the dams, he said without hesitation, "We don't support the dam. The village doesn't support it either ... We will not move."

On my last day in the Nu valley, I stopped at the controversial resettlement village of New Xiaoshaba near the Liuku Dam site, which has yet to be approved or built. I met with two residents of Old Xiaoshaba village who had refused to leave their land. Because of Liuku Dam, their entire village has been involuntarily resettled

Continued on page 11

Taking Action in India on Downstream Impacts of Dams

By Parineeta Dandekar and Samir Mehta

India is on a large-dam building spree, with more than 5,100 large dams already blocking almost all of its important rivers, and more to come. These dams have had a profound negative impact on communities and ecology upstream and downstream. While promised benefits of these dams (irrigation, hydropower or flood control) have been overstated, numerous interrelated and complex negative impacts have simply not been studied or documented. Nonetheless, communities and ecosystems continue paying huge prices of these impacts.

One such neglected aspect of India's dam spree is the downstream impact of dams. Dams completely change the nature of the river downstream, severely affecting communities dependent on the river for drinking, irrigation, fishing, transport and ecosystem services. In Northeast India, where an army of large hydropower dams is planned, in certain rivers daily water level fluctuation downstream of some dams is estimated to be over 13 feet. Communities are being warned to keep off their rivers! The need for strong advocacy to stall and mitigate these disastrous impacts cannot be more urgent.

In this context, International Rivers and Save Western Ghats Movement jointly organized a three-day meeting on downstream impacts of dams, held in the Western Ghats, India, a global biodiversity hotspot. It was a first meeting of its kind in the country where the extensive downstream impacts of dams were discussed in detail by a range of stakeholders. There could not have been a better venue for such a workshop than the banks of Jog Falls on the River Sharavati. Jog is the highest untiered waterfall in India, six kilometres downstream of the Linganmakki Dam. The falls and river have been reduced to a trickle of their former self, with huge negative impacts on the unique ecology and sociology of the downstream region.

The 30 participants, representing 16 organizations, came from diverse streams, like ecology, sociology, hydrology, activism, aca-

demia and law. Participants shared their studies and experiences on dam safety, environmental flows, species loss due to upstream dams, and other relevant topics. One young, anguished ecologist said, "My studies tell me that we have lost several species even before we could record them."

The most touching speakers were the fishermen and farmers who shared their difficult stories of lives torn apart by dams. Rajesh, a traditional fisherman from the dammed Neyyar River in Kerala, lamented that his son cannot be a fisherman, because since the dam there have been no fish to catch.

Ritwick Dutta, an eminent environmental lawyer, deplored the lack of information shared with civil society. He stressed the importance of building evidence and presenting the right ecological information as an effective tool in the fight against unsustainable dams. Some destructive dams, he said, could have been halted if crucial information about their impacts on certain endangered and threatened species had been collated and presented in Court. This was an important lesson for all.

Participants also wrestled with the definition and scope of "downstream." It was accepted that downstream impacts do not stop at a certain pre-defined distance, but depend on various factors like the geomorphology and sediment load of the river, and patterns of settlement and the size of the river-dependant population. In view of failed institutions and shoddy environmental governance, a central role for communities and NGOs was recommended. It was unanimously decided that the group will advocate with the Ministry of Environment and Forests for inclusion of the study of downstream impacts in Environment Impact Assessment reports of proposed dams. Strong advocacy becomes all the more urgent in the face of numerous dams coming up in the country's northeast.

The way forward looks hard but clear. Many organisations have

enthusiastically come forward to take on crucial tasks – for example, doing a pilot study of specific river basins in Western Ghats to study the downstream impacts of dams, mapping the ecological status of river basins in the region, and working on a status report on the downstream impacts of dams in the Western Ghats.

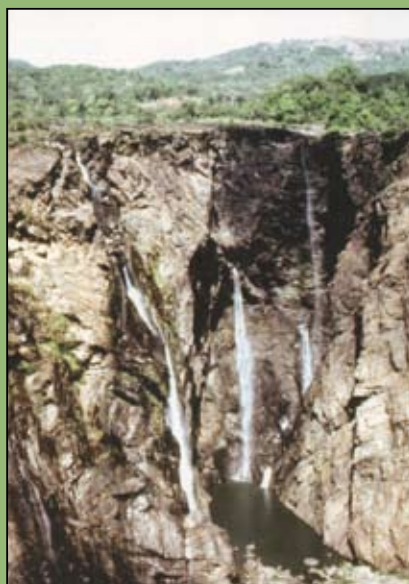
The workshop has been a great start in initiating new discussions and bringing diverse stakeholders together. In the end everyone asserted the need to highlight downstream impacts of dams in basin-level planning, and in their individual work. They underlined the need for creating teams of experts and community representatives for assessing and mitigating downstream impacts of dams in this global biodiversity hotspot. Representatives from northeast India stated they would hold a similar workshop in their region later this year. ●

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Jog Falls in Western Ghats, India: Dammed



1955, before the dam



2006, after Linganmakki Dam was built

Environmental Flow Policies: Moving Beyond Good Intentions

by Eloise Kendy and Tom Le Quesne

A river's flow is its heartbeat. Few human influences are more deadly to freshwater ecosystems than alteration of natural hydrological rhythms. Poorly planned dams and unbalanced and unsustainable water use have brought too many of our river systems to a tipping point.

Because we have interfered with the heartbeat of so many rivers and lakes, our freshwater ecosystems are losing species and habitats faster than any other type of ecosystem. Freshwater plants and animals have evolved with, and intimately depend upon, natural patterns of hydrologic variability. Naturally high and low water levels create habitat conditions essential to reproduction and growth, and drive ecological processes required for ecosystem health. The natural rise of a river following a rainstorm may cue fish to move to spawning grounds, or enable them to move up- or downstream to access food, or freshen the water quality so it is more conducive to growth. Similarly, many wetland and floodplain plants reproduce only under certain flow conditions, such as prolonged flood recession.

Patterns of freshwater flows are crucial for a range of other services provided by river systems. For example, flood pulses move sediment that maintains the form and function of rivers. In sediment-rich rivers, such as the Yellow River in China, this movement of sediment is vital in the ongoing management of flood risk. Seasonal inundation of floodplains and wetlands supports groundwater recharge on which water supplies depend. And, the flow of freshwater to estuaries prevents saline intrusion into coastal aquifers and drinking water supplies. The patterns of river flows are therefore integral to water systems on which people depend.

Environmental flows are the seasonally and annually varying water flows and levels that support ecosystems and human livelihoods while providing for other uses such as hydropower, irrigation, and water supply. Many governments and river-management agencies around the world have developed policies to protect environmental flows, and more are doing so all the time. Yet implementation of these policies remains weak.

Obstacles to implementation

A recent report by WWF and The Nature Conservancy reveals some of the main obstacles to the implementation of environmental flow policies across the world. Policy change alone does not result in implementation. At the highest level, political support for environmental flow policy is essential

for setting strategic direction, securing resources, working with stakeholders and enforcing the policy.

Having sufficient capacity is equally key to success. Conducting a thorough assessment and developing operational rules for environmental flows at even a single dam requires significant technical and institutional capacity. A comprehensive framework for implementation requires that relevant laws, policies, regulations and institutions be in place across a wide range of water resource management functions.

Conflicts of interest can waylay the best plans. Environmental flows are inherently interdisciplinary, and may involve agencies that plan and manage hydropower, agriculture, land use, industrial development and natural resources. The conflicts of interest only intensify on transboundary rivers.

Recommendations

While there is no single correct approach to environmental flow policy implementation, lessons are beginning to emerge from the growing body of international experience. We propose the following guidelines:

■ *Undertake a phased approach to implementation.* In many of the world's environmental flow success stories, implementation started with simple approaches in select locations, and evolved to encompass more comprehensive and sophisticated approaches nationwide. South Africa's landmark 1998 water law, which prioritized environmental flows over economic water uses, was initially stymied by an inability to quantify, allocate, and enforce those flows



California's dammed Trinity River is flowing more naturally this year, thanks to an agreement to restore environmental flows. Photo: Conservation Lands Foundation

throughout its large and diverse territory. Eventually, by phasing implementation geographically and by adopting an assessment hierarchy which prioritized the most important rivers, South Africa is now making strides toward implementing its inspirational policy.

■ *Be opportunistic.* Institutional barriers can often be overcome by introducing and implementing environmental flow policies opportunistically. Opportunities may take the form of water resource planning, creative interpretations of existing policy, legal challenges or other crises such as social reform, or climate change. Being opportunistic may simply mean finding the right legal instrument. Mexico's lack of a clear policy regarding water re-allocation to the environment did not deter river advocates in the Colorado River delta, who saw an opportunity in the existing legal framework. Although no precedent exists for stopping irrigation to improve stream flows, moving water rights from one irrigated parcel to another is a well-established practice in Mexico. By changing the locations of irrigation rights from cropland to natural floodplain wetlands, they successfully re-allocated ecological flows to the delta without officially changing the uses associated with their water rights.

■ *Don't exceed available capacity; build capacity into the process.* A common temptation is to adopt approaches that are too sophisticated for the available local capacity. It is important that at any given time the policy, methods, and approaches are within the ability of the existing institutions to actually implement them. When Florida's (US) water policy was reformed in 1972, it was considered visionary and potentially unachievable. However, progressive implementation of the policy in sync with capacity building has enabled methodology improvement, extensive data collection, and increasingly sophisticated environmental flow provisions over time. Nearly 40 years later, the reform survives and has established Florida's leadership in comprehensive, science-based environmental water management.

■ *Limit water abstraction and flow alteration as soon as possible.* It is much easier to impose requirements on new users than to enact changes to existing use. It is better to introduce a cap now that can be relaxed later if warranted than to allow water use to impair ecosystems, resulting in the need for difficult future re-allocation processes. Even in basins that are truly over-allocated, however, a cap should not prohibit new water uses. Instead, it is the cap on new withdrawals that incentivizes legal, financial, and technical innovations for managing limited resources efficiently. These include water transactions, as in Australia and the western USA, as well as engineering solutions involving dam re-operations, for example. Many measures that drive efficient water use – water transactions, conservation, re-engineering, and other innovations – simply will not occur in the absence of an effective cap on new withdrawals.

■ *Develop a clear statement of objectives based on an inclusive, transparent and well-communicated process.* Support for environmental flows is bolstered where a clear, high-level statement of objectives is achieved at the national policy and river basin level, involving as broad a range of groups, interests, and stakeholders as practical. This can secure the political commitment required to ensure that implementation occurs. The shared vision need not call for a uniform level of protection for all water bodies across a jurisdiction. For example, highly biodiverse areas may receive greater levels of protection than highly utilized areas in economically important regions.

Many governments, including South Africa, Maine, and Connecticut, have established stakeholder processes for classifying water bodies according to river condition goals that correspond to different degrees of allowable flow alteration. Interstate agreements pose special challenges, since each state is a stakeholder representing multiple stakeholders within it. The Mekong River process stalled in the absence of a shared vision among states. In contrast, the Great Lakes Compact directly addresses the common goal of protecting water resources within a shared basin in the US, and implementation is progressing on schedule.

■ *Develop a clear institutional framework, with independent oversight.* Transparent, effective institutions and rules for water allocation and management are critical precursors to effective environmental flow policy; if they are lacking, then comprehensive water policy reform may be essential. Independent oversight is an important element of an effective institutional framework. Institution building can be a long and complex process. Nearly a decade after passing its first national Water Act, the government of Kenya has only recently established an independent national Water Resources Management Authority and six regional Catchment Area Advisory Committees to carry it out. Likewise, Australia has been comprehensively reforming its water sector for more than 15 years to address growing concerns over the deteriorating state of the country's rivers.

■ *Create sustainable financing mechanisms.* Environmental flow programs, like any other government program, require sustainable funding. Revenue sources may range from general taxes to fishing license fees to hydropower compensation funds and water markets. Conflicts of interest may arise if ongoing institutional functions are funded by the regulated community through water use fees, as this incentivizes financially strapped agencies to issue excessive water use permits.

■ *Conduct proof-of-concept pilot projects.* Successful local pilot projects build technical capacity and political support, and show that implementation is possible at much larger scales. The engagement of stakeholders in pilot projects ensures buy-in and builds trust that catalyses broader policy reform. National environmental flow programs from Costa Rica to Lesotho were inspired and informed by successful local pilot projects.

■ *Allow flexibility for implementation methods, while setting a clear deadline and goals for implementation.* Programmatic flexibility is important for adapting approaches according to learning and local circumstances. Some flexibility allows for pragmatism; too much, however, can prevent administrations from being held accountable. Deadlines for implementation counterbalance flexibility and ensure progress.

As reform efforts from every continent demonstrate, it is one thing to pass ambitious, high-level laws and policies, and quite another to implement the on-the-ground actions that protect and restore environmental flows. It is at the implementation stage that policy reforms come face to face with challenging realities, from political opposition to capacity constraints to institutional barriers. Yet case after case from around the world show that by undertaking a deliberate, incremental process over time, meaningful outcomes can be – and are being – achieved. ●

Dr. Kendy (The Nature Conservancy), and Dr. Le Quesne (WWF) are co-authors of the report. Read the full report: <http://tinyurl.com/63u8ua3>

Where Rivers Run Free

Policy Tools to Protect Free-Flowing Rivers

By Parineeta Dandekar

Free-flowing rivers have become so rare that they would be classified as an endangered species if they were considered living things rather than merely support systems for all living things. In the past half-century or more, the world has seen the number of undammed rivers shrink dramatically. In ecological and cultural terms, the value of these free-flowing rivers is immense and growing, as more and more rivers are being dammed the world over.

What have we lost in the rush to dam our rivers? Of the world's 177 largest rivers, only one-third are free flowing, and just 21 rivers longer than 1,000 km retain a direct connection to the sea. Damming has led to species extinctions, loss of prime farmland and forests, social upheaval, loss of clean water supplies, dessicated wetlands, destroyed fisheries and more.

Ecologically, free flowing rivers have huge significance. Natural flow levels support specific ecological functions, including groundwater recharge, nutrient balancing in soils, fish spawning, the movement of sediments, and more. For example, India's few remaining free-flowing and minimally modified rivers are the last refuges of culturally important and endangered species like Mahseer (Tor Species), Giant Catfish, Ganges River Dolphin, Snow Trout, and others. The Aghanashini River, free-flowing for its entire 121 km length, flows through the biodiversity hotspot of Western Ghats, and supports over 50 fish species, most of which are endemic.

At the same time, free-flowing rivers also provide innumerable community services like fisheries, land-replenishing silts, tourism and water supply, to name a few. The value of these ecological goods and services remain unaccounted for in many parts of the world.

Unfortunately, the nations building the most dams – India, China and Brazil – do not have legislation to protect the free flowing status of their rivers, and are not using the laws they do have to protect important rivers.

A growing movement is working to protect these last lifelines from the onslaught of dams by working to pass laws that would protect free-flowing rivers. A number of countries have devised ingenious legislative tools that are useful models for such efforts. One caveat: it is a major undertaking to get such policies and laws passed. In nearly all cases, many individuals and civil society organisations lobbied for them hard and long.



Patagonia's free-flowing Baker River is under threat by dams.
Photo: Jorge Uzon

Most of the countries that have set criteria for protecting free-flowing rivers have meticulously classified activities that can take place in various stretches of these rivers. Community participation and special attention to indigenous communities and traditional water rights are also highlights of these cases. Here is a brief look at some of the best examples.

Wild and Scenic Rivers Act, United States

"It is hereby declared to be the policy of the United States that certain selected rivers of

the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations."

This Act specifically "[d]eclares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes."

The essence of this Act, adopted in 1968, is protection of the free-flowing character of the river. Free-flowing is defined as "existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway."

Each river is administered by either a federal or state agency, such as the Bureau of Land Management, US Fish and Wildlife Service, US Forest Service or National Park Service. A Wild and Scenic Rivers Council helps coordinate agencies that have interests in protecting or managing these rivers.

Jurisdiction of the states over their waters remains unaffected, so long as it does not interfere with the functioning of this law. Water rights of affected individuals are compensated.

The Act prohibits federal support for actions such as the construction of dams or other in-stream activities that would harm the river's free-flowing condition, water quality, or outstanding resource values.

As of 2009, the Act has protected more than 12,000 miles of 252 rivers across the nation. By comparison, more than 75,000 large dams across the country have modified at least 600,000 miles of American rivers.



The Taku River (Alaska and Canada) is being considered for protection under US and Canadian law.

The US also has an extensive dam-decommissioning movement, which has helped restore many miles of rivers to their free-flowing state (see page 1 for latest updates).

Canadian Heritage Rivers System

“Canada’s outstanding rivers will be nationally recognized and managed through the support and stewardship of local people and provincial, territorial and federal governments to ensure the long-term conservation of the rivers’ natural, cultural and recreational values and integrity.”

The Canadian Heritage Rivers System (CHRS) was established in 1984 to conserve and protect the best examples of Canada’s river heritage, to give them national recognition, and to encourage the public to enjoy and appreciate them. It is a cooperative program of the governments of Canada, all 10 provinces, and the three territories. Participation is voluntary.

The system is governed by a Heritage Rivers Board which has members from the government as well as citizens. To be considered for inclusion in the system, a river must have outstanding natural, cultural and/or recreational values, a high level of public support, and a plan to ensure that those values will be maintained. One of the important (though not deciding) criteria is the “absence of human-made impoundments in the river course.”

The river is designated a Heritage River when a management plan, or heritage strategy, to ensure its outstanding natural, cultural and/or recreational values are protected, is lodged with the Board by the nominating government(s). This plan charts out important activities to be undertaken to protect the river, such as restoration, environmental education, pollution treatment, etc. Production of a management plan or heritage strategy is based on public consultation and consensus.

Recently, a parliamentarian from North Alberta voiced strong opposition to an oil-sands project, which would draw water from the untouched Clearwater River. He was backed by strong support from his constituents and the Clearwater’s CHRS status.

The CHRS not only works with free-flowing rivers, but also on highly developed rivers, to conserve their heritage. Currently, 38 rivers are designated as Heritage Rivers, while six more have been nominated.

Wild Rivers Act, Australia

This Act defines a Wild River as one whose “biological, hydrological and geomorphological processes have not been significantly altered since European settlement.”

Many of Australia’s river systems were ravaged during the process of colonization and the development of modern Australia. Most of its river systems today are severely degraded due to over-extraction, pollution, catchment modification and river regulation.

The seeds of the Wild Rivers Campaign and the subse-

quent Act were sown during the Franklin River campaign, led by the Tasmanian Wilderness Society in the 1970s. Thanks to their tireless efforts, a huge hydropower dam on the Franklin River in Tasmania was stopped. After the campaign was over, the Wilderness Society’s efforts to protect the nation’s remaining untouched rivers continued.

The Wild Rivers Act was passed in 1992. The main responsibility of managing Wild Rivers is with the Australian Heritage Commission.

Overseeing the project is the Wild Rivers Committee, which includes representatives from the Commonwealth, State and Territory governments, local government, landowners (including the National Farmers Federation), conservation groups, Indigenous people and the scientific community.

Wild Rivers must have all, or almost all, of their natural values intact. This does not necessarily mean that a river must be in pristine condition. The following elements are necessary to constitute a wild river:

- **Hydrology:** The rivers are free-flowing and well connected to their floodplains and shallow aquifers.
- **Geomorphology:** The bed and bank are stable with a natural movement of sediment along the river to estuaries and floodplains.
- **Water quality:** Sufficient to meet human and ecological needs.
- **Riparian vegetation:** Sufficient trees, shrubs and sedges to protect banks and provide food for fauna.

Wildlife corridors: Natural habitat along rivers to allow native animals to migrate within their natural ranges.

Water is a state subject in Australia, and each state has the right to manage its Wild Rivers however it deems fit.

How the Legislation works

A Wild River Area is mapped into different management areas, which have varying rules to guide development activities in the Wild Rivers Code. Management areas include:

Continued on page 15



Lost species of the Aral Sea.

The Dying Sea

Photos and Text by Radek Skrivanek

The images in this narrative describe the aftermath of one of the largest environmental disasters man has perpetrated – the death of the Aral Sea, once the planet's fourth largest lake.

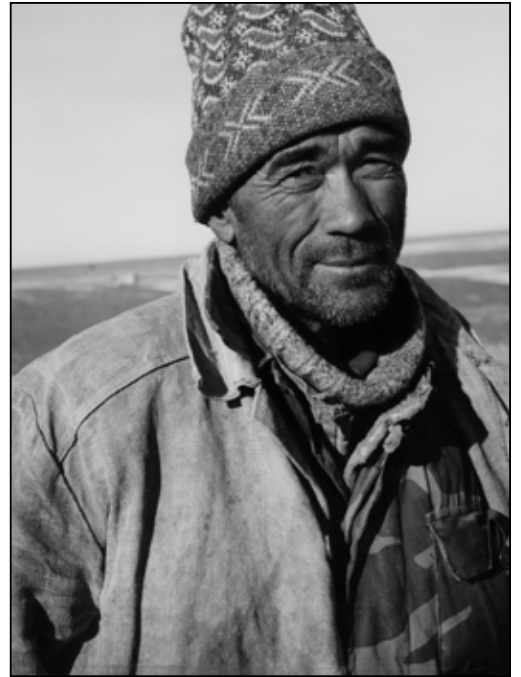
In the winter of 2004, I arrived to Aralsk, the gateway to the Aral Sea. It was once the sea's largest city and a center of the thriving fishing industry, with a bustling port and shipyards. My first visit coincided with the centennial of the city's founding. The freshly painted administrative buildings contrasted sharply with the general decline resulting from the surrounding ecological catastrophe. The city's port, shipyards, and the entire fishing industry vanished as the sea receded behind the horizon. In the port, the loading docks are quietly frozen in time, the arms of abandoned port cranes tower above like fossil remains of bygone era. The rising salinity of the shrinking sea made the remaining lake uninhabitable to the indigenous species of fish. With no fish to catch, the fishing fleet was abandoned 40 miles south of town in a small natural harbor, where the ships sunk their keels into the mud as the sea withdrew from underneath them.

The loss of the Aral Sea ecosystem, and the following collapse of economy was only the beginning. Other unforeseen consequences soon began to manifest throughout the region. The local climate, which once was moderated by the mass of water in sea, has steadily grown more extreme.

Wind erosion of the former seabed is a serious problem. The sediments on the dry seabed contain salt from the retreating sea as well as toxic chemicals deposited after decades of runoff from the intensive cotton farming which drained the lake. On windy days, these particles are stirred into ominous clouds that engulf the entire region and beyond. These toxic dust storms pose a serious health hazard for the remaining population along with contaminating the soil and

groundwater. Mothers' milk in the area of Western Uzbekistan contains high levels of these poisonous substances.

The widespread cotton farming, responsible for the creation of these conditions, did not bring much prosperity to Central Asia. On the contrary, the proceeds from the exports of cotton often support governments with some of the worst human rights records. Intimidation of farmers to force cultivation of cotton in place of other crops, as well as using child labor to work the cotton fields, are well established practices, adding much human suffering to the already extracted price of environmental degradation. ●



Once he was a fisherman.



The abandoned fleet.

Persistence and patience are finally paying off. As a first step, the Glines Dam reservoir was lowered about 1.5 feet per day at the end of April until it was six feet lower than normal.

One of the major challenges in removing these two dams is dealing with nearly 18 million cubic yards of sediment trapped behind the two reservoirs –the equivalent of a million dump truck loads. The quantity is so great that scientists have studied the debris flows from the 1980 eruption of Washington's Mount St. Helens volcano to gauge how aquatic life might react to such a large sediment flow washing downstream. Both dams will be notched in increments to allow sediment to flow out slowly, and keep it from choking the river and the salmon they are trying to save. The sediments will help rebuild the wetlands, beaches, and the river's estuary.

The start of removal of the dam walls will start in September 2011 and is expected to take three years. Scientists expect the majority of the silt to reach the ocean in 3-5 years, and say the restored, free-flowing river could sustain as many as 400,000 salmon and steelhead within 30 years.

Tribes and Farmers Unite

Another slow but steady dam-removal process is taking baby steps forward in Northern California. After more than 10 years of negotiations, agreements to remove four dams on the Klamath River were signed in February 2010 by over 45 stakeholder groups, including three affected tribes, irrigators, fishermen, conservation groups, dam owner PacifiCorp, as well as numerous politicians and agencies at the national and state levels. The California Public Utilities Commission endorsed removing the hydroelectric dams on the May 5.

The Klamath, Karuk, Yurok, and Hoopa tribes in the Klamath Basin are deeply connected to the land. Today these tribes and other nature-dependant people in the rural region are suffering from loss of land, loss of what was once one of the most productive salmon rivers in the country, and the loss of their traditional diet, which affects many cultural practices.

Mirroring the Elwha story, the primary goal of Klamath restoration efforts is to restore the river, which runs in Northern California and Oregon, and the threatened species the river supports. While fisheries restoration is the banner issue, what really drives this costly and contentious process forward is the fact that the

four dams slated for removal are too expensive to maintain, and don't provide enough hydropower to justify their price tags.

Commercial salmon fishing on the Klamath River has been increasingly troubled due to greatly reduced and changed flows out of the dams (especially in drought years), and changing conditions in the ocean as well. The result was a complete closure of the fishery in 2008 and 2009, and an extremely limited season in 2010.

"The basin is basically cut in half," says Karuk Tribe Vice Chairman Leaf Hillman. "To restore runs, we need that untapped productivity that fish aren't able to access anymore – all that spawning habitat" beyond the dams.

The Secretary of the Interior will determine by March 2012 whether dam removal will go forward, based on the completion of scientific studies and environmental reviews. At that point, the secretary would authorize transfer to a dam removal entity, likely to be the federal government. Federal legislation is also needed to authorize and fund key elements of the agreements including fish restoration projects, measures to achieve the water balance in the agreements, and programs to help communities in the basin. Removal of the dams is projected to begin in 2020.

Reoperation and Recovery

Restoring rivers does not always require removing dams. Reoperating and changing existing schemes can allow rivers to once again perform many of their natural functions.

In 1984 California's Trinity River Basin Fish and Wildlife Management Act was signed, authorizing the Secretary of the Interior to develop and implement a management program to restore the fish and wildlife populations in the Trinity River Basin to levels which existed prior to construction of the Trinity and Lewiston dams.

In May, flows down the Trinity River hit their second highest level since two dams were constructed 50 years ago. The Bureau of Reclamation released 11,400 cubic feet of water per second from Lewiston Dam. The high water is being released to flush the river as part of an ongoing restoration, said Jennifer Faler, acting executive director for the Trinity River Restoration Program.

The rush of water will move the gravel and reshape the river, mimicking the ebb and flow of nature. While the flows are big now, the river used to see flows around 11,000 cfs every year and a half. ●

Nu River *continued from page 4*

to New Xiaoshaba. They told me how they've spent the past five years struggling to keep their home.

The new resettlement houses are a gleaming white on the outside, but after only two years, their poor construction has begun to show in the form of cracks, leaks and mold. According to one villager, many have been idling away their resettlement money. Some still return to their old fields to grow their crops.

Dams a double-edged sword

Despite the fact that the Nu River is already home to over 100 hydropower stations on its tributaries, the distribution of benefits is incredibly uneven and poverty prevails even in the shadow of these stations. If all the small and medium dams were effectively harnessed to meet the local government's poverty alleviation goals, there would be no need for the large dams on the Nu mainstream. One of the towns that I visited, which is currently threatened by one of the dams in the cascade, has a collectively owned small hydropower station that provides enough electricity for both the town and for export – at times as much as 20% is exported.

Should the dam cascade move forward, the obvious fallout will be greater risks to lives and livelihoods, the destruction of the scenic and biological value of the Three Parallel Rivers World Heritage Site, and reduced river flows for all the communities living downstream in Yunnan and across the border in Burma and Thailand.

In the next few months, International Rivers and our local Chinese partners will be calling on the Chinese government to explore other alternatives such as increased energy efficiency measures; greater reliance on solar, wind, and geothermal resources, and more effective use of existing small and medium hydropower stations. Ultimately, we will work to make sure that the government does not expose a seismically hazardous region to the risk of dam failure, and that it recognizes the value of preserving a remnant of China's cultural, biological and ethnic heritage for present and future generations. ●

Learn more about how you can help protect the Nu:
www.internationalrivers.org/en/node/355

News Briefs

by Kate Ross



Site of Japan's Fujinuma Dam failure. Photo: Geo-Institute Team

Japan quake sparks dam safety concerns worldwide

The massive earthquake that struck Japan in March caused waves of destruction throughout the country, including a dam break in the Fukushima region, in the Northeast. The failure of the Fujinuma Dam released a wall of water that washed away many homes. At least another seven dams were damaged. While these incidents were underreported in the wake of the nuclear crisis and tsunami damage, they sparked renewed interest in dam safety worldwide, calls for some dam plans to be cancelled in quake-prone areas, and promises for better dam-safety procedures by some dam-operating agencies.

For example, in Uzbekistan, the Japan earthquake raised concerns over the potential dangers for Central Asia if an earthquake were to break the proposed Rogun Dam. Experts say that if an earthquake the size of the one in Japan were to hit, the 335-meter-high proposed dam could fail, creating a wave of water over 100 meters high – much larger than the tsunami that hit Japan. Such an incident would create a devastating domino effect as huge amounts of water would destroy all the hydropower plants of the Vashkh cascade and flood dozens of cities and highly populated area in Tajikistan, Uzbekistan and Turkmenistan.

Similar concern has been raised in India's Northeast, where numerous large dams are proposed. Two groups in that region, Arunachal Citizen's Rights and the Northeast Peoples Alliance, have since called for a moratorium on all big dams in the earthquake-prone Northeast. "All those who do not heed this warning of Japan, must face the wrath of people if wrong decisions are made," the groups stated in an editorial.

In China, two senior geologists warned the government to pause and consider the events in Japan as China gears up for a hydro-power push in its earthquake-prone southwest (see story p. 4).

Burma war zone no place for dams

The Salween Watch Coalition has demanded an immediate halt to all plans to build dams on the Salween River in Burma, which is now in an active conflict zone. The group has appealed to the governments of China, Thailand, and Burma, and Chinese and Thai companies involved in these projects.

On March 13, Burma's military regime broke its 22-year-old ceasefire with the Shan State Army–North, mobilizing over 3,500 troops which launched a fierce attack in central Shan State, shelling civilian targets, committing gang rape, and displacing thousands of civilians.

Since the November national election in Burma, fighting has intensified in Karen, Karenni and southern Shan States, around the five other planned dam sites along the Salween, and has now spread to northern Shan State.

The Thai government and Thai companies are proceeding with plans to build Burma's biggest dam, the giant Tasang Dam in southern Shan State. Only days after Burma's election in November, Thailand's EGAT International and China's Three Gorges Group signed an agreement with Burma's military rulers to develop Tasang, which would be the tallest dam in Southeast Asia. Salween Watch reports that surveys are now being carried out in the area, under heavily armed military escorts.

"Building dams in a war zone would make it impossible to adhere to meaningful standards or ensure that project-affected communities remain safe, says Sai Sai, the spokesperson for Salween Watch. "Apart from the direct security risks to construction crews, investors risk their reputations by partnering with a regime that is fueling escalating conflict."

Solar gets cheaper

As the cost of solar-generated electricity begins to rival coal, experts expect to see a surge in solar panel installations. At the Bloomberg New Energy Finance summit in April, CEO Michael Liebreich said that "the cost of solar will halve again" in the next decade, due to the development of better technology and more streamlined manufacturing processes. According to Canadian Solar Inc, solar is already competitive with peak electricity prices in places such as California and Japan. Furthermore the cost of solar is often overstated, as comparisons are made between the price paid by consumers and small businesses who install roof-top power systems rather than the rates utilities charge one another. As the price of solar continues to decrease, it is estimated that by 2013 installation of solar PV systems will almost double to 32.6 gigawatts, from 18.6 gigawatts in 2010.

Indonesia dam repression

The Poso 2 Dam being constructed on the Sulewana River in Indonesia will affect more than 2,000 people and destroy productive agricultural land and forests. Over the past six years the two companies involved in the project, both owned by former vice president M. Jusuf Kalla, have been forcing people to give up their land in exchange for 3,000 Indonesian Rupiah (US\$0.35) per square meter, equivalent to the price of a pound of rice. Police and military personnel have used violence and repression toward those who speak out against the project. On March 12 one villager was arrested and threatened for blocking the route of construction workers through Peura Village. Peaceful protests have been violently broken up by police. The authorities involved have not consulted community members about

the project nor has there been a thorough environmental impacts assessment. Friends of the Earth Indonesia has organized an international petition, calling for cancellation of the project and respect for the rights of the affected communities. Sign the petition: <http://tinyurl.com/4ope3nv>

Iran dam gets boost from China

On March 14 – ironically the International Day of Action For Rivers and Against Dams – Iran's Energy Minister announced that Chinese dam builder Sinohydro had signed a \$2 billion deal with the Farab Iran Company to build the world's largest concrete dam in the western province of Lorestan, Iran. The 315-meter-high dam, proposed for the River Bakhtiari, will create the Islamic Republic's largest reservoir. Iran is determined to move forward with plans to expand its power sector through a chain of hydropower projects, despite heavy economic sanctions imposed by the UN Security Council, the United States and the European Union. While the sanctions were imposed to undermine Iran's nuclear program, they have also impeded other large energy projects, including hydropower dams. China has stepped in to fill this funding gap.

Sinohydro is the world's biggest dam builder, and as of December 2010 has been involved in some 107 dam projects in 49 countries outside of China. Iran currently has 23 operational hydropower plants, and the Iranian Water Resource Management Co. reports that since March 2010 work has begun on 17 dams with another 120 scheduled to begin construction by the end of 2011.

Panama dam protest

The fight to protect the Tabasara River in Panama has been ongoing since the 1970s. A recent 15-day protest led by a group called M10 (the April 10 Movement for the Defense of the Tabasara River) against the controversial Barro Blanco project is just the latest in the long campaign. Affected communities living along the banks of the Tabasara River camped outside the entrance to the dam site for 15 days, effectively stopping construction on the dam. They also shut down part of the Pan-American Highway. According to Oscar Sogandares, Asociacion Ambientalista de Chiriqui (ASAMCHI), who was at the protest, "the protestors had nothing to lose, they [were] even willing to give up their lives if need be."

The 29 MW hydroelectric project, planned for western Panama, will directly affect more than 5,000 Ngobe indigenous people who depend on the Tabasara River. The Barro Blanco project is marred by numerous human rights violations and a continued lack of transparency by the companies involved. The environmental impacts study included "interviews" with local residents who had been dead for 50 years, and also claimed that no communities would be impacted by the project.

In 2010, groups from across Panama and Europe were successful in prompting an investigation by the European Investment Bank (EIB) into human rights abuses, which forced the dam developer, Generating of Istmo SA (GENISA), to cancel their EIB loan request. However, GENISA is now looking to receive carbon credits through the Kyoto Protocol's Clean Development Mechanism (CDM) to help fund the project. Panamanian and international organizations have written to the CDM Executive Board urging them to deny the project's request for carbon credits.

Whisky power in Scotland

Contracts have been signed for the construction of a whiskey-powered bio-energy plant in Seyside, Scotland. The combined heat and power plant will use by-products of whiskey-making to power local homes. Draff, the spent grains used in the distilling process, will be burned with wood chips to produce electricity for homes, while pot ale, a residue from the copper stills, will be made into concentrated organic fertilizer for local farmers. Waste from 16 whisky distilleries in Speyside will provide electricity to 9,000 houses in the area. While the project has received widespread support, locals and environmentalists are keen to ensure that the biomass is sustainably sourced.

The venture will be the first from the Scotch whisky industry to produce energy for public use. They are currently close to completing construction on a bio-energy plant in Fife that will provide power for the Cameronbridge distillery.

Cyanide dam collapses in Turkey

Two embankments of a three-stage dam containing cyanide-contaminated water collapsed in the western province of Kutahya, Turkey in May. The dam is located in a silver mining and refining facility owned by the Eti Silver Corporation. More than 250 people gathered outside the facility to protest the risk of cyanide contamination in the river basin and to call for the mine's closure.

Heavy rain in the days after the collapse led to concerns that the last dam would overflow, releasing large amounts of cyanide-contaminated water into the river basin. The Chamber of Environmental Engineers urged the region to be immediately evacuated. However, the Environment Minister has refused to address

these concerns, claiming there is no cyanide in the region. The Council of Turkish Medicine Association released a statement saying that the "collapse of the embankment would cause fatal threats to human health and the environment."

Drought in China Hits Hydropower Hard

A severe drought is adversely affecting electricity production at hydropower plants in central China. The drought has lowered water levels in the Yangtze River to historically low levels, forcing some dams to stop operating. Water levels fell below the 156-metre level required for full power generation at the Three Gorges Dam, the world's largest hydropower project, forcing the operator to decrease electricity production. The dam was also forced to discharge millions of cubic metres of water in May to relieve downstream drinking water shortages. Although no link has been proved, critics say the dam has changed regional water tables, contributing to the shortage.

It has been reported that hydropower may have fallen by as much as 20% throughout China, and by 50% in parts of Central China.

"Over the longer term, the drought raises questions about the wisdom of China's reinvigoration of approvals for large hydropower plants along the Yangtze River, given their susceptibility to low water levels. Smaller hydropower plants would be better suited to meeting local demand without significantly restricting water levels elsewhere on the river," reports HIS Global Insight, a global information company working on energy.

Harnessing Creativity on the Day of Action for Rivers

By Kate Ross

Creativity shone on the fourteenth annual International Day of Action For Rivers. A record number of countries held actions on March 14, 2011 in celebration of their rivers and in solidarity with thousands of people around the world fighting to protect them. More than 112 actions took place in 36 countries around the world. Highlights included:

In Turkey, mountain climbing groups reached new heights in their effort to raise awareness about the campaign to protect Anatolian rivers, climbing to the top of five mountains and scaling down two caves to display signs which read “we won't give up Anatolia.”

On the Xingu River in Brazil, thousands of fisherman celebrated river life with a two-day fishing expedition, returning on March 14 to share their catch with family, friends and nearby communities. The event was held to call attention to the impacts on fisheries and families of the monstrous Belo Monte Dam, which threatens the survival of indigenous communities throughout the Amazon.

Activists gathered in the Czech Republic to repopulate the dammed Elbe River with symbolic “fish” baked out of flour and water.



Members of the Czech group Arnika repopulate the Elbe River in the Czech Republic with “fish” made from flour and water.

In China the aim was to raise awareness among the next generation of river activists, with a series of events held for children and families in the city of Dalian. Activities included painting green

bags with messages of river protection and an “environmental aspiration wall,” on which families posted their own hopes for healthy rivers.

Activists in Kenya have been working tirelessly to stop the Gibe III Dam on Ethiopia's Omo River, which will drastically affect ecosystems and livelihoods all the way down to Lake Turkana in Kenya. On the Day of Action, Friends of Lake Turkana organized *barazas* (public meetings) along the lake, where they worked with partner environmental groups within the region to create awareness and update the communities about developments in the campaign against Gibe III Dam. ●



Villagers gather to give thanks and worship the mighty Mekong on March 14. Photo: Pianporn Deetes

You can read more on our website, and see the many creative ways in which groups expressed their love for rivers. Be inspired to hold your own action next March 14 – it is never too early to start planning!

■ **High Preservation Area:** The buffer zone around the main watercourses and wetlands where ecologically destructive development like dams, irrigated agriculture and strip mining is prohibited. Lower-impact activities, such as grazing, infrastructure such as houses, and fishing are allowed.

■ **Preservation Area:** The remainder of the basin, where most development activity can occur as long as it meets requirements that minimize the impacts on the river system.

■ **Floodplain Management Area:** Important floodplain areas where the construction of levees and other flow-impeding development is regulated to protect the connectivity between this area and the main river channels.

■ **Designated Urban Area:** Areas where there is a town or village, so certain types of development are exempt from the Wild Rivers Code.

In practice this means that destructive developments like large dams, intensive irrigation, and mining cannot occur in sensitive riverine and wetland environments (in the High Preservation Area), while a range of other developments have to meet sensible requirements outlined by the Wild Rivers Code.

A Wild River declaration cannot occur without extensive community consultation. The formal consultation process is triggered when the government releases a draft declaration proposal (termed a "nomination"). This includes releasing a draft map showing proposed management areas, and is followed by months of face-to-face meetings.

National Rivers, Sweden

According to the Swedish Ecologist Christer Nilsson, one of the pioneering champions of free-flowing rivers, a movement to protect the country's last four major rivers from dams began in the late 1960s, following the damming of the majority of Sweden's rivers. This was the first major environmental battle in Sweden.

The Swedish Government was pressured by this movement to protect these four rivers as National Rivers. Today the rivers Kalix, Torne and two others are national rivers, protected from development.

Conclusion

It is high time that we learn the lesson that conservation is better than restoration. The need to protect our few remaining free-flowing rivers is very real and urgent. As a first step, ecologically and socially important stretches of our remaining free-flowing rivers should be identified. At the very least, rivers representing different ecological classes – high mountain, desert, and rivers with major cultural significance – should to be conserved.

Rivers whose water and sediment flows are not strongly affected by dams, which have not been embanked or channelized, which have good riparian health and water quality, which support important biodiversity and community services should be protected for the benefit of current and future generations. ●

The author is a researcher with SANDRP and Gomukh Trust, working on e-flows and assessment of ecological goods and services of free flowing rivers in India. She writes on these issues at the India Water Portal.

This Year's Endangered Rivers

Two North American groups have released their annual "most endangered rivers" lists, highlighting rivers threatened by dams, water diversions, oil and gas drilling and other river-killing projects.

Canada's Outdoor Recreation Council (OCR) released its Endangered Rivers List in April.

This year's list highlights the interdependence between healthy rivers and healthy lives, emphasizing the need to protect the great salmon populations and develop new water management regulations to protect Canada's rivers. The detailed list describes specifics about all major threats, and what steps communities, tribes and activists are taking to protect their rivers.

At the top of the list is the Kettle River in southern British Columbia. The Kettle has suffered excessive water withdrawals, and more proposals are in the works to extract water near its source.

A number of the endangered rivers are threatened by dams, including the Peace River, the Similkameen, the Kokish, the major rivers of the Bute Inlet, and the Aitlin.

In May, American Rivers released their "Most Endangered Rivers List," sounding the alarm for American rivers threatened by natural gas projects, mining, pollution and dams. In addition to the top 10 rivers, the Mississippi River received a special mention for "outdated flood management" in the wake of the recent massive flooding. ●

World Rivers Day
- A Celebration of the World's Waterways -
Sunday, September 25th

Join an Event or Start Your Own!

Visit our Web site
www.worldriversday.bcit.ca
to find out what's happening around the world. Register your event with us and we can help you get the word out!

"Join us in honoring the many values of our global river heritage"

Mark Angelo, renowned river advocate, World Rivers Day Chair

• River clean-ups • Art exhibitions • Habitat restoration •
• School projects • Community festivals • Paddle trips •

HSBC The world's local bank | rivers institute at BCIT | NORTH GROWTH FOUNDATION | United Nations World Water for Life, Stockholm, Canada



A Wave of New Non-Dam Hydropower Developments

By Kate Ross

As we've reported in the past, the global potential for "un-conventional hydro" – which does not involve new dams on rivers – is huge. The topic has been much in the news of late. Here are some of the latest developments.

Super Batteries: A team at Stanford University has developed a simple rechargeable battery that takes advantage of the difference in salinity between freshwater and seawater to produce electricity. Anywhere freshwater enters the sea, such as river mouths or estuaries, could be potential sites for a power plant.

The battery is filled with freshwater and a small electric current applied to it. The freshwater is then replaced with seawater. Salty seawater contains 60 to 100 times more ions than freshwater and therefore increases the electrical potential between the electrodes, allowing the battery to generate far more electricity than used to initially charge it. The electricity is then removed from the battery for use and the cycle starts again. Head researcher Yi Cui predicts that if all of the world's rivers were put to use, the batteries could supply 13% of the world's current electricity consumption.

Although the process itself should have little environmental impact, siting these plants would need to avoid environmentally sensitive areas.

The team did estimates for various countries and found that the Amazon River has the most potential, followed by Africa, Canada, the US, and India. One potential application is urban use: according to Cui, these batteries could be used to generate electricity

from storm-water runoff and grey water, and perhaps even treated sewage water. A power plant operating with 50 cubic meters of freshwater per second in a city could provide enough electricity for about 100,000 households.

Tapping Scottish Tides: The Scottish Government has approved a plan by Scottish Power Renewables to develop a 10 MW tidal power array in the Sound of Islay on the west coast of Scotland. The project proposes to generate enough electricity to power the equivalent of the whole island. The company is currently constructing the first tidal power turbine in Orkney. Scotland is leading the way in offshore power generation, with a range of wave, tidal and offshore wind projects already underway.

Huge US Potential: The US senate passed a series of bills in April to increase research into hydropower technologies. The Interior and Energy departments announced that \$26.6 million in funding would be allocated for hydropower research and the development of marine and hydrokinetic energy projects. As part of this push, the US Department of the Interior released a report that shows the potential for substantial development of new hydropower capacity at existing federal facilities. The study analyzed 530 sites, including dams, diversion structures, and some canals and tunnels. Of those sites, 70 facilities with the most potential to add hydropower were found to have the potential to generate up to one million megawatt hours of electricity annually. The study says that such hydropower additions would create 1,200 jobs. ●