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Dams, Rivers & People

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Lead Piece

Scam: UNFCCC registers Rampur hydro

In a shocking move, UNFCCC (United Nations Framework Convention on Climate Change) approved the extremely controversial Rampur hydropower project in Himachal Pradesh (India), which is set to increase global CO2 emissions by 15 million tons, at a cost of $164 million to energy consumers in Sweden. The project exemplifies how hydropower companies and other investors, with support from the World Bank, are using the system of climate finance to reap benefits, degrade ecology, harm local communities and yet get a license to call their projects 'green'.

It is particularly shocking that the UNFCCC Executive Board is incapable of seeing through the fraudulent claims of the projects like Rampur. Most disappointing aspect is that we can see the fraud being indulged in front of us, but nothing can be done about it!

Rampur is a 412 MW hydropower project on the Sutlej River being developed by the Sutlej Jal Vidyut Nigam Limited (SJVN). SJVN signed an agreement with the local govt to implement the project back in 2004. The World Bank approved a loan of $400 million for Rampur in 2007. ***Throughout this process, SJVN assured the public & lenders that the scheme was a least cost project and would remain financially viable even under adverse hydrological conditions***. At no time did it indicate that the project needs carbon credits to go forward.

A key condition of the CDM is that carbon credits are only awarded if a project would not go forward without them, also known as additionality test. However,

- The project had signed implementation agreement with HP govt way back in 2004, claiming its financial viability. This fact has been conveniently omitted from the PDD.
- It had applied for techno economic clearance from the CEA in June 05, which had assessed its economic viability.
- There are no barriers to large hydro projects. It is the govt policy to push large hydro to the maximum possible extent, with provision of all the available resources. In case of Rampur, the financial resources are already in place with the debt portion being funded by the World Bank, and the equity portion coming from SJVN and the Himachal Govt. The decisions to allocate these resources have been taken long back. This provides further support to the conclusion that project is non additional.

The Validation report by the DOE has stated several times that, "Barriers have been removed from Project Design Document during the course of validation." In that case the old PDD is no longer adequate or valid document. ***If indeed the PDD is changed so drastically as claimed, it qualifies for new round of stakeholder comments.***

SANDRP and Himadhara hade written to the DOE, UNFCCC board & the Swedish Energy Agency about the blatant procedural and ecological violations involved in the project. Local communities from HP, including workers from the project site have been protesting against the project, its many violations including incomplete EIA & EMP reports, since 2006. The submission to the UNFCCC stressed how the project has been turning a deaf ear to community concerns & is facing protests. Considering all the aspects, it is difficult to understand the basis on which UNFCCC has approved the project for carbon credits. It seems there is a huge scam, considering the amounts involved if the project were to be approved as a CDM project.

Now it seems the Swedish polluters can emit 15 m tons of CO2 more than they are entitled to under the Kyoto Protocol, and SJVN will sugar-coat its profits with an extra $164 m, harming the local communities and ecosystems. The Rampur case also sheds light on the dubious role which the World Bank plays in abetting the scams that Wiki leak exposed. ***The Bank claims that its projects are financially viable when it lends to them, and pretends that they are not when it arranges carbon credits for some of the same projects.*** Indeed, ***these decisions are raising pertinent questions regarding the ability of the CDM mechanism in curtailing emissions or promoting sustainable development, without swaying to external pressure.*** (SANDRP, International Rivers 051011)

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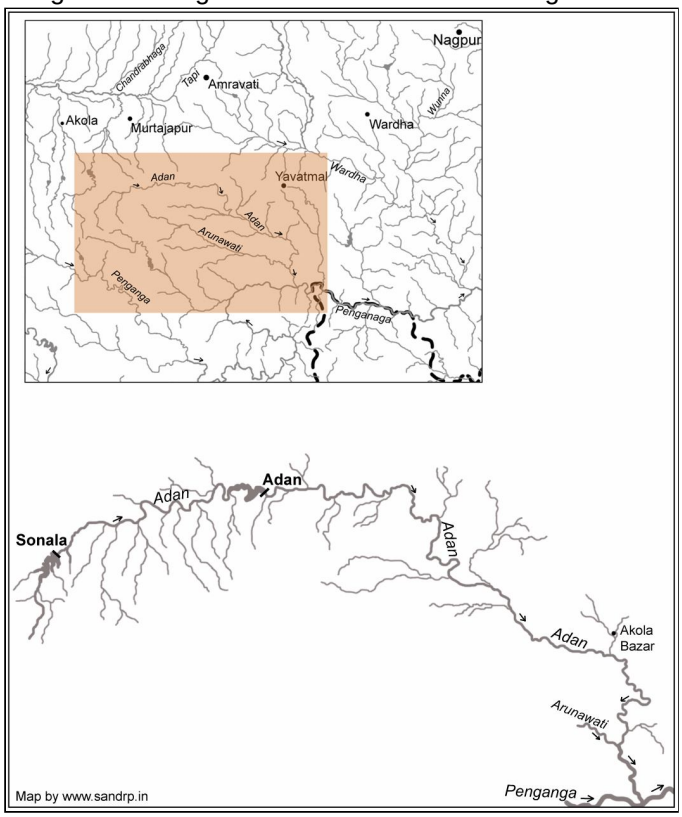
Contact Himanshu Thakkar, Parineeta Dandekar, Ganesh Gaud, *Dams, Rivers and People*, C/o 86-D, AD Block, Shalimar Bagh, Delhi 110 088. India. Ph: +91-11-2748 4654/5 ht.sandrp@gmail.com Web: www.sandrp.in

The story of Samvardhan from Vidarbha

Reviving Adan River through conservation and employment generation

These days, 'Integrated Water Resource Management' is put forth as a panacea to nearly all problems faced by the water sector. The scope of this term is so broad that it can be interpreted in convenient ways by a number of agencies, be it research and community organisations, Governments or financial institutions like World Bank and ADB. As a result, water privatization, increasing water tariffs, changing water allocations are also being justified under the guise of Integrated Water Resource Management.

'Vidarbha' immediately conjures a vision of farmer suicides, crumbling social systems and large tracts of barren land. Vidarbha is much more than that. Most of the area comes under 'assured rainfall region', has supremely fertile soils, huge tracts of forests and diverse tribal communities.



However, there are some initiatives which, without claiming to adhere to principles of IWRM put forth by any organization, are integrating numerous facets of water and natural resource management into an approach. One such initiative which has gathered strength during the past 5 years is ***Adan River Restoration*** effort, led by a small team of committed individuals from Vidarbha region in Maharashtra.

Districts like Bhandara from Vidarbha have had a remarkably rich tradition of community tanks which supply water to farms and villages, made and managed entirely by local communities (See ____ in this issue).

Main rivers in the area include Wainaganga, Painganga, Wardha, Pench, Kanhan and parts of Tapti. Most of the rivers support high biodiversity and numerous fish species.

Adan is one such tributary of Painganga, which flows for 209 kms through Washim and Yavatmal districts and meets Painganga near the Andhra Pradesh border. Adan is joined by tributaries like Arunavati. The river flows through an agricultural landscape as well as a recently established Blackbuck Sanctuary. 43 fish species have been documented from this river[1], including the endangered Mahseer.

However, most of the Mahseer, tiger prawn and *Anguilla bengalensis* populations have been wiped out upstream of dams in the basin and are now found in downstream tributaries only. The depleting fish species have affected the livelihood of the fishermen drastically and in desperation, poison and electric currents are now being used for fishing, which was never the case earlier.

Fishing in the Adan River Photo: Dr. Nilesh Heda

Initial years In 2007, Nilesh Heda, from the local town Karanja started PhD work with IISc (B) and Amaravati University, documenting fish species & traditional knowledge about fisheries in Adan & nearby rivers.

[1] Notable species include: *Barilius sps, Danio aequipinnatus, Garra mullya, Glossogobius giuris, Glossogobius giuris Gonoproktopterus kolus, Labeo fulungi, Lepidocephalus thermalis, Macrognathus aral, Mastacembelus armatus, Mystus, Nemacheilus, Notopterus notopterus, Ompok bimaculatus, Osteobrama cotio peninsularis, Osteobrama cotio peninsularis Puntius, Salmostoma, Thynnichthys sandkhol, Wallagu attu, Xenentodon cancila etc.*

During his study, he witnessed serious issues which were not only affecting the fish diversity but having far reaching impacts on the entire socio-ecology. One of the main issues was the change in the nature of the river from perennial to seasonal. While part of the blame was on increased siltation due to faulty land use practices and deforestation, a major part of this was due to two dams built on the river.

Adan dam changed the traditional cropping pattern of the region from cotton-jowar-bajra to sugarcane, which was not cultivated earlier in the region. It also stopped nearly all the downstream flows of the river and affected about 3000 strong fishing community of Bhois adversely. The Bhois took lead and formed fisheries cooperative with over 450 members.

Sonala Dam is a 15.28 m high dam built near the origin of the river in 1971 and **Adan dam** is a 30 m high dam near Karanja town built in 1977, falling in the middle reaches of the river.

Adan dam changed the traditional cropping pattern of the region from cotton-jowar-bajra to sugarcane, which was not cultivated earlier in the region. It also stopped nearly all the downstream flows of the river and affected about 3000 strong fishing community of Bhois adversely. The Bhois took lead and formed fisheries cooperative with more than 450 members to fish in the dam. However, down the years, the fisheries cooperative has been systematically broken down and contracts for fishing have been awarded to non-local city dwellers who now hire Bhois at an extremely low salary to catch fish from the dam. For many years, contractors simply hired fishermen from Andhra Pradesh to fish in the reservoir, totally cutting the Bhois off their river.

It is Samvardhan's stand that like tribals now have a legal right over their forest resources through FRA and PESA, fisher-people should have rights over their river, from which they receive ecosystem goods and services.

Dr. Heda with villagers in Adan

Sugarcane cultivated by the dam waters brought sugar industry with it, which polluted Adan's water considerably. Numerous fish kills were reported and Dr. Heda has been a part of an agitation against the untreated sludge released by the industry in the river. Sugarcane also required less farm laborers than before and affected the economy. Interestingly, the storage capacity of the dam has been decreasing rapidly and the sudden burst of sugarcane fields is now receding. The industry now gets its sugarcane from different areas.

Need to address wider problems Dr. Heda realised that in order to conserve the fish and riverine ecosystem, it is necessary to address a number of interconnected problems in the entire basin. At the same time, in the face of growing unemployment and droughts in the region, he saw the futility of working single-mindedly on conserving some fish species. In the midst of farmer suicides and social unrest, conservation had to be linked with long term as well as immediate short term gains for the community. There was a more urgent need to revive links between the river and its people, restoration and employment.

Using NREGA as an effective tool During the same period (April 2007) NREGA was amended to include all districts of the country. The law highlighted 'work on demand' and stipulated that a minimum of 50% and maximum 100% of all works will be done by the Gram Sabha. This was a perfect opportunity to integrate conservation and employment and initiate a basin-wide effort. However, using NREGA was easier said than done. Uneducated and unemployed people had no idea of NREGA or their right to demand work. Samvardhan team first initiated awareness generation about the law and its use in the community. Despite this, NREGA works were not started in Washim for a long time and Samvardhan had to do an intensive follow up with nearly all officials and write to the Ministry of Rural Development repeatedly.

With a planned ridge to valley approach, Samvardhan spearheaded works on NREGA in more than 75 villages of the Adan and adjoining basins in nearly the entire Washim district. These included watershed works, extensive afforestation and awareness generation about natural resource management. **Till now, more than 5000 villagers have contributed to river and ecosystem restoration through NREGA!** More than 90000 trees have been planted in two villages alone, bunding and watershed works in hills and farms have reduced soil erosion and resultant siltation.

Gram sabhas in Adan and also nearby tributaries have become proactive about planning and implementing works in their villages. Meetings for each Gram Sabha are initiated by Samvardhan team, which also includes fishermen and local farmers and they talk about local resources and problems and chart out a plan for work.

Looking at the invasion of exotic fish species, fish farms with local and carp species have been started.

When asked about the impacts of this work, Dr. Heda says, quoting Rajendra Singh (who has been involved in Samvardhan's work) that river revival is a *"Baaraa saalon ka kaam"* and not a one-night wonder.

However, Samvardhan has been witnessing many indirect impacts of the work like increasing water table and reduced siltation, improved participation in gramsabhas and local planning.

It is too early to see results in terms of river restoration and increased species diversity. However, the path chosen by Samvardhan of social upliftment, awareness generation and *shramadan* has proved to be the 'Rajmarga' for achieving lasting results as demonstrated by Arwari, Ralegan Siddhi and Hiware Bazar. Some good stories are emerging from the tormented Vidarbha.

Samvardhan Samvardhan is working with some villages to protect socially and ecologically important stretches of rivers as community conserved areas.

This will help fish production as well as overall river health and biodiversity. It is Samvardhan's stand that like tribals now have a legal right over their forest resources through FRA and PESA, **fisher-people should have rights over their river, from which they receive ecosystem goods and services.**

This right should be protected from dams, pollution, industries and other interventions in the upstream. They have zeroed down on a number of conservation areas in the river working with villagers to develop a set of rules for managing this area.

There is an urgent need for using new and existing legal tools (like community and conservation reserves under the Wildlife (Protection) Amendment Act of 2002) for protecting important rivers and riverine stretches so that the services provided by rivers are sustained.

Dr. Heda is happy to have changed his focus from a conservationist to a field worker and more. In his words, ***"I don't have to worry about fish conservation now, it will get done automatically!"***

Samvardhan Team: The team of the Samvardhan is as diverse as its work. Founded by Dr. Nilesh Heda in 2007, along with his likeminded friends, Adv. Sumant Bandale, Kaustubh Pandharipande, Adv. Radhika Sone, it now comprises of local college students, fishermen, labourers & village level workers.

(As told to Parineeta Dandekar)

Himachal bans hydropower projects in Tirthan & tributaries

According to a Himachal Pradesh government spokesperson, "No hydropower project will be allowed in future in the tributaries of the Tirthan River. This will help conserving the trout," A decision in this regard was announced by Chief Minister Prem Kumar Dhumal in the state assembly.

In 2004, the government imposed a complete ban on allotting hydro projects in the Tirthan River. "Now the government has included its **tributaries** too under the ban as two hydropower projects working there have a negative impact on the aquatic fauna," the official said.

Interestingly, the Brown and Rainbow trouts which have lead to this protected status are not native to Himachal waters, but exotic species, introduced by the British in 1909 to promote game fishing.

While protecting a biodiversity-rich river and its tributaries is a welcome step, it will help Himalayan ecology considerably if such concern is also shown to native and endangered fish species like the Golden Mahseer and Snow Trout. These fish are found abundantly in Tirthan, as well as other streams and rivers which are being rampantly dammed and destroyed.

However, Fisheries Department has been turning a Nelson's Eye towards destruction of such habitats. As SANDRP had reported, Fisheries Department has notified Chanju Nallah as a 'No Development' stream for in situ conservation of fish. However hydro project proponent blatantly presented before the EAC that Chanju has no fish in it and also showed a certificate to that effect from Fisheries Department.

Traditional Water Management Systems of Eastern Vidarbha: Community Conservation-1

Manish Rajankar

Background Water harvesting is an age-old concept in India. Traditional systems are specific responses to ecology and culture of the region in which they evolved. Traditional systems have benefited from collective human experience since time immemorial and in this lies their biggest strength.

Traditional systems of water management are found in different regions of India. *The techniques used in these systems, the reasons for choosing that particular technique, resources utilized for building the structures, rules and regulations of using the system, decentralization of decision making and integrated approach for management of the resource, are some important aspects.*

***Bhandara District alone had more than 15000 tanks and smaller boadies, irrigating varying areas of land*. Some of the largest tanks, like Navegaon Bandh in Sakoli Taluka of Bhandara, were built more than 400 years ago by the Kohli community.**

One such traditional system of water management exists in the eastern part of Vidarbha, known as ***Zadipatti***. We have been observing that water is valuable for the area of scarcity and people of those areas design such systems of wise use of this precious resource. The *Zadipatti* region receives 1200-1500 mm rainfall & yet, people here developed an intricate management system which is being used effectively even today.

Navegaon Bandh, the biggest Malguzaari tank in Bhandara

The area of Bhandara, Gondia, Gadchiroli, Chandrapur and partially Nagpur districts is known as *Zadipatti*. This area is part of the broader area known as Gondwana. The area was under the reign of Gond Kingdom. Historically the area of zadipatti was divided in three kingdom of Gonds; Deogarh, Mandla & Chanda.

As per the name of area, there was dense forest in the region. But for generating revenue and maintain a kingdom, it was essential that the area had human habitation and agricultural lands. A Gond King, Hirshah of 16th century issued two *Farmans* (orders). One was, ***"a person who clears the forest and sets up a village will receive a title of Sardar of the village"*** and the other was, ***"a person who builds a tank will get all the land irrigated by that tank, as khudkast (reward)".*** These orders led to setting up of prosperous villages dotted with hundreds of tanks in the region.

History of Tanks *Kohli* community of Zadipatti has major contribution in the lake building activity in this area. According to anecdotes, kohli community was settled in Zadipaati by the Gond King from Benaras, while he was on pilgrimage. He saw the expertise of this community in water management and invited them to his country. They honored the request, came to this area and used their skills of lake building.

Kohli community was known for their exemplary skills in site selection for tanks. They have chosen tank sites where least bunding is required for tank construction. Till date, parts of the Kohli community reside in the area of Balaghat district of Madhya Pradesh along the bank of Wainganga River, in Bhandara, Gondia and Chandrapur districts and in Wadsa tehsil of Gadchiroli district. Later, Ponwars, Gonds, Kunbis and Brahmins also constructed tanks in this region.

Bhandara District alone had more than 15000 tanks and smaller bodies, irrigating varying areas of land. Some of the largest tanks, like Navegaon Bandh in Sakoli Taluka of Bhandara, were built more than 400 years ago by the Kohli community. When constructed, the catchment area of Navegaon tank was 23 sq. miles, and it irrigated about 2250 acres of land.[2] Navegaon Bandh has been declared a wildlife sanctuary.

Network of Tanks Though there has been sufficient rainfall in the area of Zadipatti, communities of this area tried to construct as many tanks as possible and irrigated maximum land. Tanks were constructed at every possible site. If water was flowing over the waste weir of one dam, another tank was constructed downstream. At many places, cascades of tanks can be seen. Almost each tank is a part of some cascade and there are some villages which have more than one cascade of tanks!

The excellent piece of this traditional wisdom can be seen at village Aashti in Tumsar tehsil, Bhandara district. This village has three cascades of tanks with a total of 76 tanks! All these tanks are linked with an intricate network of canals.

[2]The Imperial Gazetteer of India Vol. III Central Province, 1885, Tubner and Co. London; Central Provinces District Gazetteer, Bhandara District, 1908, Pioneer Press, Allahabad

Water from upstream tank can reach at any downstream field. The available water is used for growing sugarcane, and all the sugarcane produced in village is converted into jaggery in village itself.

Many houses have small units of jaggery production. Due to this there were many incidents of fire. The drainage line before every house is connected with the canal network and in case of emergency water is made available at doorstep. It is hard to believe that all this work has been done in the period when sophisticated engineering equipments were not in existence.

If water was flowing over the waste weir of one dam, another tank was constructed downstream. Many cascades of such tanks can be seen. Almost each tank is a part of some cascade & there are some villages which have more than one cascade of tanks!

Features of Tanks

Tank types Locally, tanks are divided in five types, based on their size and purpose.

Pair of endangered Sarus Cranes nesting in Shringar Bodi

The biggest tank is called the ***Bandh*****.** Bandh provides irrigation to more than one village. Bandhs are few in number.

Talao/ Gaon Talao A Talao generally irrigates area of one village or less. It is also used for domestic purposes like washing clothes and utensils, bathing, water for livestock, etc. If the tank is very close to the village it is called as ***Gaon Talao (Village Tank).***

Bodi Bodi is smaller than the Talao and there can be more than one *Bodis* in the command of big tank. Water of bodi has been reserved for growing rice, locally called *parhe*. Bodi was not a perennial source of water. Indeed after irrigating the first crop, the bodi was used for cultivating wheat, chana etc., because of its excellent soil moisture.

Water from bodi was distributed by turns. However, if crops were water stressed, bodi's water was released in channels and used by everyone. Depending on the rain, number of bodis could vary from year to year. If rains were good, then the land of and around the tank was used for cultivation, but in case rains were scanty, then the bodis were used exclusively for water storage.

Kutan: Kutans are smaller tanks made to store rain water. One type of Kutan was made upstream of the bigger tank and in case of emergency, the water from this kutan was used as a measure for watering a drying crop. When turn at irrigation from a bigger tank came, the farmer stored this released water in the Kutan.

Fishing in Water Bodies

The other type of Kutan was made in the downstream of a big tank. These are small bunds; 3 to 4 ft high running parallel to the bund of tank at a distance of 50 to 60 ft. Water from big tank was first released in these kutans, due to which, water was distributed evenly and then released in channels, minimizing the chance of eroding channels due to excessive pressure of sudden water release from the bigger tank.

Dob Excess water from paddy fields was stored in a small pond at the lowest point of field is called *Dob*. This water was used for irrigation in the downstream.

Structures and features of tanks Integral features of various types of tanks are: the catchment of the tank (locally called as *Yewa*), the embankment (*Paali*), gates for releasing water (*Tudum*), the canals/channels for distributing water to fields (*Pat*) and the waste weirs (P*haras or Salang*).

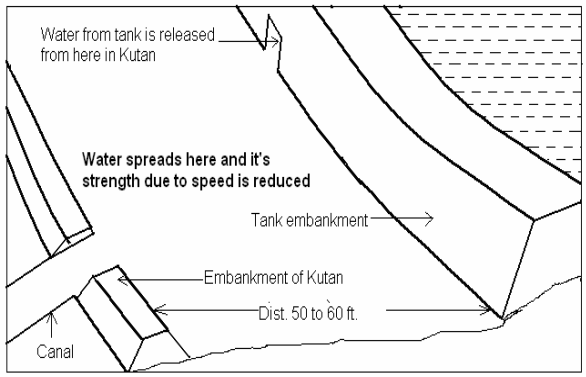


Figure 1 Kutan below the Tank

Yewa (catchment) The catchment area and network of smaller streams which feed in the tank was called the Yewa. Every year, before rains the catchment was inspected by the beneficiaries and cleaned thoroughly. Any obstruction to the path of water was removed, sometimes using bullock and plough. All beneficiaries took active part in this process.

Paali (embankment) The construction of embankments, their thickness and height was decided depending on the texture of the soil and location of the tank. After every layer of mud, bullocks made several rounds on the embankment, strengthening it. If, due to pressure of water, mud did not stay and leaked, a mixture of lime, jaggery and mud was used to set it.


Harvesting Water Chestnut 'Shingara' from local tank

These days this practice is replaced by stone pitching and trees on the Paali are cut down. However, earlier, Vetiver grass and trees like Mango and Tamarind were especially planted on the Paali to hold the soil and strengthen tank walls. Even today a number of mango orchards bloom on these Paalis.

Tudum Tudum is a stone structure for releasing water from the tank into canals. These were crafted out of a specific red stone, which is soft when excavated and becomes hard with contact to atmosphere. Inside the tank is a step-like structure and each of these steps have a hole. When water was to be released, this hole was opened. Before rains, the hole was closed by a flat stone cemented by a mixture of mud. This was very effective and did not allow any leakage. In case of any problem, everyone in the village was trained on how to repair the Tudum.

Salang or Faras Salang is an overflow channel which is parallel to land, or if need be, slopes towards the outer side. Because of this structure, the fish spawning upstream during breeding season could easily enter the tanks and go back. Their eggs were retained in the tank. Eventually, the tanks became remarkable banks of biodiversity.

In 2009, members of the Gondia Nisarga Mandal counted 48 endangered Saarus Cranes in the numerous Bodis and paddy fields in Bhandara and Gondia districts. Navegaon Bandh, also a tank built by the Kohalis is now a Wildlife sanctuary supporting numerous species of migrating and resident water birds

Social characters of tanks in Eastern Vidarbha More remarkable than their unique technical features, are the social norms and rules that surround the tanks in Vidarbha. It is this system of values and beliefs which has significantly added to the sustainability of these systems, which are being used till today.

Most of the usage and maintenance rules are clear cut and involve active participation. The waterways and streams joining the tanks are to be cleaned by all the tank beneficiaries. Beneficiaries also work on desilting the tanks, repairing the Paalis (embankments) and Paats (channels).

The alluvial silt excavated from the tanks has been prized as a fertilizer and the decision as to who should take how much silt was taken collectively. Desilting was done once every two-three years.

The decisions related to management & upkeep of the tanks were taken collectively by the beneficiaries. Interestingly, decisions regarding water sharing were taken only after setting up a water balance. This was done by a person known as '*Pankar'* who was supposed to be unbiased & had knowledge about the region & its hydrology.

Only a 'Pankar' had the right to carve out new channels and provide additional water. If anyone broke a channel to get more water to his fields, he was fined. Many such Pankars still exist in Bhandara, Chandrapur and Gadchiroli districts and are playing an active role in equitable water management and conflict resolution.

They are nominated by the informal village tank samiti and are generally landless laborers. In olden days they were paid with a part of harvest, but these days they are paid according to their time.

After years of acclimatization, the tanks have become an integral part of the ecosystem, which supports numerous species of fish, amphibians and reptiles, insects and water birds. Water plants and rushes also grow along the tanks and all these resources are sustainably harvested and used effectively by the local population.

Tanks as a part of the village system Initially the tanks in this region were built specifically for agricultural use. However, over time, they were being used for a number of purposes.

After years of acclimatization, the tanks have become an integral part of the ecosystem, which supports numerous species of fish, amphibians and reptiles, insects and water birds. Water plants and rushes also grow along the tanks and all these resources are sustainably harvested and used effectively by the local population.

Incidentally, this quote from the official gazetteer is quite relevant here: "*I have not discovered a single case of a Kohli malguzar failing to keep his tank in effective working order;.. in this respect he forms a very pleasant contrast to the Brahman malguzar of other tehsils, who will never spend a penny on his tank himself, and will certainly not let his tenants do so when re-settlement operations are pending.*"

Allied activities like fisheries, harvesting of Vetiver (*khus*) grass, water chestnut (*shingada*), louts roots (*kamal kand*) are also supported by the tanks. The grasses on the tank banks are used as fodder for animals, and for making roofs and brooms. These non irrigation benefits still play an important role in the fragile village economy, especially for the landless and low land holding families.

Thus, tanks which were meant to be tools for irrigation were slowly integrated in the fabric of the social life in Vidarbha.

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Water Management and Biodiversity Ecosystems supported by the tanks have been a lifeline of not only the local communities, but numerous other species as well. It has been observed by the locals that tanks where lotus (*Nelumbo*, *powan* in local language) grows in abandon has cooler waters and in summers, small fish congregate around these louts tangles to seek protection from larger fish and birds like kingfishers, ibis and ducks.

The specific layering of multiple species of grasses and aquatic vegetation also acts as a very effective biological filter, arresting silt from entering the tank and reducing its lifespan. Thus, the silt gets deposited along the streams and water ways that feed into the tanks and these results in fertile ground for small scale agriculture.

Traditionally, when vetiver grass growing on the tanks banks was harvested, two parallel layers of vetiver were always maintained in order to bind the soil together and avoid erosion. There are numerous such examples wherein locals have very ingeniously used links between plants and their relation with water management.

When the author discussed these traditional systems with botany professors, it was found that local knowledge in the area is not just in keeping with the scientific knowledge, but has surpassed it in the sense of its seamless integration and effective use in daily life.

(Translated from original Marathi Article)

(Next part of the article will deal with the current situation of these tanks, government responses and the way ahead.)

Dams, Rivers and Ecology

Nachiket Kelkar

In this article, I attempt to broadly describe the threats posed by large dams and other freshwater diversions to freshwater and terrestrial biodiversity and ecosystem processes that maintain river ecology, with examples from the Indian subcontinent.

River dolphin populations in Nepal have been extirpated (made locally extract) from many locations because of barrages on the Narayani (Gandak) & Kosi rivers. The Indus River has a series of barrages that have caused decline in numbers of Indus river dolphins, a critically endangered subspecies of the Ganges river dolphin. Dolphins have almost been driven to extinction in many reaches of the excessively regulated & polluted Yamuna River. The Chambal, one of the cleanest large rivers of India, is highly threatened by multiple irrigation dams existing & planned, and gharial and dolphin populations stand a lot to lose.

The riverine ecosystem synthesis There are some fundamental concepts that together structure a holistic synthesis of riverine ecosystems. The river has been viewed as a continuum with four dimensions of connectivity, including the temporal dimension. At another scale, ecologists have thought of the river to be a series of discontinuities where two broad categories of habitat existed in pools and riffle channels: with diversity being concentrated at a few prime habitats and populations connected by intervening 'relatively unsuitable' habitats. In a topological sense, rivers and streams form dendritic networks that comprise of 'nodes' (e.g. confluence habitats) and 'branches' connecting these nodes, both used by different organisms for survival and reproduction.

The river is not a homogenous entity to begin with: it functions through interactions within and between hierarchically arranged 'patches' of habitat. Also, the river is not a spatially or temporally static system, and the annual flood pulse plays an important role in a total recharge of rivers once a year. In the large floodplains, the river is never the same any year.

Upstream impacts Dams create large reservoirs for storing water. The reservoirs lead to large-scale inundation of land vegetation that subsequently decays and lets off huge quantities of methane, causing trapping of solar radiation, also leading to local temperature changes.

Large dams are also significant contributors to global warming. Also, large tracts of forests, reserves and protected areas, get submerged and lost. This also adds to the burden of erosion in the catchments and greater sediment load gets trapped in dams causing high siltation. Loss of forests in the hills and catchments leads to local temperature inversions, moisture regimes and affects river flows lower down, by causing harm to the feeder streams in the catchments.

Displacement of local people for dam also has had manifestations in land use change, including possible depletion of forest cover. A case study from Panshet in Pune describes how poor resettlement packages for dam-displaced communities led to increased denudation of the catchment hilly areas over the years.

Displaced settlements resettled higher up in the hills, and continued their old practice of shifting cultivation for *Ragi*, even on the higher slopes, causing further loss of forest and hill vegetation from these areas.

Across many regions of India (esp. Western Ghats, Central India and the Himalayan foothills), paradoxically enough, important Protected Areas (PAs), including many critical wildlife habitats and tiger reserves have been designated in upper catchments of dam reservoirs. A lot of forests in dam-adjacent areas of the Western Ghats have been converted to rubber plantations in Kerala.

People displaced by dams are mostly resettled in poor conditions. Resettlement has been non-existent in most cases, and the displaced communities have been reduced from stakeholders to ecological refugees, almost just like the several wild species who have lost their rightful survival domain.

Also, dams have biased the designation of PAs to these inaccessible areas, where protection would be naturally possible from isolation. Existing PAs may not represent many components of diversity just due to their biased location in highland areas.

Not all species can adapt to the sudden change from river to reservoir: the river usually disappears in functional terms because of large inundation. **River dolphin** populations in Nepal have been extirpated (made locally extinct) from many locations because of barrages on the Narayani (Gandak) and Kosi rivers.

It is apparent that dolphins may not have adapted to the changed conditions in the upstream areas and emigrated out from many locations.

The Indus River has a series of barrages that have caused declines in numbers of **Indus river dolphins** or *Bhulan*, a critically endangered subspecies of the Ganges river dolphin. The other serious threat of dams is the genetic isolation of disconnected populations of river dolphins. Dolphins have almost been driven to extinction in many reaches of the excessively regulated and polluted Yamuna River.

The Chambal, one of the cleanest large rivers of India, is highly threatened by multiple irrigation dams existing and planned along its course, and **gharial and dolphin populations in the Chambal stand a lot to lose.** Dams and barrages act as physical barriers to movement of fish species along the length of the river.

Many fishes have to swim upriver from estuaries, for several km in order to breed in freshwater reaches. However, dams have critically affected their movement, thus badly affecting fish reproduction & adult stocks.

Large dams have as badly affected no other fish as the Hilsa *Tenualosa ilisha*, which was also the most important commercial fish species in the Ganges basin. A 99% decline of Hilsa has been reported across the region upstream of the Farakka barrage, making it ecologically and commercially extinct.

The collapse of Hilsa fishery in the reaches of the Ganges in Bihar brought about in its wake, a large-scale collapse of the fishers' economy. The Hilsa has met a similar fate across most of its natural range because of river engineering projects. Many commercially viable species of native carps have also declined in numbers. Local fisheries departments, in order to augment the declining carp production, have conducted introductions of exotic carps and Tilapia that could potentially become invasive and could lead to loss of native fish species.

Interestingly, it has been claimed that even these relatively hardy fishes have also not been able to establish populations in the larger rivers, because of pollution and poor environmental flows. The river fisheries in the Gangetic basin, largely due to altered flow regimes face the threat of ecosystem-level collapse. Bihar, a state with several fertile floodplain rivers, has to import freshwater fish from Andhra Pradesh. The commercially viable carp fisheries in rivers have rapidly shifted to trash, non-target catfish species.

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Upstream impacts link directly to the downstream reaches, as storage in reservoirs leads to a major deficit in environmental flows and sediment transport downstream. When the reservoir capacity gets filled, dam gates release huge volumes of water downstream. This sudden entry of water into a hitherto low-flow riverbed also becomes excess in its own way. Irregular releases can hamper breeding, habitat use and foraging efficiency of many riverine species, as well as change the resource utilization practices of fisher-people. Dam—canal systems of water storage and distribution have further interfered the natural capacities of riverine floodplains to absorb flooding impacts.

Downstream impacts Downstream impacts of dams include water scarcity to floodplain agriculture and fisheries, to riverine biota, through highly reduced river flows, cutting off connectivity between river stretches. There is simply not enough water in the rivers, neither enough depth to maintain channel morphology, erosion-deposition patterns, nor enough stable flow for nets of fishers to stay taut in the waters.

***Why is it that we fall way too short in coming up with creative alternatives or thinking of innovative replacement systems for large dams? Our idea of river development is manipulated by a system that will only consider advanced technological solutions, but never ecological solutions as they offer small steps, and not giant transformations*.**

In the Ganges and Brahmaputra basins, River dolphins, Gharial, mugger crocodiles, diverse fishes, otters, and similar species uniquely adapted to natural flows are facing increasing loss of river habitat connectivity. The problem is even more acute in the peninsular rivers, & has taken a toll on fisheries sustainability & productivity.

Regeneration of hyporheic zones and groundwater in downstream areas particularly in peninsular India has been greatly affected because of altered dry-season flows. As water available to the downstream regions becomes a scarce resource, the pressure on abstraction of water rises enormously, for both irrigated agriculture and chemical industries.

Dry-season abstraction of water in tributaries of the Ganges, Kosi and Godavari rivers have led to key habitats such as major confluences getting cut-off in the dry season, creating blocks in fish migrations and seasonal movements of other riverine fauna.

Also, meander habitats which aid in consistent stable flows and sediment transport might gradually get cut off as flow regimes reduce and cause increased straightening of river channels in the antecedent tributaries of the Ganges.

Dams will have to be rethought not by policy-making, but also by the larger society, by economics, for biodiversity conservation. If we do not take active, urgent steps to curb destructive dams, in reality & in policy, we might have a lot of rocky structures to be proud of; but perhaps rivers with no life.

Unregulated, free-flowing rivers harbour, on average, higher diversities. In rivers with severe flow-regulation, ingress of saline water into low-elevation coastal agricultural land can render large regions infertile and cause crop failures. Entry of organic debris and saline water, without adequate water to provide dilution of accumulating substances, can also pollute groundwater.

Excessive pollutant releases are concentrated further if water volumes are not adequate, and can cause major health hazards. Arsenic contamination of groundwater, a major problem in the lower Gangetic plains, may be accelerated further by altered flows. Rivers are often reduced to ponds because of excessive regulation and these remnants serve as breeding grounds for hordes of mosquitoes and other disease vectors.

Modified flow regimes thus, mainly destroy a river's connectivity in four dimensions, and mark ecosystem-level, high impact changes on ecological links in the floodplain. The impacts of flow regime alterations are being faced across India today, and they are perhaps most severe in the Gangetic basin, the Godavari-Krishna basins & the Western Ghats.

Although state and National water policies state the importance of maintaining e-flows, on the ground, large dams have thwarted the hydrology and changed flow patterns on a landscape scale. E-flow requirements of a river need to be critically addressed and implemented for riverine biodiversity and directly dependent communities, apart from its use-value for socio-economic activities.

Although state and National water policies state the importance of maintaining base flows of the river, on the ground, large dams have thwarted the spatial hydrology and changed flow patterns on a landscape scale. Environmental flow requirements of a river need to be critically addressed for assessing what the river must provide for biodiversity, apart from its use-value for socio-economic activities.

Going even further, it may be argued whether deconstruction or removal of dams might make sense, to start large-scale river restoration and ecologically geared floodplain reclamation programs. There is a lot of scope for exploring stepwise downscaling of large dams to their eventual removal, while providing alternative arrangements for water supplies.

In many areas of the Deccan plateau and rain shadow zones of the Western Ghats, the creation of man-made lakes, percolation aquifers, village tanks, temple tanks, gypsum-clay structures, and stream conservation measures for providing smaller units might be cost-effective & eco-friendly. An overall revival of suppressed systems of urban water management & lakes is needed. Traditional water management systems in the rural landscapes of India have been driven almost to extinction, and their revival, demonstrated in remarkable efforts such as the *Johad* system in Rajasthan, is of high importance.

Why is it that we fall way too short in coming up with creative alternatives or thinking of innovative replacement systems for large dams? Our idea of river development is manipulated by a system that will only consider advanced technological solutions, but never ecological solutions as they offer small steps, and not giant transformations. Small will be beautiful, if our production and consumption systems are geared to appreciate ecology over blind technology.

The arguments against large-dams are multivariate and complex, with important linkages to political, socio-economic, cultural and ecological issues. The clinching statement that pervades all the above clauses is that large dams are simply wasteful and cost-ineffective. There is a realization of the disparity that dams bequeath, & an acknowledgment of the unaccounted costs.

We have tried to grow beyond uncertainty not by understanding it, but through futile attempts to control it. The natural spatial heterogeneity in distribution of flowing water bothers us. We forget that the Indo-Gangetic floodplain is not the same as the rugged Deccan plateau. We cannot assume that dams will cure everyone of their own irrational exploitation of water, and completely forget the diversity of traditional water management systems, tailored to local geomorphology and hydrologic regimes.

Dams will have to be rethought not by policy-making, but also by the larger society, by economics, for biodiversity conservation. If we do not take active, urgent steps to curb destructive dams and river interlinking projects, not merely in reality but in philosophy as well, we might have a lot of rocky structures to be proud of; but perhaps rivers with no life, to give them any meaning.

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Saving some last remaining free flowing rivers

Novel Conservation reserves on Kali, Bedthi and Aghanashini in the Western Ghats

Parineeta Dandekar

Background In the Western Ghats, rivers arising from the mighty mountains and flowing towards the east are worshipped as *Dakshin Vahini* or *Purva Vahini Ganga*. And understandably so. While rivers which flow west of the water divide flow for mere 80-100 km before meeting the Bay of Bengal, rivers like Krishna and Godavari that fall to the south-east flow for thousands of kilometers, meeting tributaries, gathering strength and gifting life and livelihoods to hundreds of towns and villages in the downstream, before meeting the Bay of Bengal.

A landmark decision taken for conserving biodiversity-rich Rivers and basins is the declaration of three conservation reserves in Uttar Kannada district of Karnataka, namely the Aghanashini Lion Tailed Macaque Conservation Reserve, Bedthi Conservation Reserve, and Hornbill Conservation Reserve, on May 31, 2011 by the state Govt.

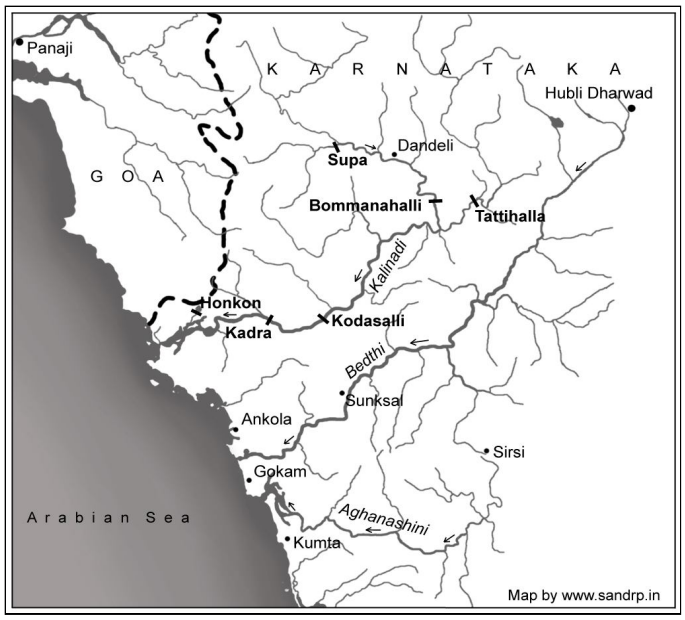
However it seems the short, swift and neglected west flowing rivers have a secret to keep. These river basins are the protectors of some of the richest biodiversity pockets in India, while providing a range ecosystem goods & services to the mountain & coastal populations.

These rivers cut across the Western Ghats and coastal strip of Gujarat, Maharashtra, Goa, Karnataka, Tamilnadu and Kerala. The region is traversed by as many as 115 small and some fairly big rivers. According to National Institute of Hydrology, of these 115 rivers, one in Tamil Nadu, 32 in Kerala, 10 in Karnataka, 3 in Goa, 11 in Maharashtra and 5 in Gujarat are important rivers with more than 23 large dams built on them for water supply and hydropower.[3]

Some of these rivers have been spared as yet from large dams, because of their 'difficult' location. However, most of these unique rivers are being degraded rapidly and irreversibly through large dams, diversions, power plants and polluting industries on their banks.

For example, the ***Vashishthi*** River in Maharashtra suffers doubly as its natural hydrograph is skewed beyond control by water releases of the Koyana hydro electric project, which diverts water from water deficit Krishna valley to water surplus Konkan region for electricity generation. At the same time, Vashishthi houses one of the most polluting stretches of chemical industries on its banks at Lote Parshuram village. Lote Parshuram MIDC has severely polluted the river, making its water unfit for consumption and releasing toxic wastes without treatment, resulting in near total destruction of fisheries and dependant livelihoods in the Vashishthi Estuary downstream. Same is the case of ***Patalganga*** River, which arises from Matheran and flows down to form the Dharamtar creek. Rasayani Chemical industrial belt along Patalganga has rendered its water entirely unfit for consumption, killing fish and rendering agricultural lands fallow and poisoned[4].

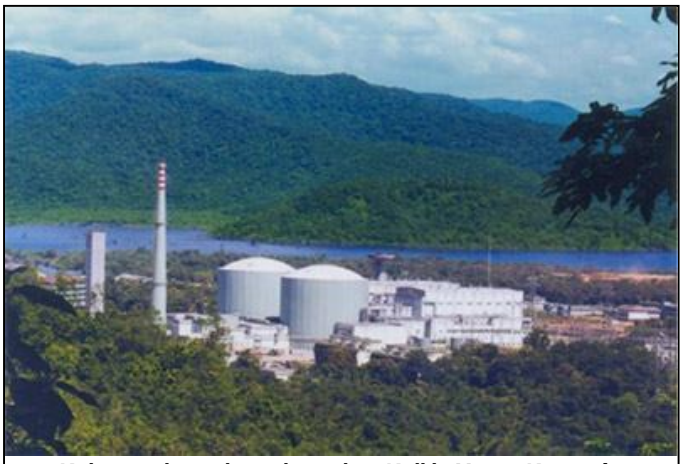
West flowing rivers in Goa, lifelines of the tiny state, face a terrible fate due to rampant illegal mining in river beds and banks. In the catchment of ***Mandovi***, 27 mines generate more than 10000 tonnes of mining rejects per year, which end up in the river. River ***Zuari*** faces the same problem, while River ***Khandepar*** has 21 mines within one square kilometer (For details on impact of mining on rivers in Goa: April May 2011 issue of "Dams, Rivers & People", page 10-12).



Story of River ***Kali*** in Karnataka is no different. Kali, a 184 km long river, flowing through Uttara Kannada district of Karnataka is one of the 'hottest hotspots' of Western Ghats, showing remarkably high biodiversity, species endemism and unique ecosystem goods and services. The river has six dams, world's only nuclear power station in a forest, the Kaiga Power plant, and polluting paper industries on its banks. The Centre for Ecological Sciences, Indian Institute of Science has studied the Ecological status of Kali floodplain.

[3] http://www.nih.ernet.in/rbis/basin%20maps/westflowing.htm

[4] http://infochangeindia.org/water-resources/features/will-area-water-partnerships-give-people-back-their-rivers.html



Kaiga nuclear plant along river Kali in Uttara Kannada

According to CES, '*Six major dams across the river, a nuclear power plant and the paper and sugar industries on its bank have already caused tremendous loss of the biodiversity in the region. Any further development be it a hydro electricity project or any thermal power plant in the district is likely to cause a lot of damage the left over biodiversity as well as it will harm the fish production capacity of the region'.*[5] Campaigns by Environment Support Group, Bangalore and others in the past have been able to stop the proposed Dandeli hydropower project and some other destructive proposals.

Pollution of River Kali has been affecting fisheries, agriculture and cattle of the area. The effluent discharges have resulted in epidemics and deaths due to Gastroenteritis in the villages downstream. Time and again, the Karnataka State Pollution Control Board has been turning a deaf ear towards complains filed by local communities.[6] This is very similar to the response of Maharashtra Pollution Control Board regarding pollution of Vashishthi due to chemical industries in Lote Parshuram village. According to the Western Ghats Expert Ecology Panel Report, the only response of the MPCB has been to shift the field office from Lote MIDC to Chiplun, '*rendering any chances of effective action even more remote than before*.' Similar is the situation in west flowing rivers of ***Damanganga*** and ***Kolak*** in Gujarat, which receive toxic effluents from more than 1000 individual factories in Vapi. Vapi had been considered as one of the top ten most polluted places in the World. [7]

Though the terrain and strata do not encourage large dams, most of the west flowing rivers have been dammed many times over. All of Mumbai's water supply for domestic and industrial purposes comes from dams built on west flowing rivers in forest region. Mumbai is now planning to build more than 8 dams on some of the last free flowing rivers of the region like ***Kalu, Shai, Pinjal and Gargai***. At the same time, the Damanganga-Pinjal Link, a part of the controversial National River Interlinking project foresees not only a dam across Pinjal River in Thane district of Maharashtra, but a link between Damanganga Dam from Gujarat to Thane, through Western Ghat Forests.

In Karnataka too, west flowing rivers like ***Kali, Sharavathy, Nethravathy and Varahi*** have been dammed and diverted at several places, degrading riverine biodiversity, local water supply and fisheries of these basins. Interlinking of Rivers proposals involve further links involving Hemavathy, Nethravathy, Bedthi and Varda rivers.

For Kerala, West flowing rivers form its lifelines and nearly all of the major rivers have been dammed and diverted, including the ***Chalakudy, Nayar, Sholayar, Kuttiyadi, Bharathpuza, Pamba and Periyar.***

In this scenario, there is an urgent need to protect these ecological and social wonders from being further degraded. It has been seen that the Laws like the Wildlife Protection Act (1972), the Water (Prevention and Control of Pollution) Act (1974), the Forest (Conservation) Act (1980), the Environment (Protection) Act (1986), Biological Diversity Act , 2002, etc., despite holding many applicable sections, have proved to be ineffective because of absence of enforcement & community participation. A number of organisations and communities[8] have been demanding that these areas and rivers should be declared as eco sensitive and should be protected from further disturbances.

Name	Area in sq km	Conservation Priority Species	Priority locations
Aghanashini-LTM Conservation Reserve	299.52	LTM, Myristica swamps	Unchalli Falls Katlekan Mukti hole
Bedthi Conservation Reserve	57.07	Hornbills *Coscinium fenestratum*	Magod Falls Jenukallugudda Bilihalla valley Konki kote
Hornbill Conservation Reserve	52.50	Hornbills	Kali river

A landmark decision in this regard is the declaration of three conservation reserves in Uttar Kannada district of Karnataka, namely the Aghanashini Lion Tailed Macaque Conservation Reserve spanning 299. 5 sq. Km Bedthi Conservation Reserve, spanning 57.3 sq. Km and Hornbill Conservation Reserve 52.5 sq. Km, on the 31st May 2011 by Karnataka Govt, Forest, Ecology & Environment Dept.

[5] http://wgbis.ces.iisc.ernet.in/biodiversity/pubs/ETR/ETR29/index.htm

[6] http://www.narmada.org/related.issues/kali/documents/cm.complaint.20030714.html

[7] http://www.blacksmithinstitute.org/wwpp2007/site10e.php

[8] http://www.ces.iisc.ernet.in/biodiversity/sahyadri_enews/newsletter/ETR29_CES_Kawar_23_Oct08/index1.htm
Submission to WGEEP by a number of organisations to declare West-flowing rivers of Western Ghats as Ecologically sensitive areas.

Fishermen and Mangroves in the Vashishthi Estuary

Conservation Reserves Conservation Reserves are a new concept in the rigid framework of Protected Areas under the Wildlife (Protection) Amendment Act of 2002. The novel part of these reserves is that they seek to protect habitats that are under private ownership also, through active stakeholder participation. They are typically buffer zones or connectors and migration corridors between established national parks, wildlife sanctuaries and reserved protected forests in India. They are designated as conservation reserves if they are uninhabited and completely owned by the government but used for subsistence by communities, and community reserves if part of the lands are privately owned. Administration of such reserves would be through joint participation of forest officials and local bodies like gram sabhas and gram panchayats. They do not involve any displacement and protect user rights of communities.

The setting up of these conservation reserves was a part of a lengthy process which involved a number of stakeholders. For example, in case of Aghanashini Lion Tailed Macaque (LTM) reserve, a detailed survey was carried out by Karnataka Forest Department, SACON and ATREE which confirmed largest LTM population in this region. This formed the basis to identify the area as a potential conservation reserve for the lion-tailed macaque. A plan was submitted to Principal Chief Conservator of Forests (Wildlife) in 2008 and also presented to Western Ghats Task Force Committee. It was considered as one of the priority issues by the Western Ghats Task Force Committee during the meeting in 2008 - 09. Scientists from SACON carried out studies with the help of Karnataka Forest Department and CEPF-ATREE Small Grants in this region while pursuing with officials to form a lion-tailed macaque Conservation Reserve for the region adding little more sensitive forests along Aghanashini River and other important fauna and flora of the region to strengthen the fact. In this regard boundary was remarked with the technical support by Mr. Balachandra Hegde and a new proposal was prepared. Deputy Conservator of Forests submitted the proposal to the State Govt and efforts were made to pursue the matter with State Wildlife Advisory Board. [9]

Driving Force behind the Idea Balachandra Hegde, born and brought up in a remote village in the Aghanashini valley and recipient of the Ruffords Grant Award for conservation has been one of the strong proponents of the idea. Here is the story in his words:
'Uttara Kanada district from central western Ghats, Karnataka has four major rivers flowing through it: Kali, Bedthi, Aghanashini and Sharavathi. Out of these, river dynamics of Kali and Sharavathi are already disturbed by 6 and 3 dams respectively. However, like the situation world over, free flowing rivers support immense biodiversity and livelihoods in this region. *In Aghanashini alone, bivalve-based economy has an estimated turnover of Rs 57.8 m per year. It generates direct employment for about 2,347 people, and nutritional security of many more along the Karnataka coast and also in neighboring states.*
(http://www.ces.iisc.ernet.in/energy/water/paper/ETR30/index.htm accessed on August 11, 2011.)

Long history of development v/s environment Uttara Kannada district has about 81 % of its geographical area under forest administration. Though actual forest cover of the district is much less, reliable estimates say at least 60 % of the region is under forests. 1.4 m people live in the district, which has 10251 sq km of geographical area. Only 11 % of the area is cultivated. Population density is about 140/sq kms (Census of India, 2011).

Uttara Kannada has a long history of being proactive about environmental concerns. ***Bedthi and Aghanashini are freely flowing till today only because of the strong people's movement in the region since last three decades.*** Several development projects like hydro electric dam, mini hydel projects, thermal power projects, were proposed along these rivers. Thanks to generations of local people and peoples movements for protecting the river valleys from such development projects.

Karnataka Govt had decided to build major dams across these two rivers during 80's. Widespread opposition to these plans created national level discussion about the projects. Around 2004, Central Electricity Authority planned hydro electricity dams across these rivers under its ambitious project called '50,000 MW hydro electric initiatives'. Conservationists and activists of Uttara Kannada got together to find long lasting ways to stop such efforts. A meeting was organized at Svarnavalli, Sonda, near Sirsi, during 2006 to identify the conservation strategies.

[9] Honnavalli N. Kumara, Declaration of "Aghanashini Lion-tailed Macaque Conservation Reserve", Salim Ali Centre for Ornithology and Natural History

Unchalli Falls on the Aghanashini, protected as a Conservation Reserve

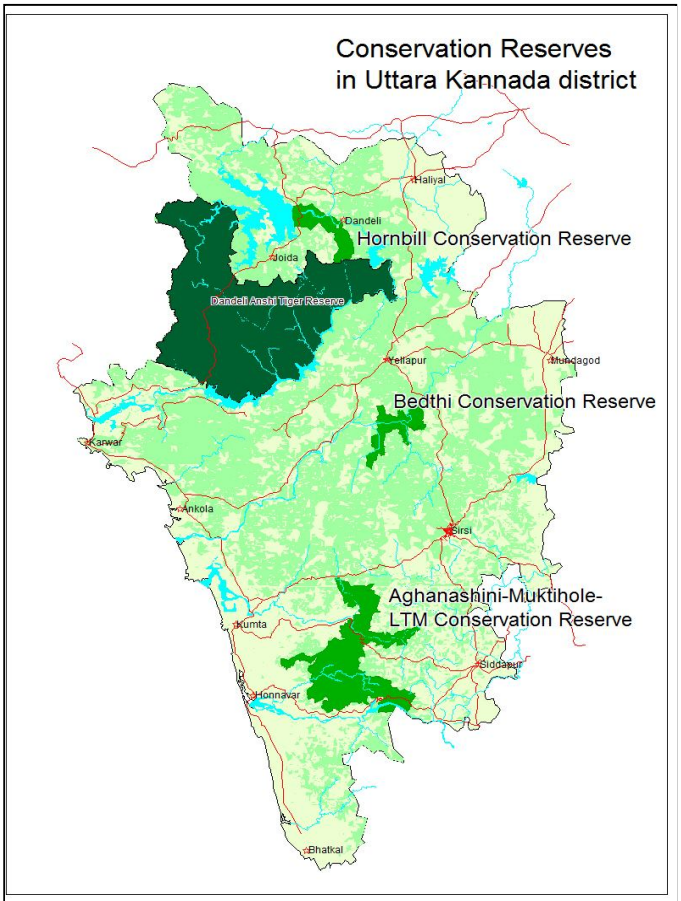
Dr Hedge suggested identifying biodiversity hotspots rich with high conservation value within the landscape and proposed protecting these hot spots with legal options like conservation reserves.

A detailed survey was conducted for this purpose with the support from Western Ghats Task Force and Karnataka Forest Department. Presence of endangered and endemic species, critical corridors connecting larger Western Ghats landscape and potential threats for the region etc., were considered for identifying conservation priority areas.

10 priority conservation areas were identified within this landscape and three conservation reserves covering these priority areas were proposed. Primarily, areas along Bedthi, Aghanashini and Kali river valleys received *Conservation Reserve* tag.

The three reserves set out to protect Lion Tailed Macaque Habitats, rare and endangered Myristica Swamps of the Western Ghats and Hornbill habitats. While the focus is conserving each of these iconic species, the end result of protecting the entire ecosystem will lead to conservation of a number of other endemic and endangered species including the free flowing rivers!

We hope that these conservation reserves herald a beginning of innovative ways devised by communities and experts to protect our last remaining, rare and extremely valuable free flowing rivers. Many such rivers all across the country have been nurturing biodiversity and supporting livelihoods and it is high time that civil society groups, scientists and policy makers come together and look for various ways to protect these rivers from the onslaught of dams and pollution, for the current and future generations.



Map of Conservation reserves in Uttara Kannada. Bhalchandra Hegde

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Freshwater Biodiversity Assessments in WG A two year (2010-2011) project funded by the Critical Ecosystems Partnership Fund reported its key findings about status of freshwater biodiversity in the world's most heavily populated Biodiversity Hotspots, which provides for and supports 400 million people through water for drinking, transport, irrigation, and hydroelectric power, together with food and resources to sustain livelihoods. The project lead by IUCN Global Species Programme's Freshwater Biodiversity Unit, in collaboration with the Zoo Outreach Organisation, conducted the Western Ghats Freshwater Biodiversity Assessment to review the global conservation status and distributions of 1,146 freshwater fishes, molluscs, odonates and aquatic plants.

According to the report, ***the pace of growth of the Indian economy and rates of industrial and urban development are not in tune with the conservation needs of this freshwater ecosystem and the remarkably high diversity of species they contain.*** In most instances the development planning process does not consider the ecosystem's requirements, mainly due to a lack of adequate information on the distribution and status of freshwater species and the threats they face. ***There is also little appreciation of the value of freshwater ecosystems to the livelihoods of many people, often the poorest in society.***
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The geographic scope of the project included all major river catchments with their origin within the Western Ghats Biodiversity Hotspot. The Tapi, Krishna, and Cauvery systems were included, with freshwater species native to the Western Ghats states of Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu, as well as parts of Andhra Pradesh and western & southern portions of Madhya Pradesh, Orissa and Chhattisgarh were assessed.

According to the report, *the pace of growth of the Indian economy and rates of industrial and urban development are not in tune with the conservation needs of this freshwater ecosystem and the remarkably high diversity of species they contain. There is also little appreciation of the value of freshwater ecosystems to the livelihoods of many people, often the poorest in society.*

Key Outcomes

- The Western Ghats (WG) hotspot, originally designated for its plant species, is confirmed as a globally significant centre of diversity and endemism for freshwater species.
- Close to 16% of the 1,146 freshwater taxa assessed are threatened with extinction, with a further 1.9% assessed as Near Threatened. Approximately one-tenth of species were assessed as Data Deficient.
- Within the WG, catchments in the southern part of the region in Kerala, Tamil Nadu and southern Karnataka have the highest freshwater species richness and levels of endemism, but also contain the highest number of threatened species.
- Although many protected areas are located within or near areas of the richest freshwater diversity, the southern WG region also experiences the highest level of threat to freshwater species.
- The northern WG region within Maharashtra has a lower recorded freshwater diversity. Although this trend supports the expected relationship between species richness and rainfall, the lower diversity is probably due to inadequate surveys in the freshwater ecosystems of the west flowing rivers of the northern WG.
- Aquatic plants and fishes are the most heavily utilized freshwater groups in the WG. 28% of aquatic plants are harvested for medicinal purposes, and 14% and 13%, as food for people and animals, respectively. More than half of all fish species are harvested for human consumption and a growing percentage (37%) of species are captured for the aquarium trade. 18 % of mollusc species are used as food for humans.
- *The main threats impacting freshwater biodiversity in the WG include pollution (with urban & domestic pollution ranking as the worst threats followed by agricultural & industrial sources), species use (including fishing & collection for the aquarium trade), residential & commercial development, dams & other natural system modifications, alien invasive species, agriculture & aquaculture, energy production and mining.*

Key recommendations / conclusions

- Taxonomic studies, inventories and monitoring of freshwater fauna and flora of the Western Ghats are urgently needed.
- Many species are narrowly distributed within the WG, where destruction or alteration of a small catchment may lead to their extinction. *Actions required include protection of key habitats, prevention of flow modifications where possible, conservation of specialized ecosystems such as Myristica swamps, prevention of agrochemical use in upper catchments & regulation of tourism in critical habitats.*
- Improved enforcement of pollution laws is needed along with effective effluent treatment and better solid waste disposal protocols.
- Investigations into the spread and impact of invasive alien fish and plant species are an immediate priority. A national policy on the introduction of alien species and their management is required.
- *EIAs of development activities must be evaluated for their impacts to freshwater ecosystems.*
- Awareness programmes promoting better understanding of the values, sustainable use, and management of wetlands and rivers are crucial to eliminate public perception of wetlands as wastelands.
- *Given the rapid rate of development across the region, politicians, legislators and other relevant stakeholders must be given access to key biodiversity information for freshwater ecosystems and this should be integrated within decision-making and planning processes.*
- *Legislation to protect species and habitats exists across the region, but implementation and enforcement need to be more effective. Threatened and endemic species of freshwater fish of biological and socio-economic importance should be included within the National Wildlife Protection Act.*
- *Workshops involving local and regional stakeholders should be carried out to identify and prioritise a set of Freshwater Key Biodiversity Areas based on the potential KBAs identified in the current study. Management plans for these areas can then be implemented to benefit both the many dependant people and the rich biodiversity that these areas support*. (http://www.iucn.org/about/work/programmes/species/our_work/about_freshwater/what_we_do_freshwater/western_ghats/)

Lohit Basin Study by WAPCOS: A mockery of e-flows and cumulative impacts

Looking at the standard of cumulative impacts assessment studies that are being churned out by organisations like IIT R and WAPCOS, it seems like 'Cumulative Impacts Report' will rapidly reach the same level of notoriety as that enjoyed currently by the EIA reports. Cumulative Impact Assessment Report or 'Basin Report' as it is called of Lohit Basin falls in the same category. In order for the report to be of any substantial use, it will need to be redone, with an emphasis on the development in the entire basin.

There is an urgent need to set criteria for preserving continuous free flowing stretches of optimum length of rivers which confirm with important ecosystems & socio cultural needs. For rivers like Lohit, which are free flowing, unregulated, unpolluted & supporting remarkably high biodiversity, we need to immediately decide to leave them in free flowing states.

SANDRP wrote to the Expert Appraisal Committee, River Valley Projects who were supposed to discuss the Lohit Basin study which was commissioned to WAPCOS. Some of the major points raised in the SANDRP letter about the WAPCOS study were:

Assessing impacts of projects on tributaries of Lohit While the basin study looks at the impacts of 7 projects on the main stem, there are other six projects being developed on the tributaries which include: 98 MW Tiding – I, 68 MW Tiding – II, 96 MW Raigam, 21 MW Kamlang, 99 MW Gimliang, 75 MW Noa-Dihing.

SANDRP had written to the EAC about close distance between cascade projects on Jan 19, 2011. The issue was on agenda for the EAC meeting of Jan 21. But as per the minutes on the MoEF website, the issue was not discussed at all in that or any of the subsequent meetings and now EAC has been arbitrarily recommending a distance of 1 km. between two projects as some sort of a misguided standard.

As stated on page 1 of the basin study report, two of the four objectives of the basin study are:

- Review of existing and planned developments as per various developmental plans.
- Evaluation of impacts on various facets of environment due to existing & planned development.

Fulfilling these objectives is impossible without integrating impacts of these six large projects on the tributaries, on the hydrology, ecology and socio cultural scenario in the basin. On the contrary, the report makes assumptions like: "The migratory route of the fishes as such would be affected to some extent, but then the entire *river course is regularly drained by numerous inlets in forms of small rivers,* seasonal nallahs, channels, rivulets and like water sources where these fishes can get refuge during course of their migration to carry out their annual spawning/breeding activity."

Livelihood issues do not find a mention Tribals in Lohit basin have been traditionally dependent on the river basin for ecosystem goods and services it provides. This includes subsistence fishing, floodplain farming, jhoom cultivation, gathering of medicinal and wild food plants, hunting gathering, etc. This crucial element does not find mention in either the individual EIAs or the basin study. At the same time, the report does not mention the impact of the projects, construction activities or submergence on places of religious importance (like Parsuram Kund), temples and local land holdings.

Free flowing stretch of river *"According to the report: With the construction of the proposed hydroelectric projects including Anjaw hydroelectric project, free flowing river shall be available from international boundary for a length of 42.4 km in a stretch of 144.2 km upto dam site of Demwe Lower HEP."*

This gives an impression that the river flows freely for 42 km (there is no ecological justification for this, since free flowing length is broken into several small pieces and it does not make sense to add up such small pieces without assessing if the small lengths are sufficient for the river to regain its ecology). However, it is clear that 32 km of this is in the initial stretch from international boundary to submergence of Kalai Stage I project. From here on, the free flowing 'stretch' is **10.4 km of the 122.2 kms river length!**

Submerged area, behind a reservoir cannot be considered as a 'free flowing river'[10] and stretches can be considered free flowing only if they adhere to e-flow releases. So, of the 122.2 kms stretch of the river downstream Kalai Satge I, hardly 8.5 % of river flows freely, that too in highly fragmented patches.

[10] SANDRP had written to the EAC RVP about close distance between cascade projects on the 19th January 2011. The issue was supposed to be on agenda for the EAC meeting on the 21st January. But according to the minutes published on the MoEF website, the issue was not discussed at all in that or any of the subsequent meetings and now EAC has been arbitrarily recommending a distance of 1 km. between two projects as some sort of a misguided standard.

What sort of ecology and ecosystem goods and services can be supported by such severe fragmentation? All the migratory routes and spawning grounds of endangered fish like Trouts and Golden Mahseer (which cannot use the fish ladders effectively, even if they were to exist and to be operated, both of which are big question marks) will be destroyed.

So, of the 122.2 kms stretch of the river downstream Kalai Satge I, hardly 8.5 % of river flows freely, that too in highly fragmented patches. What sort of ecology and ecosystem goods and services can be supported by such severe fragmentation? All the migratory routes and spawning grounds of endangered fish like Trouts and Golden Mahseer (which cannot use the fish ladders effectively, even if they were to exist and to be operated, both of which are big question marks) will be destroyed.

There is an urgent need to set criteria for preserving continuous free flowing stretches of optimum length of rivers which confirm with important ecosystems and socio cultural sites. For rivers like Lohit, which are free flowing, unregulated and unpolluted with remarkably high biodiversity, endangered and supporting many schedule I species, we need to urgently decide to leave them in free flowing states.

Rivers of the north east are some of the last remaining free flowing rivers in the country, which support unique biodiversity, endangered species and communities. There is an urgent need to protect the free flowing character of these special rivers for the benefit of future generations. The North Eastern States, UN bodies, communities, environment groups and MoEF should be proactive in this respect and should set a bench mark in protecting free flowing status of important rivers, like many countries have already done.

The basin study states too many methodologies and how they are used, without clearly concluding on any methodology. It does not clearly state the data available for Lohit, the data constrains and most importantly, the objectives for setting a certain e-flows regime.

Environmental Flows *The section on environmental flows appears to be most critical and unfortunately, the weakest section of the study. The report states:*

For Kalai I Downstream stretch of river from the dam site will remain dry for a period of 16 to 19 hours, which will be followed by a continuous flow equal to rated discharge of 1033 cumecs for a period of 5 to 8 hours.

Kalai II In lean season river water will be stored for a period of 15-20 hours. As a result, downstream stretch of river from the dam site will remain dry for that period. This will be followed by a continuous flow of 1112.27 cumecs (rated discharge) for a period of 4 to 9 hours.

Hutong I In lean season, river water will be stored in the reservoir for 17-21 hours, the river will remain dry for the corresponding period downstream of dam site. This will be followed by a continuous discharge of 1423 cumecs (rated discharge) for a period of 3 to 7 hours.

Hutong II In lean season, water will be stored for 17-21 hours, resulting in drying of river Lohit downstream of dam site. This will be following by a continuous discharge of 1423 cumecs for a period of 3 to7 hours.

Demwe Upper Project The river flow will be used to fill up the reservoir in lean season for 14-19 hours, the river will remain dry for this period. This will be followed by a continuous discharge of 1513 cumecs for 5 to 10 hours.

Demwe Lower In lean season the river will remain dry for an average of 10 to 19 hours followed by 5 to 14 hours of design discharge (1729 cumecs).

Considering the massive impacts of this drying and flooding regime on the ecology and communities in the downstream, it is imperative to have a sound e-flows assessment and implementation for the Lohit River.

Unfortunately what we find is: The basin study states too many methodologies and how they are used, **without clearly concluding on any methodology.** It does not clearly state the data available for Lohit, the data constrains and most importantly, the **objectives** for setting a certain e-flows regime. For nearly all the methodologies, the crucial part is the objectives being set. In the absence of stated objectives, it is seen that the study **makes some wrong assumptions.**

Tennant Method: Section 9.4 begins with: ***"Assume fair and degrading conditions prevail in the basin".*** **On what basis can this assumption be made**? Through this assumption, very low e-flows, to the tune of 10% Average annual flows in lean season and 30% in April-September have been prescribed. The report itself states that Lohit basin has low pollution, good water quality, high proportion of endemic and endangered species and is completely free flowing as of now. So what is the justification of calculating e-flows which are tailored for a degrading river and lead to a degraded river? This assumption is clearly unacceptable.

Hughes & Munster Method Hughes & Munster method assesses e-flow requirements based on the

environmental category of the river (from A to D). Category selected for Lohit is not clear. Actually, it is unclear if the method followed in Hughes & Munster or Smakhtin (2004) for which no reference is found in the report.

Index Method According to the Index method:
Mean Instream Flow (MIF)= Q355*ka*kb*kc
According to Lohit river basin study: Ka= 0.7 because the report states: "**River ecology is very sensitive"**
Actually, according to Maran's original paper on Index Method, the range for Ka is between 0.7 to 1, depending on the river and ecology. **So 0.7 factor actually indicates the lowest range of ecological sensitivity!**

Kb= 0.25 "River is in a natural state therefore any implementation factor is required." Actually, kb indicates the gradual time application norm (which goes on from 0.25 to 1), as e-flows cannot be increased rapidly for an already modified basin, **but we are talking about a free flowing river here and not a modified river so factor of 1 needs to be used.**

Kc Ranges from 1 to 1.5, depending on the different nature of protection in different stretches of the river (for example for a protected area). **This is again taken as one, lowest on the scale.** Looking at the flawed assumptions, the conclusions arrived at using them cannot be credible.

Only 3 methods: Tenant, Hugh & Munster & Index are considered by the report. We saw some of the short comings & faulty assumptions made in using these methods. Even more surprisingly, the Final Proposed 'Minimum' Flow (Table 9.16) is not based on any of these methods! Neither is the methodology used for arriving at the result indicated! Looking at the far reaching implications of e-flows in Lohit basin on ecology and communities in the upstream as well as the downstream till Assam, there is an urgent need to rework the e-flows section, set objectives based on the pristine state of the river and use a globally accepted methodology, through a transparent and participatory process.

E-flows need to address not only the seasonal variations, but the diurnal fluctuations as well as they are huge. For example, the daily fluctuation in Lower Demwe in the month of February between 88 cumecs and 1729 cumecs will still be ecologically disastrous for ecologically sensitive habitats in the downstream as is obvious from existing global literature on the impacts of peaking hydropower projects.

This highlights the need for e-flows and not 'minimum flows' indicated in the study. There is a need for assessing and maintaining real time (hourly) natural flow patterns of the river in the undammed state in order to mitigate some of the impacts of peaking in order to maintain ecological integrity of the very sensitive ecosystems, as well as livelihood security in the downstream. Massive daily flow fluctuations between 35 cumecs and 1729 cumecs (or for that matter 88 cumecs and 1729 cumecs) cannot be described as e-flows.

Considering these issues, the WAPCOS's Lohit Basin Study Report should be rejected & a fresh study by an independent, credible agency should be initiated.

Cumulative Impacts not assessed An important component of the basin study should be to assess the 'Cumulative Impacts' of all the projects in the basin which go beyond individual impacts. However, no such attempt has been made in Lohit Basin Study. Specifically, some of the cumulative impacts that the report has not assessed include:

1. Changes in sedimentation at various points within project, at various points within a day, season, year, over the years and cumulatively across the basin and impacts thereof.
2. Cumulative impact on aquatic and terrestrial flora and fauna across the basin due to multiple projects.
3. Cumulative impact on hydrological flows, at various points within a project, at various points within a day, season, year, over the years and cumulatively across the basin and impacts thereof.
4. **Green House Gas emissions**, project wise & cumulatively.
5. Cumulative impact of mining of various materials required for the projects (sand, boulders, coarse and fine granules, etc.)
6. Cumulative impact of blasting of tunnels on various aspects.
7. Cumulative impact of muck dumping into rivers (normal practice) and of muck dumping if done properly.
8. Impact of release of silt laden water into the river channel downstream from the dams, and how this gets accumulated, to be assessed singly and cumulatively.
9. Impact of release of silt free water into the river downstream from the power house and impact thereof on the geo morphology, erosion, stability of structures etc, singly and cumulatively.
10. Cumulative impact of all the project components (dam, tunnels, blasting, power house, muck dumping, mining, road building, township building, deforestation, transmission lines, etc) for a project and then adding for various projects.
11. Cumulative impact of deforestation due to various projects.

Considering these issues, the Basin Study Report, as it stands now should be rejected & a fresh study, which includes multiple stakeholders should be initiated which will give us a clear idea of the possible impacts of the cascade of projects on the ecology and people in the Lohit river Basin.

Parineeta Dandekar

CLIMATE CHANGE & WATER SECTOR

Dam Planners not accounting for climate change A new paper in the journal PloS Biology suggests that dam planners not planning in keeping with climate change challenges. Typically, dam engineers study historical water data and decide on a flow rate that will make for an optimal dam project. But the paper's authors, led by John Matthews of Conservation International, note that history no longer offers a reliable guide, particularly with global warming. The paper states that as the hydrological cycle can respond dramatically to even small climate shifts, planning dams in business as usual approach *could soon prove useless*. The authors suggest that large, multi-decade water infrastructure works, such as China's South-North Water Transfer Project are not good ideas as it's becoming increasingly difficult to make long-term plans around a stable climate. (http://www.plosbiology.org/article/info%3Adoi%2F10.1371%2Fjournal.pbio.1001159)

Narendra Modi's Convenient Actions ignore inconvenient truths: *Excerpts from a book review by Rohit Prajapati* Modi's take on climate change conveniently ignores environmental degradation in Gujarat. The book has selectively presented information and data which are convenient to defend the 'development model' being pursued by the state. The author has conveniently ignored the level of irreversible environmental degradation in Gujarat and does not acquainted with the bare-minimum basic grassroots level reality of Gujarat which is facing severe problems due to pollution and degradation of resources, especially dysfunctional effluent treatment facilities. Functioning of Pollution Control Boards at key chemical industrial areas like Vatva, Nandesari, Ankleshwar and Vapi also remain outside the purview of the book.

In reality, Gujarat's environment needs immediate firm affirmative action to stop its further degradation, but for Chief Minister & industries of Gujarat such actions are not convenient for their profit, investment, and "development model".

In the chapter *Big is Also Beautiful (Sardar Sarovar Project)* the author states "Narmada waters have been released in the dry beds of Heran, Orsang, Karad, Dhadhar, Mahi, Saidak, Mohar, Sedhi, Watrak, Meshwo, Khari, Sabarmati and Saraswati rivers. The ecology and water quality of these rivers have drastically improved over the last couple of years." The author conceals the fact that the SSP has affected the downstream ecology, and that the quality and quantity of water of the downstream villages has got severely affected. The author also conveniently ignores the fact that SSP had submerged the rich forest and had displaced lakhs of people. Perennial rivers support biodiversity specific to their hydrograph. Flooding these rivers with inter basin transfers is actually degrading them further.

In the chapter *Silenced River Springs Back to Life (reviving Sabarmati River by inter-basin water transfer)* the author states, "During last three years on an average, 600-1,200 MCM of water [From Narmada Canal] was released every year in the dry bed of river Sabarmati, which gets stored in a stretch of 10.6 km – right upto Vasna Barrage." This conveniently ignores the fact that the Sabarmati River is not just 10.6 km long and does not end at Vasna Barrage of Ahmedabad but flows beyond this through various villages, where people are facing severe problems because of contamination of the river, mainly due to Ahmedabad.

The author ignores the fact that because of the SSP, what had happened to the Sabarmati River (due to damming in 1970s) has started happening to the Narmada River as well.

The author also states: "The primary objective of this escape structure was to safely release the canal water to Sabarmati River in the event of any sort of mismatch between demand and supply which could cause a potential threat to the safety of the canal…. With the stage-wise increase in the Sardar Sarovar Dam height and associated enhancement in available storage, this escape structure became a perennial source of water for Sabarmati River." The author appears to have forgotten the real purpose of the SSP: to supply water to Saurashtra & Kutch as tom-tommed by all Govts including his own.

The author is shockingly and surprisingly proud of converting 10.6 km of Sabarmati River flowing inside Ahmedabad into a canal. The author is least concerned about the river and its ecology and impact on the people and seems only bothered about the 'River Front project', which is all about money, real estate, investment & profit.

Predictably the SSP and river linking projects are cited in with mostly unsupported or unsupportable claims of so-called benefit it will accrue, but not a word on their adverse impact, reported in so many downstream studies not only in case of Narmada, but Sabarmati and Mahi as well. While there is complete silence on the industrial contamination of their waters in downstream areas, how big dams and river linking projects can be an ideal intervention programmes in face of climate change remains unclear. (South Asia Citizens Web 210611)

Global warming contributes to food price increase Researchers from Stanford University have studied global production of four major crops, maize, wheat, rice and soybean. They found the production of maize and wheat declined by 3.8 % & 5.5 %, respectively. The study concludes that the warming of the planet over the past three decades has already led to a measurable reduction in crop production of wheat and maize. The study says the warming effects on production have led to about 20 % increase in global market prices of the four

crops. "At current market prices and global production levels, this translates to about an additional US $50 billion per year spent on food."

Many independent studies are being conducted in India to understand the impact of climate change on crops. One such study shows that rice production has declined in Tamil Nadu. Since 2008 the Agro Climate Research Centre of Tamil Nadu Agricultural University in Coimbatore has been assessing the impact on the state's rice production. They analysed data pertaining to temperature and rainfall on rice production in Tamil Nadu. According to the study's climate projections, Tamil Nadu can experience an increase of 1.5°C towards the middle of this century. This may further increase by 2°C towards the end of the century. "If appropriate adaptive cultivation is not undertaken rice yield would decrease by 15-20 % by the end of the century," warned the team. (DowntoEarth 300611)

Himalayan glaciers receding Indian Space Research Organisation (ISRO) study reveals that 75 % of Himalayan glaciers are on the retreat, with the average shrinkage being 3.75 km during the 15 years under study. During the study, ISRO looked at 2,190 glaciers. The project was commissioned by the Union Ministry of Environment and Forests. The ISRO study used satellite images taken by Resourcesat-1 during 1989-2004. Around 50 experts and 14 organizations including G B Pant Institute of Himalayan Environment & Development, Kashmir University & JN University(Delhi) were involved.

The study included the basins of the Indus, Ganga and Brahmaputra, as well as parts of China, Nepal, Bhutan and Pakistan. Some of the striking examples include the Suru basin (in Ladakh region of Kashmir), a tributary of the Indus River, where the loss in glacier cover has reached nearly 17%. Fourteen smaller glaciers in Suru Valley have already vanished. Discharge of river Lidder, which feeds into Jhelum has increased sharply. One of the reasons for this is the retreating Kalohoi glacier. The Kolahoi glacier could "completely disappear within the next ten years," according to a team of Kashmir University scientists who visited the area in August 2008. The glacier has abnormally shrunk—from 13 sq kms to 11.5 sq kms in the past 40 years and is receding at 10 ft a year. (One World South Asia, India Water Review 050511, 110611)

Glacial Lakes a serious threat Climate change is leading to retreating and melting glaciers, which affect not only the hydrology, but pose a serious danger in terms of glacial lakes that may burst. United Nations Development Fund documentary highlighting the danger of climate change to 1.3 billion people living in downstream valley has stated that there are now 20,000 lakes in the Himalayan belt from Pakistan in the west to Burma in the east. Some of these lakes pose danger to habitations as there is a risk of overflowing.

In 2005, Pareechu Lake in China had burst causing flash flood in the downstream Sutlej basin in Himachal Pradesh in India. At least 32 events of glacial lake overflows have been recorded in the Himalayan region causing huge loss. (Hindustan Times 110711)

Climate change threat to biodiversity in North East A study has warned that change in temperature and quantum and intensity of rainfall coupled with extreme weather condition would have a long-term impact, particularly on the structure and composition of forests in the North east India. The impact is likely to be more severe in areas where other pressures are high, including stability of the natural systems affected due to socio-economic pressures such as dams and such projects, etc. The study estimates that about 30 % of the total forest cover in the region is under pressure due to various factors. Besides pressures from natural hazards such as floods, forest fires and landslides, the study pointed out that seismic activity further exposed the region to the threats. Lack of effective early warning & disaster management systems further intensify the impact of natural hazards. (Governance Now 100611)

Climate Science Review Paints Bleak picture The Review of Climate Science by the World Resources Institute paints a bleak picture. We are continuing to see accelerating change in many systems, with some changes happening much faster than initially envisioned.

- 2000-09 was warmest decade on record since 1880.
- New evidence suggests that as temperature rises, there may be positive feedbacks (processes that reinforce processes) through less cloud cover and in changes in aerosols, soils, peat-lands, and Arctic ice cover, which can accelerate climate change impacts.
- Observations show that multi-year winter sea ice area decreased by 42 % during 2005-2008 and that there was a thinning of about 0.6 m in multi-year ice thickness over the same 4 years (average thickness of the seasonal ice in midwinter is about 2 m).
- Ocean acidification– caused by the buildup of carbon dioxide concentrations – was only recently recognized as a threat to coral in areas such as the Great Barrier Reef (and is happening much more quickly than anticipated). It is now recognized as having implications for the entire ocean food web which is critical to whales, fish, and mollusks (snails and scallops).
- The rate of mass loss in the East Antarctic Ice Sheet may be greater than previously estimated.
- Cumulative total human-caused carbon emissions need to be limited to one trillion tons if global average temperature rise is to remain below 2°C, the goal agreed to by the international community at Cancun. We have already emitted half of that amount (by 2060 we will have emitted the other half, and would need to immediately eliminate all carbon emissions after that date to limit warming to 2°C). (WRI 18x11)

GOVERNANCE

NGT raises questions about Accountability of EIA The National Green Tribunal delivered its first judgment on 12-9-2011 in the matter of Sarpanch Gram Panchayat Tiroda and others Vs Ministry of Environment and Forest and others. The judgment was delivered by Justice Ramulu and Devendra Kumar Aggrawal. The decision relates to a mining project approved by the Ministry of Environment and Forest and was challenged in view of the faulty appraisal process.

The NGT has set aside the Environment Clearance granted by the Ministry of Environment and Forest. The Judgement notes, ***"It is baffling to notice that the EIA consultant, who is supposed to be an expert in the field, has no accountability what so ever, even if he furnishes wrong information or insufficient information, which leads to wrong conclusions that may be arrived at by the EAC as well as MoEF. The proponent generally is not an expert; he goes by the report prepared by the EIA consultant. It is always better to fix the responsibilities on the EIA consultant and made liable for taking suitable action (both civil and criminal) for furnishing any wrong information. The EC must take into consideration the present and the future of environment and ecology of the surroundings for the benefit of posterity. No procedure can be said to be not mandatory. Once a wrong decision is taken, it harms the generations to come. The natural heritage cannot be allowed to be destroyed at the cost of environment, ecology and the future generation. ….we are constrained to record that the act of EAC/MoEF in completely ignoring the non-compliance of the awarded ToR for EIA studies at the time of appraisal and/or grant of EC is totally unreasonable. This approach made by the EAC/MoEF requires to be avoided.***"

The judgment is seen as a "wake-up call" for EIA consultants who produce so called "sweetheart" reports that favour the developers. The NGT judgement is also a wake call for the Expert Appraisal Committee and the Union Ministry of Environment and Forests, both have been guilty of neglecting these issues and not taking action even when evidence was presented to them. They have never taken action against EIA consultants known for plagiarising. (www.ercindia.org 210911)

FAC members critical of corrupt Forest bureaucracy In a scathing letter to the environment Minister Ms. Jayanthi Natarajan, three non official members of the statutory Forest Advisory Committee, Mahesh Rangarajan (Director, Nehru Memorial Museum), Ullas Karanth (Wildlife Expert) and Amita Baviskar (Associate Professor Institute of Economic Growth) have written that Forest officials are fudging data, hiding facts, sidestepping laws, overlooking violations and finding ways of clearing even projects that are dangerous for forests. "From the bottom up, state forest depts/ govts are routinely approving even obviously damaging projects. They have abdicated their role of due diligence, mandatory under the Forest Conservation Act, & honest expression, possibly under political or other pressure."

"We are being forced to take decisions on the basis of inadequate & inaccurate information. When we impose conditions, there is no guarantee that they will be enforced," they said. In most cases, the fact sheet they get from officials fails to provide a substantive basis for rational decision-making, they said. "The only way of accurately evaluating a project is by using independent experts and this procedure needs to become routine in the functioning of the FAC," they have written.

The letter states that the forest bureaucracy was not even providing all the information required under the law for them to take a decision. There is no monitoring of projects once conditions were imposed. "Violations of previous conditions imposed by the FAC are going unchecked," they wrote. They have cited examples to the minister as to how projects were being cleared with shoddy and wrong information. In the report on the controversial Niyamgiri bauxite mining case of Vedanta, they said, "A retired senior official claimed there was an animal with stripes that could either have been a tiger or a hyena (and this on the basis of discussion at roadside tea shops)! No one was punished for providing such false information in the FAC meetings.

They recorded that even the agenda of FAC was not put up in public domain giving them or people time to react in time like it is done in the environmental clearance process. Natarajan confirmed receiving the letter and said that the ministry will consider it seriously and will make any course correction that is required.

Warrants issued for the arrest of absconding IPS Officer in Allain Duhangan case in Himachal Pradesh A session's court in Kullu had issued arrest warrant against a Himachal cadre IPS officer, absconding after being suspended on charges of corruption. AIG (Police) K K Indoria was suspended for allegedly taking bribe from the Allain Duhangan hydro-power company during his posting as SP, Kullu. After rejection of his bail plea by the Supreme Court in the bribery case, Vigilance Bureau was expecting him to surrender but he failed to show up after which a local court declared Indoria as a proclaimed offender. A promotee IPS, the ex SP Kullu Indoria was facing charges of ***corruption and benefiting from Allain Duhangan Hydropower Ltd*** during his tenure from 2009 to 2010. "The vigilance teams will conduct raids at all possible places where Indoria has been moving," Sadyal said. Earlier, the vigilance had arrested a Kullu businessman, who allegedly used to collect bribe on his behalf. Indoria was arrested on Sept 2 and sent on five days police remand. (PTI 170611, The Times of India 030911)

Following this incident, the Minister transferred DIG (Forests) CD Singh, Member Secretary, FAC for fudging of data related to Forest clearance of a hydel project in Himachal Pradesh. According to reports, CD Singh's office put a note to the AIG which contained the photocopy of a note-sheet wherein sanction for another hydro project was recommended. It is reported that a vigilance enquiry has been initiated against CD Singh for "ill-advising" a junior IFS officer at the AIG rank who is his sub ordinate to process the clearance for the project. Unfortunately, none of this information, including the name of this project, is officially available in public domain. Some information which was earlier published on websites like *Bureaucracy Now* has been pulled out.

Looking at the rampant development of hydel projects in Himachal Pradesh which are showing utter disregard to community needs, ecosystem security or even project viability and optimality, this is critical sequence of events. A number of communities, civil society organisations and individuals have been working in Himachal Pradesh, trying to highlight adverse impacts of cascade of hydel projects on communities, rivers, environment and forests. In keeping with the spirit of transparency and accountability in governance, it is crucial that these communities are informed and aware about what is happening with the projects which will have serious impact on them and their ecosystems.

SANDRP, Himdhara, River Research Centre and Manthan Adhyayan Kendra have written to the Minister on the 22 September 2011 **requesting the Ministry to make all the documents in this regard, including letters by the Ministry pertaining to Shri. C.D. Singh and the said project, open to public** and informing the steps which the Ministry is planning to take against Shri. C.D. Singh, apart from simply transferring him. We have not received any response from the Ministry as yet.

However, the forest bureaucracy has stonewalled any attempt to discipline the erring forest officials. Firstly, Mr VK Bahuguna, former IG of Forests (Forest Conservation) in MoEF and current Director of ICFRE (Indian Council of Forest Research and Education) in Dehradun wrote a rejoinder to the letter from FAC members to minister. The article, ostensibly on behalf of Indian Forest Service Association (Central Unit) tried to defend the track record of the forest officials, but failed miserably to achieve anything.

One thing the article achieved was to expose the forest bureaucracy further. Its response to need for greater transparency, accountability and participation is very interesting: "To regulate and monitor the entry of visitors in FC wing by locating it in a secured floor where entry should be controlled by electronic mechanism and entry should be based on prior appointment." The article did not say any thing about the work of the ICFRE that Bahuguna heads, but the EIA of the Renuka dam done by ICFRE is very poor job, and if that is an indication of the work of ICFRE, it reflects very poorly on them. The EIA has such serious contradictions that one is tempted to use that oft repeated phrase: Shocking. EIA was so full of contradictions that it led the NGT to order that the work on the Renuka project be stalled.

Moreover, when Union Environment Minister Jayanti Natarajan wanted to suspend CD Singh, but her move was blocked by the ministry officials. He was sent back to his parent cadre, Himachal Pradesh, after the minister insisted on disciplinary action against the official. Similarly when on Sept 14 Natarajan sent notice for the immediate transfer of AK Rana, chief conservator of forests and in-charge of ministry's Bhopal office, following allegations of him favouring project proponents in violation of norms, Rana continued to function till Sept 18 at least, clearing projects. The whistleblower in this case was his subordinate Sujoy Banerjee, another IFS officer, who alleged that Rana had circumvented the provisions of the Forest Conservation Act to give permission for diversion of forestland.

Meanwhile, a detailed expose of the fraudulent practices of EIA consultants, authored by journalist Anusha Subramanian has been published by business weekly. This should serve as another wake up call for the EACs and MEF, besides the EIA consultants. The detailed critique shows how *the entire process of preparing environment impact assessments has been corrupted*. (News Reporter, The Times of India 220911, The Hindustan Times 250911, Business Today 300911, Pioneer 05x11)

HC orders fresh public hearing for Lanco TPS The Nagpur bench of Bombay high court on Oct 18, 2011 asked the Maharashtra Pollution Control board to conduct a fresh public hearing in Wardha for the Lanco Thermal Power Project. A division bench asked the Wardha collector and superintendent of police to personally monitor the public hearing, sign the minutes and ensure it was video-graphed. Petitioners - Padmakar Deshmukh and others challenged the legality and validity of environmental clearance granted by union ministry of environment and forest to the 1,320MW project. The farmers from Pullai village in Wardha also challenged the legality of the public hearing conducted by the MPCB on Sept 17, 2010 for granting environmental clearance. The judges also asked the expert appraisal committee of Government of India to review environmental clearance granted by MoEF to the project after getting minutes of fresh public hearing. Unfortunately, the court, declined to stay the work on the project. The court said that the public hearing was indeed vitiated and the farmers should be given chance to speak.

The petitioners argued that the villagers were ruthlessly beaten, threatened, manhandled, and forcibly taken away by the goons of Lanco Company during the hearing. The order is yet another wake up call for the Pollution Control Boards, Expert Appraisal Committees & MEF to give due consideration to ensure that genuine public hearings take place as per letter & spirit of the environment law. (The Times of India 19x11)

Mismanagement of Hirakud leads to avoidable flood disaster in Orissa AGAIN

Orissa has again experienced a flood disaster in Sept 2011. The sheer scale of the flood can be judged from the fact that 21 of the state's 30 districts are affected. Initial calculations by the state government reveal that almost 6 million people have been directly and significantly affected. Crops on 4.78 lakh ha of land have been destroyed. At least 83 deaths have been reported. More than 2,900 km of road have been damaged. Thousands of affected people were desperately looking for food. The most shocking aspect is that this is mostly man made flood disaster. Most of the damage could have been avoided had the operation of the Hirakud dam been done keeping in view the actual rainfall in the basin over the past few days and how it will enter the reservoir, forecast of the rains in next few days, the status of reservoirs in the basin and carrying capacity of the downstream rivers.

As early as Sept 4, there was weather forecast about heavy rainfall in Chhattisgarh, western and interior parts of Orissa consisting of Balangir, Sonepur, Sambalpur, Jharsuguda, Deogarh and Boudh districts. But between Sept 4 and 7, only 10 to 15 sluice gates of the reservoir were opened. During these days, water had been flowing at Hirakud reservoir at above 620 ft. If the dam operators had started releasing more water from Sept 4 or earlier, when the forecast was available, they may have had much larger cushion in the dam after Sept 8.

On Sept 7, the dam's level was at 625.6 feet when 10 gates were open. On Sept 9, Hirakud dam was just a few inches short of its maximum storage level—the reservoir level was 629.08 feet against the full reservoir level of 630 ft—and it opened its 59 flood gates. This resulted in one of the worst floods in Orissa since 1982 and 2008. The gates remained open for two consecutive days. Official said that unprecedented rainfall in Chhattisgarh, which accounts for 85 per cent of the river's 84000 sq km catchment area upstream of the dam, led to a huge inflow of water into the reservoir. Within four hours of the opening up of the gates on Sept 9, Sambalpur, which is immediately downstream of the Hirakud, got flooded. In places like Sonepur, a district headquarter town some 80 km from the dam, the river's level rose by a foot an hour during the night of Sept 9.

By Sept 13, large part of the Orissa state was again in the clutches of floods. The flood has impacted all the districts along the Mahanadi which are downstream of Hirakud multipurpose dam in Sambalpur district. This happened despite the fact that the dam, commissioned in 1958, was meant to control floods in the delta areas.

Experts and public in general are attributing this flood entirely to the mismanagement of the Hirakud dam. It is indeed true that for the past ***23 years the dam has not changed its flood control strategy while the rainfall pattern has undergone major changes in local areas***.

Since 1982, almost all severe floods in the state have been triggered by the abrupt opening of the dam's gates—2002, 2008 and 2011. There is a widespread demand that the dam authorities abandon the old rule curve and adopt a new one based on the present rainfall pattern both upstream and downstream of the dam, reassessed storage capacity of the reservoirs in the basin, capacity of the river downstream from the dam to take water, high tide times and prediction of rainfall. This would also involve an agreement and flood coordination with Chhattisgarh state for which there is no such mechanism currently.

Violations of the Rule Curve Rule Curve is a mechanism to regulate outflow and storage in a reservoir in such a fashion that there is no need for sudden release of water in case of heavy inflow. This also ensures maximum storage post-monsoon for power generation and irrigation. All major dams have rule curves and the dam operators are supposed to follow them. However, neither are the rule curve regulations in public domain, nor do they have any legal backing. No one knows what happens if and when dam operators violate rule curve. In fact there is no known instance where senior dam operators have been punished for violation of these regulations. The Central Water Commission, India's apex technical body on water resources management, which is involved in formulation and approval of regulating rules for each major dam and also is involved in monitoring and forecasting of regulation of reservoirs, has very poor track record itself.

In 1988, Hirakud got a new rule of curve that still holds. By this rule curve, the reservoir should attain full reservoir level by end of September. Going by the current phase, the dam had a storage level of 595 feet in the first week of July. It increased to 596.85 ft on July 20. ***On Aug 1 it reached 607.27 ft***. The next week the level rose to 620 ft, against recommended level of 606 ft. ***The reservoir was, in fact, nearing full reservoir level in the first week of Sept, instead of the end of Sept. For a week before Sept 9, there have been regular warnings from the India Meteorological Dept about heavy rainfall in both Chhattisgarh and Odisha. Only in the last week of Aug, the dam opened 10 gates while retaining near full reservoir level. That left the dam operators to pass all the inflows from Sept 9, opening all the possible gates. Rest is part of the state's disaster filled history.***

In 2008 too, a similar situation led to major flood disaster in Mahanadi basin in Orissa. It was the worst flood after the one in 1982. All through August, the authorities filled

the dam reservoir. On Sept 18, it was almost full. Rains in the catchment created a situation wherein the dam's gates had to be opened in a hurry when the downstream areas were experiencing heavy rainfall, which was predicted a week earlier. Floods inundated 19 districts. There were debates and protests because the flood of 1982 was also caused in a similar manner. (SANDRP had worked on a detailed critique of Hirakud mismanagement in 2008: www.sandrp.in/floods/Hirakud_Dam_brings_floods_in_Orissa_Sept08.pdf)

The rule curve says that if there are warnings from the Indian Meteorological Department, the reservoir should be emptied partially so as to accommodate floods and regulate the flow of the river. This, however, was not done. The rule curve is premised on higher rainfall and inflow in July and August, and lesser rainfall in Sept. However, of late there seems to be more such deviations and more regular deviations. There is a clear shift towards more rainfall and runoff in the month of Sept.

Similarly, the issue of coordination and proper operation of upstream dams in Chhattisgarh should also be part of the enquiry. For example, the Has Deo Bango Dam in the basin in upstream Chhattisgarh suddenly released 1.5 lakh cusecs in River Hasdeo on Sept 8 without allegedly informing Hirakud authorities.

Out of the 19 major floods experienced in the state in the recent past, 14 were downstream of the Hirakud and nine were caused by sudden release of water from the dam. In the past one decade, the frequency of floods has increased: there have been five major floods, and all of them have been attributed to the dam storing water in violation of the rule curve.

Notwithstanding the Orissa government's clarification that there has been no violation of the water management in the Hirakud reservoir, Governor M C Bhandare has favoured for an independent inquiry into the controversy over the water management in the dam which led to unprecedented floods in Orissa. Mr Bhandare had asked the Orissa government to conduct an inquiry by a high level committee comprising experts from Central Water Commission. Unfortunately, Central Water Commission itself is an involved party, as mentioned above and an enquiry by it is not likely to be credible. The Central Water Commission itself has had pathetic track record in forecasting floods, including in Mahanadi basin. Moreover, the CWC is supposed to recommend & approve any amendment in the rule curve.

A Public Interest Case filed in Orissa High Court has sought direction to the state government to constitute an expert committee to monitor maintenance of water level in Hirakud reservoir during the rainy season. Suryanarayan Biswal and two other members of the Orissa High Court Bar have said in the PIL that the recent floods in Orissa cannot be attributed only to "nature's fury" and have also sought compensation to the affected due to the man made flood.

"Each time when a flood happens, the officials talk about more dams to contain floods," said Professor Rajkishor Meher of the government-run Nabakrushna Choudhury Centre for Development Studies in Orissa. "Hirakud has already made Mahanadi a river of sorrows and more dams will make this woe permanent."

In a State Level Consultation on Floods on 23rd October at Bhubaneswar, participants re-emphasized on the need for learning to live with rivers rather than trying to tame them to control a few days of flood. Presenting a study on the mismanagement of Hirakud and Rengali dams during the recent floods, Ranjan Panda, Convenor of Water Initiatives Odisha (WIO), showed how Hirakud dam is causing more floods than controlling. WIO organized this consultation along with Orissa Development Action Forum, Forum for Collective Forms of Cooperation and Odisha Khadya Adhikar Abhiyan. The consultation resolved that "No more Big Dams should be allowed in the state." (Water Initiative Orissa, various dates, Down to Earth 140911, Asian Correspondent 270911, Telegraph 08x11, Reuters 12x11, UNI 14x11)

Polavaram tenders raise fresh controversy Former Environment and Forests Minister Jairam Ramesh has said that the Polavaram project conceived by the Andhra Pradesh govt would lead to submergence of huge tracts of land and displacement of people in Dhantewada in Chhattisgarh and Malkangiri in Orissa. He said the Andhra Pradesh govt has been advised to set up an independent monitoring agency. He opined that it should be ensured that no submergence takes place in Chhattisgarh and Orissa where people and the state govts were opposing the project and no impact assessment or consultations have been held. Meanwhile, a huge controversy has erupted about the declaration of contracts for the dam by the Andhra Govt in Oct 2011. There have been serious allegations of violations of the contract terms by the tendering firms and also allegations of give and take by the state govt and the Telengana Rashtriya Samiti leadership. (newkerala.com 150911, Deccan Chronicle 2311, 24x11)

SARDAR SAROVAR PROJECT

Sabarmati will have to depend on Sardar Sarovar According to a study by a study by Indian Institute of Management Ahmedabad (IIM-A), the Sabarmati riverfront project will have to depend on Narmada river to survive because the river may not have much water left in less than 40 years. The study predicts that Gujarat will be a water-scarce state in the near future, and the water coming from the catchment area of the Sabarmati River may reduce by as much as 70 per cent by 2050 causing absolute water scarcity in the sub basins of the river.

"In fact, Sabarmati River Front Development Corp Ltd cannot depend on uninterrupted water supply from Narmada in future as SRFDCL has no formal

agreement with Sardar Sarovar Nigam Ltd, the agency that controls the use of Narmada water to supply water to the river," the study says. According to the study, the annual mean rainfall in the catchment area of Narmada itself will reduce by 229 millimeters by that time and the annual surface flow of the river will be reduced by 3.4 per cent. Talking about the Sabarmati riverfront, the IIMA study says that the project has not considered climate change in any of its projections, though climate change can drastically reduce the water availability in the basin. (Times of India 010711) In any case, the SSP design has not allocated any water for Sabarmati or any of the rivers of the state, nor has there been any allocation in SSP for Ahmedabad or any town or industry south of Sabarmati. All allocations being made now are at the expense of drought prone areas of Kutch, Saurashtra and N Gujarat.

Supreme Court upholds strict compliance of Rehab In a significant judgment for the Narmada valley, delivered by the Supreme Court on July 26, 2011, a three-judge bench have ***held the amendment in Para 5.1 of the R&R Policy which disentitles and bars the oustees who have been paid compensation from claiming their land entitlements under the R&R Policy, is of no consequence.*** Thus the Supreme Court has cleared the path for the thousands of displaced families of the Narmada valley, to claim their entitlements of a minimum 2 ha land under the R&R Policy. These oustees had been pauperized and made landless, by being kept in the dark and denied their land entitlements and by being forcibly paid cash compensation by the State and project authorities, in violation of the R&R Policy. The Supreme Court has now held that there has to be strict adherence of the R&R Policy and that the amendment in PARA 5.1 cannot be permitted to affect the land entitlements of the oustees, or prevent the oustees who have been paid cash compensation, from claiming their land entitlements.

The Supreme Court held that the State has to strictly adhere to the R&R Policy to ensure the fundamental rights and constitutional rights of the oustees to be made better off after their displacement and to ensure special care of the tribals, Dalits and weaker sections under the Directive principles of State Policy enshrined in the Constitution. SC also held that the judgment given by the Supreme Court on May 11. 2011 for the oustees of the Omkareshwar dam would also be applicable in the case of the Upper Beda dam. The Supreme Court in its judgment on May 11, 2011, had held that the allotment of land to the oustees or assistance to them in purchase of land of their choice from other agriculturists could have been done “pari passu” to the construction of the Dam, and could have been completed much in advance of completion of the Dam to the Full Water Level. ***It is thus clear that in keeping with the principle of completion of R&R including the allotment of land before submergence, the lands and houses of the oustees of the Upper Beda dam cannot be submerged, until the thousands of oustee families are allotted agricultural land.***

It may be noted that the Madhya Pradesh State Government issued the R&R Policy for the oustees of Narmada Projects in November 1987. The R&R Policy had stipulated that every family losing more than 25% of its land-holding shall be entitled to and be allotted land to the extent of land acquired, with a minimum allotment of 2 ha to all the displaced families. However, in the last 24 years since the inception of the R&R Policy, ***not a single oustee in any of the dams of the Narmada valley has been provided land entitlements under the R&R Policy.*** However, the State distributed cash compensation to the oustees by keeping them in the dark about their land entitlements, and then on the basis, that compensation had been given to them, barred the oustees from asking for land entitlements. The official data placed on affidavit by the State itself shows that ***70% of the farmers of the Upper Beda dam became landless after their lands were acquired, and 89% of the farmers in the Omkareshwar dam became landless*** after their lands were acquired. The Supreme Court judgment, however has not upheld the entitlements of the landless families which were set out in the GOI clearance given to the project, and the NBA will be filing a review on this matter.

The Narmada Bachao Andolan welcomed this judgment and called on the State Government to give effect to this judgment by ensuring that the oustees who have been denied their entitlements under the R&R Policy and who have been rendered landless and paupers be provided land, so that they can lead dignified and productive lives after their displacement, and the historic injustice done to the Narmada dam oustees for the last 25 years be corrected. (NBA Press Note, 290711)

HYDRO PROJECTS

Inordinate delay in publication of WG Report The Report of the Western Ghats Expert Ecology Panel, headed by Prof Madhav Gadgil which has named Athirapilly as one of the Eco-sensitive Locations in Kerala and has taken a tough stand on mining in Goa has not yet being published. This is despite the fact that the report has been submitted by the end of Aug 2011. A number of community groups and civil society organisations have written o the ministry for speedy publication of the report and implementation of its key recommendations. In the meanwhile, hydro lobbyists have already started opposing the report, even before the publication of the report. (Save the Western Ghats Movement, The Hindu 180911)

Proposed Sindhol Hydro project opposed in Odisha The decision of the State Government to go ahead with the three-stage Sindhol hydro-electric project

downstream of the Hirakud dam to generate 320 mw of power, is being opposed in parts of western Odisha including Balangir, Sonepur, Boudh and Sambalpur.

An MoU has already been signed by the Government of Odisha, the Odisha Hydro Power Corporation and the National Hydro Power Corporation forming a joint company. The project envisages construction of a barrage on the Mahanadi 40 km away from village Deogaon and 90 km from Chipilima. The second unit is 30 km from village Kapasira and the third barrage will be at Godhaneswar. The joint venture company will set up the project Sindhol-1 (100MW) in Sambalpur, Sindhol-II in Sonepur and Sindhol-III in Boudh district.

"The project will displace large number of people in the entire Kosalanchal region. In the past, people of this region rose in stiff opposition to the Manibhadra dam project which had to be shelved. This time also, people will oppose the Sindhol projects tooth and nail," said Kohal Kranti Dal president Promod Mishra. According to a preliminary survey done in 1990, it would submerge 118 villages and 37,000 hectares of total land including reserve forests, village forests and residential areas in Sambalpur, Sonepur, Boudh and other parts in western Odisha. In addition, at least 30 villages under 8 gram panchayats of Kantamal constituency in Boudh district are going to be submerged besides large tracts of land including historical monuments. (The Pioneer 230711)

HYDRO PROJECTS IN NORTH EAST INDIA

Power Ministry seeks Rs 113 B from World Bank According to a release issued by North Eastern Council, Power Ministry has sought a financial aid of over Rs 113 billion from the World Bank for a project of transmission and distribution of electricity among the eight northeastern states. The release also mentioned state-owned Oil and Natural Gas Corporation's 726 MW capacity commercial power project at Palatana, 60 km south of Tripura capital Agartala. Issues like opposition to large dams, their impacts on ecosystems and communities, implications of large infrastructure projects of high seismic activity areas, etc. did not feature in the discussions. (The Economic Times,200611)

Activists in Dibang being branded as Maoists The public hearings (at two different locations) for 3000 MW Dibang hydroelectric project are planned on Oct 24, 2011 and on Oct 28, 2011 (with the proposed dam being one of the world's tallest concrete gravity dam at 288 m) and in face of the stiff local opposition, the administration is trying its best to divert attention from the issue and weaken the opposition. The dates of public hearings have been shifted to Oct 28 and Oct 31, 2011 now.

In a shocking move, it has been claimed that Maoist elements have entered Arunachal from Assam and will be trying to 'misguide and provoke the locals' during the public hearing. However, the Dibang project has been opposed for the past many months and years and there is hardly any question of 'misguidance or provocation'.

Lower Dibang Valley Deputy Commissioner Garima Gupta and Superintendent of Police Veenu Bansal said during a security review meeting at Roing that the district headquarters and the citizens had been put on alert about supposed Maoist activity. However, to local communities and anti dam activities, the reason behind this move is clear. According to them, "Maoist tag has given the license to the police and CRPF personnel to strike at will."

The peace loving Mishmi community is being labelled as Maoist to sabotage its movement against the massive hydropower project that "will bring ecological disaster". Even if some Maoists are active in the area, none of this can be a reason for the police to shoot at unarmed civilians at a religious function. In any case, no evidence has been made available if the Maoists are actually active in Arunachal Pradesh.

As the EPW wrote in its issue of Oct 15, 2011, "In 2008, Prime Minister Manmohan Singh laid the foundation of the Dibang multipurpose project even though it had yet to get environmental clearance and as such, according to the laws of our land, was not yet cleared for construction. By this one act, the top executive authority of the country had shown that he was willing to forgo even the basic formality of following the rule of law when it came to such "development" issues."

The Activists have accused deputy commissioner and superintendent of police of working on behalf of the dam lobby to get the public hearing done at any cost. "This (Ulfa and Maoist connection) has been planted to mobilise additional troops, so the public hearing can be conducted forcibly," said Roing Zilla Parishad chairman.

The 'striking at will' has been experienced already. On Oct 5, Police fired at a Durga Puja Pandal in the Lower Dibang valley, seriously injuring 9 students. This was allegedly done based on the Maoist links. "The unprovoked firing inside a puja pandal was meant to muffle voices against the Dibang Multipurpose Project," said activist Bamang Tago.

All India Mishmi Students Union and other organisations have lodged an FIR against Roing magistrate for the firing. The first public hearing was planned for Dibang in 2007 and it has been cancelled ten times due to public opposition and various shortcomings in the procedures.

The public hearing for the 2,700 MW Lower Siang Valley project was slated for 18 October and is being similarly opposed by the local people, especially those downstream. This public hearing had to be postponed again due to the opposition of the local communities. (The Economic Times 250911, Hindustan Times 091011, Financial Times 101011, Dibang News 131011, EPW 15x11)

Teesta Dams & the Sikkim Earthquake

Hydropower Dams on Teesta have been in the news for all the wrong reasons since their inception. These include environmental violations like dumping of debris in the river, faulty EIA and EMP reports, neglect of affected population, lying about CDM credits and so on. Right from their planning stage, a number of experts had raised doubts about the soundness of setting up the huge cascade of hydropower dams in the seismically most volatile region of India. Entire Sikkim falls in Seismic zone V. Now on the Sept 18, the region experienced a strong earthquake measuring 6.8 on Richter scale. The official number of casualties has crossed 130. The earthquake has raised many questions about the feasibility of major projects in this area, all of which involve extensive blasting and tunnelling of the fragile mountains.

According to Professor Jeta Sankrityayan, former member State Planning Board, W Bengal and also a member of the landslide expert committee 1998, ***the presence of multiple dams on the river Teesta and its tributaries could accelerate earthquakes and increase the damages***. The committee on landslides, which had also studied the tectonic plate movement, had handed over recommendations to the government of W Bengal in 2000. The committee had recommended that no constructions should be allowed on the rivers in this seismic zone. ***"It is very unfortunate that the Government does not pay heed to recommendations of its own committee for which the public have to suffer. Something more devastating can happen any day. It is time the public woke up and pressurized the Government to act more reasonably. Electricity in lieu of lives is not a very human option"*** said Prof. Sankrityayan. "A full scale inspection and study should be conducted by geologists and earth scientists into the recent quake, the damages and their relation with the hydro projects. It should be an independent probe not influenced by the Government. We should not be accelerating or bringing in such natural events otherwise we will definitely have to pay a dear price" he suggested.

According to Prof C.P. Rajendran, a palaeo-seismologist at the Centre for Earth Sciences, IISc-Bangalore, "A time-bomb is ticking away; it's not a question of if but of when the big earthquake of more than Richter 8 will strike northern India." His concerns are echoed by Harsh Gupta, noted seismologist and former secretary in the Union ministry of earth sciences. "A great earthquake in the Himalayan region is overdue. It could occur any time." However, these scientific predictions do not seem to deter the hydel power boom in the fragile Himalayan region. A major fault line is located at Kalijhora (considered the best location to study Himalayan fault lines) and Teesta Low Dam Stage 4 is located at Kalijhora.

16 hydro power employees perish in the quake
Workers of the Teesta III hydro power project abandoned the dam site after **16 of their colleagues died** in the earthquake that hit Sikkim on Sept 18. The earthquake has caused massive damage to some structures at two of the project sites of the 1,200 MW hydro project in the upper reaches of the Teesta River. According to the Senior Deputy General Manager, landslips caused massive damage to office buildings, workers' colonies, tents and approach roads at the two sites. Moreover, it is feared that at least 40 workers at Teesta III site in North Sikkim's Saffo might have perished within minutes, caught in a mountain duct when the tectonic plates under the lower Himalayas shook. Dozens others are missing and feared trapped in the same hydel project site and there's no confirmation of the number of people engaged there.

The tragedy has actually come to light in a twisted way. On the 20th September, officials of the Teesta Urja Company which is a joint venture between the Hyderabad-based Athena and the Sikkim Power Department chartered a chopper to airlift the body of a senior officer. When government sources learnt of the airlift, they asked company officials where they had found the body. The officials tried to hide facts initially, but later came out with a shocking story.

The officer had entered an access tunnel leading to the 1,200 MW Teesta Stage III Hydel Project site deep in the mountain recess when the earthquake occurred. At the time, about 40 workers were drilling through the mountain to carry water from the dam at Chungthang, 100 km from Gangtok, to the generation plant downstream at Mangan. According to some government sources, some tunnels may have collapsed burying the men deep in the mountain. ***"It is unlikely that any of the workers survived the earthquake (that measured 6.8 on the Richter scale). And even if they did, it's doubtful that they'd hold out for very long. The area is mountainous and it will take days before tunnels are re-excavated and the bodies pulled out."*** Indeed as Tseten Lepcha of ACT told SANDRP, the relief and rehabilitation work took a long time to gather momentum.

Now there are fears that Teesta Urja hasn't come out with the full disaster story. Several hundred workers were engaged at the construction site at the time of the earthquake. From Sept 21, there has been a mass exodus of workers employed by the company as well as contractual labourers engaged by sub-contractors. Hundreds of workers have trekked hilly tracks and walked over the debris of blocked roads for more than three hours from different project sites before arriving at Mangan and boarding buses that would take them to their homes.

In another instance of earthquake induced damage to hydro project leading to damages to the people, the canal supplying water to the Legyap Hydro Power Project had been damaged and water hit the Nandok village (Syari Constituency, KT Gyaltshen) collapsing 18 houses including Nandok Secondary School and partially damaging 210 houses. Repairs to all the damages caused by the bursting of the water canal of Legyap Power project would be carried out by the Central Public Works Department along with the treatment to the injured as Legyap Hydro Power Project falls under CPWD, the speaker of Sikkim Legislative assembly assured.

Dams have been scientifically shown as causes of earthquakes in several instances including in India and China. Following the precautionary principle, it will be wise to drop all plans for hydel power projects coming in the North East immediately. All the private and government companies have been aware of the high seismicity and fragility of the region and have been neglecting the fact, passing the risk to the local population. The current earthquakes stand testimony to extent of damage to life and property of local communities which can be caused by large scale infrastructure in the remote area. (IBN Live 180911, Sikkim Mail, The Times of India 210911, The Outlook 031011)

HYDRO PROJECTS IN HIMACHAL PRADESH

Growing opposition in Himachal Pradesh Clashes between local communities and project managements in Himachal Pradesh are becoming more and more common in Kinnaur, Shimla, Kullu and Chamba districts of Himachal.

In a latest protest, four functionaries of Himachal Pradesh Power Corp, including executive engineer of the 130 MW Kashang hydroelectric project in Kinnaur, were taken hostage and released a day later after the HPPCL's assurance that demands of the community on issues like using local people for construction, putting environmental safeguards in place, etc would be accepted. Kashang I, II & III projects are funded by the Asian Development Bank.

Mini and micro hydel projects are facing local opposition because of their serious impact on local water sources and irrigation and non seriousness of the project authorities to implement environmental safeguards. Strong opposition is seen for the 40-MW Renuka project in Sirmaur district, the 4.5-MW Hul project in Chamba, the 1-MW project at Jogini waterfall in Manali and the 100- MW Sainj project in Kullu.

In Chamba, locals have mobilised themselves under the *'Saal Ghaati Bachao Sangharsh Morcha'* against the Hul I and II projects since 2005. Last year five people were injured in clashes between the villagers and the hydropower company's contractors. On the 12 August, 8 Panchayats of the Saal valley have again written collectively to the officials against Hul projects.

Voters of Urni, Yula, Chagaon and Miru panchayats in Nichar subdivision in Kinnaur district boycotted the panchayat elections in December 2010 to protest the upcoming 1,000-MW Karcham-Wangtoo hydropower project due to threats of environmental damage.

Local communities have organized themselves and protesting against the projects because of their severe environmental and social costs. However, according to SJVNL deputy general manager Vijay Verma "Since there is no government land acquisition policy, ***the locals are just blackmailing the companies. The government should provide administrative support in settling land acquisition cases."*** This statement is even more disturbing as most of the power projects are owned by and will profit private companies. According to social activist Kulbhushan Upmanyu, who is heading the Himalaya Niti Abhiyaan: "Successive governments in the state are hell bent on plundering natural resources." (IndiaNews 300611)

Companies making tribals landless: National ST Commission The National Commission for Scheduled Tribes (NCST) has blamed hydro-power companies and especially private investors for turning hundreds of tribals landless and committing serious violations in the acquisition of private land in the two tribal districts of Kinnaur and Lahual-Spiti. The commission has sought a report from the state chief secretary on the number of families that have lost their land following forced acquisition and how denial of appropriate compensation has affected the tribals.

NCST Chairman Rameshwar Oraon said that the private companies, which have been allotted hydro-power projects in the tribal belt, have ***indiscriminately acquired land and made several families landless***, which has led to a strong agitation in the two tribal districts over the failure of the Himachal government to protect rights of the tribals. He further said that the committee has noticed ***serious anomalies in the payment of compensations. While the Himachal Pradesh Power Corporation has paid a compensation of Rs 1.4 lakh per biswa to the affected families, the private companies shockingly paid only Rs 20,000 per biswa***. The five-member NCST team has directed the state to provide land to all the tribals who had lost their land. A delegation from Kinnaur has met Chief Minister Prem Kumar Dhumal and informed him that the Jaypee Group (owner of the controversial 1000 MW Karcham Wangtoo) has not paid compensation to the affected villagers.

The commission has received a number of complaints from Kinnaur, Lahaul-Spiti and parts of Chamba district. An NSCT team was to visit these areas in Sept-Oct to study the situation. (Two Circles 150711, Indian Express 160711)

WATER SUPPLY & SANITATION

Mumbai's 'Chabiwalla' mafia behind dry taps

It appears that the water sovereignty of Mumbai depends not on the many dams it is planning to build but, on an unseen band of ground-level civic workers called chabiwallas, who have been exploiting their position to extort money from citizens besides diverting water to industries for monetary gains. Three chabiwallas were caught red-handed by the Anti-Corruption Bureau last month as they demanded a Rs 40,000 bribe from residents of Powai's Sun City Complex to fix the water pressure that the trio had ***deliberately reduced***. An ACB investigation found that ***"a complete pipeline had been tweaked to divert water to five big industrial groups".***

Mumbai has around 450 chabiwalas who work in shifts. Their tasks constitutes of opening the valves on smaller pipelines at different hours of the day to regulate the supply of water across the city. To carry out their task, chabiwallas get help from a team of sluicemen and labourers. The more the valve is turned open, the higher the water pressure a neighbourhood gets. There have been numerous complains that the civic workers often lower the water pressure ***on purpose and, at times, even shut the supply to arm-twist citizens into paying up.*** This has become common especially before private functions in apartment complexes.

In even more shocking instances, water supply for an apartment complex was terminated for several hours and the resident's investigation revealed that the society's ***security guard, chabiwallas and tanker owners had colluded to terminate the supply so that they could share the money paid for water tankers.*** Call centres there are said to enjoy free and uninterrupted water. Local MLA Yogesh Sagar has been demanding a report from the BMC on the amount of water supplied to office buildings and call centres in Malad but to no avail. He has monitored pipelines and says that excess water is being diverted to call centres and companies regularly.

According to BMC officials, the only way to contain these activities is by installing an electronic system to regulate the water supply along the 4,000-km network. The system includes flow meters and actuators, timer-based devices that automatically opens or shut valves. According to a deputy municipal commissioner, "The Chabiwallas are unofficially running the show." Mumbai has been grappling with water mafia for a long time now.

There is a strong nexus between local goons, politicians, BMC and private tanker owners who run this show. In 2010, a local NGO had launched a helpline to complain against water theft and corruption issues. Water Mafia has also become an easy excuse for the BMC. Everything from pipeline bursts to decrease in pressure has been blamed on the water mafia. (Mumbai Mirror 300311,Governance Now110310, The Times of India 010911)

WATER POLLUTION

Bichhri case revisited
SC comes down heavily on polluting industry

The Supreme Court has directed a polluting chemical industry to **pay over Rs 37 crore with 12 % compound interest (approx Rs 202 crore),** for frustrating its order over the last 15 years by filing frivolous petitions. Taking a stern view of sustained efforts made by the company to circumvent the order, the bench said *people who perpetuate illegal acts by obtaining stays and injunctions must be made to pay the sufferer.* The SC bench noted that though the apex court had directed closure of the Hindustan Agro Chemicals Pvt Ltd and attachment of its assets on Nov 4, 1997 for causing large scale pollution several villages of Rajasthan, the company had successfully dodged compliance due to its money power. *The bench imposed a further cost of Rs 10 lakh on the company for prolonging the litigation*. The total amount realised from the company will be utilised by the state govt to undertake remedial measures in the affected villages. The State Govt had stated that the water in certain wells in Bichhri village and surrounding villages had become unfit for drinking for human beings and cattle due to prolonged pollution. *"This class of people who perpetuate illegal acts by obtaining stays and injunctions from the Courts must be made to pay the sufferer not only the entire illegal gains made by them as costs to the person deprived of his right and also must be burdened with exemplary costs."* the judgment noted. (IBN Live 210711)

LOCAL WATER BODIES

Watershed development in Vidarbha Active local participation, help from NGOs like WOTR and Dharamitra and boost from programs of NABARD have helped troubled villages like Rahati in Wardha district of Vidarbha fight water scarcity and improve food production.

Four years back, Rahati was selected by Nabard to be part of a watershed development programme by the govt of India, which has changed the face of this village. Farmers here have smaller land holding of 3-5 ha. Over the last few years, the village has increased its earnings by about 20-30% due to an increase in crop output. Overall rise in production and water security has also helped the gawali and shepherd community who rear livestock. Watershed management works have also helped neighboring Joga Heti and Nagarjuni villages, which are part of the village cluster under the project.

Every farmer now has access to water directly or indirectly for irrigation. The village has bagged titles of Nirmalgram (clean village) and tantamukt gram (dispute-free village) in the last two years. Though watershed activities had no direct role in both these achievements,

villagers credit it for ushering unity and commitment. This helped them take up additional social tasks like constructing toilets for almost every house in the village. The village now has a temple, library, toilets and active self help groups. A farmer has been able to bring 4 Ha of his wasteland under cultivation due to bunding of forest soil over the fields and making trench bunds, which act as water storages and prevent animals from destroying the crop.

According to a member of the Village Watershed Committee, the guidance provided by Dharamitra and Nabard experts made a big difference in water and soil conservation. "***But the real change has come from use of techniques of water conservation and management, like contour bunding, trenches and farm ponds***," he said. According to NABARD General Manager, the bank has brought 2,104 ha under watershed in the Rahati cluster. First phase of project covering 90,552 ha area in 36 clusters in six distressed districts of Vidarbha, including Wardha district, has been completed with Rs 50 crore investment. In the second phase, the bank plans to invest Rs 78.46 crore for an equal area. Tarak Kate, head of Dharamitra, said he favours NABARD program over schemes like the PM packages, as the bank does not give any money to farmers, but improves their skills and knowledge. He says that the project has made farmers switch to a variety of crops and mixed cropping increasing earnings by 30%. (Times of India 090611)

HC: no construction within 500 m of HFL of Ganga & Yamuna The High Court at Allahabad is currently adjudicating a PIL 4003 of 2006 in which it passed an order in April 2011: "***We thus direct that no construction shall be undertaken by the Allahabad Development authority or by any private builders within 500 m of highest flood level of river Ganges in city of Allahabad as well as part of river Yamuna adjoining the river Ganges (Sangam). The Allahabad Development Authority and the district administration shall ensure that no construction be made in the aforesaid area".***

While this order is specific to the river's stretch in Allahabad, as the petition concerned the city only, it is significant and sets a welcome precedence as it identifies the river's natural limit as its highest flood level (flood plain) and sets a limit of 500 m there from in which no construction is to be allowed. This order could be contrasted with the High Court of Delhi's (HCD) order from Dec 2005 where it too had directed for removal of any construction from within 300 m of the river. However, the Municipal Corp of Delhi had failed to define the river and hence the said order had been variously interpreted by the authorities.

When the order was challenged by the Allahabad Development Authority before the SC, ***the appeal was dismissed by the SC and therefore the ADA has been compelled to stop all its constructions planned or happening within the 500 m limits from the highest flood level as is clear from the court's latest order dated 19 Aug 2011.*** This action of the Allahabad High Court should set a precedence for the similar orders by other courts and can also have a bearing on the MOEF proposed policy on River Regulation Zone. (Yamuna Jiye Abhiyaan 020911)

GROUNDWATER

Global Groundwater Overview One of the latest research papers on global groundwater use concludes: "Restricting our analysis to sub-humid to arid areas, we estimate the total global groundwater depletion to have increased from 126 (±32) km3/annum in 1960 to 283 (±40) km3/a in 2000. The latter equals 39 (±10) % of the global yearly groundwater abstraction, 2 (±0.6) % of the global yearly groundwater recharge, 0.8 (±0.1) % of the global yearly continental runoff and 0.4 (±0.06) % of the global yearly evaporation, contributing a considerable amount of 0.8 (±0.1) mm/a to current sea-level rise." The paper further states about ground water contribution to sea level rise: "However, it is also mentioned that uncertainty is large and that the positive contribution of groundwater depletion may be offset by impoundment in reservoirs and associated recharge of surrounding aquifers. For this reason, anthropogenic contributions to sea level rise are not quantified in Fourth Assessment Report, although they are mentioned as the possible cause for the discrepancy between observed sea-level rise and the sum of the known sources [Church et al., 2001]. However, global groundwater depletion has been increasing since the 1960 and is likely to increase further in the near future, while the increase of impoundment by dams has been tapering off since the 1990s [Chao et al., 2008]. Consequently, the contribution of groundwater depletion to sea-level rise may become increasingly important in the coming decades." (Wada, Y., et al, Global depletion of groundwater resources, Geophys. Res. Lett., Oct 2010)

RIVER LINK PLANS OPPOSED

Par-Purna dam project to displace 25000 tribals Nearly 2,000 tribals gathered at Paikhed village in Valsad district on Sept 13, 2011 to protest against the proposed Par-Purna dam project which threatens to displace nearly 25,000 tribals. The project seeks to link Par, Nar, Tan, Ambika, Khapri and Purna rivers in Dang, Valsad districts of Gujarat and bordering areas of Maharashtra and create a reservoir from which water will be transferred to the Ukai reservoir on Tapi river. Linking of Ukai to Narmada main canal is also a part of the project. At the meeting, a letter was written to the union ministers of tribal affairs and water resources highlighting that over 25000 tribals will be displaced, 19,000 acres will be submerged, of which 9,000 acres is forest land. NWDA is yet to submit the detailed project report. (Times of India 150911)

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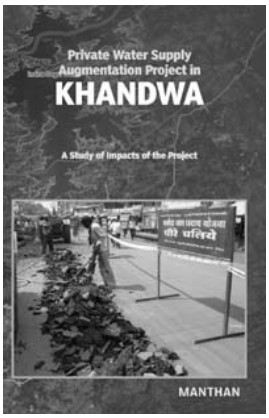

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(Gaurav/ Rehmat, Manthan Adhyayan Kendra, manthan.kendra@gmail.com)

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