

Index

Dams are a Fishy Business	1
Box: Experts on Fish Ladders	5
FAC Violating the FRA 2006	6
Thirsty Rivers, Bygone Fishes, Hungry Societies	7
Loksabha Quotes on Ganga	9
How Many Dams on Chenab:	11
The Himalayas: High Dam Density	14
Yamuna: National Shame	16
Whitewash of MAHA Scam	18
Maharashtra Water Disputes	21
Indore Urban Water Study	24
Methane Emission of Dams	26
Inspiring Microhydro	27
Groundwater Mining and Sealevel Rise	28
Ganga Water, Carcinogenic	29
Recognizing Rights of Rivers	30
Book Review: Bagmati	32

Contact:

Himanshu Thakkar, Parineeta Dandekar, Neena Koshy, Ganesh Gaud
Dams, Rivers and People
C/o 86-D, AD Block, Shalimar Bagh
Delhi - 100 088, India.
Ph: + 91 11 2748 4654/5
ht.sandrp@gmail.com
Web: www.sandrp.in

Dams, Rivers & People

Working for water resources development as if democracy, people and environment matter

Vol 10| Issue 10-11| November-December 2012

Rs15/-

DAMS ARE A FISHY BUSINESS

In recent times, fish-loving Bengalis have been a troubled lot. The supply of coveted Hilsa or Ilish fish, from Bangladesh has reduced to a trickle. Bangladesh imposed an import ban on Hilsa and the price in Indian markets soared to over 1500 Rs/ kilo. Mamta Banerjee actually requested the Centre to intervene and convince Paschim Banga to send more Ilish to Bengal. Deepa Dasmunshi raised this issue first when Bangladesh Leader of Opposition, Khalida Zia visited Prime Minister in October 2012. And she was told the real reason. Padma, a distributary of Ganga River, famed for Padma Ilish is facing an acute drought-like situation. What was not stated was that Farakka Barrage built on the Ganga just before it enters Bangladesh, has been responsible for this and the near extinction of Hilsa, which once was found much beyond Allahabad.

The above was just the most blatant example of impacts of dams on fish, an indicator of riverine health. Impacts of dams on Riverine biodiversity, including fish biodiversity, have been devastating for Indian Rivers. This has been stressed many times by fisher folk as well as studies by Central Inland Fisheries Research Institute (CIFRI), Central Marine Fisheries Research Institute (CMFRI), several universities, independent researchers, NGOs and even the last three Five Year Plans. Dams have been singled out as the main reason behind fisheries collapse in major rivers like Ganga and its tributaries, Krishna, Mahanadi and Narmada, to name a few. Dams and related hydrological fluctuations have magnified the impacts of several other aspects detrimental to fisheries like pollution, sedimentation, wrong fishing practices and invasion by exotic introduced fish species.

Dams have jeopardised the livelihood and nutritional security of more than 10.86 million fisherfolk in India, without any compensation, redressal or mitigation. There is no body entrusted with the protection of aquatic biodiversity, no separate Ministry for fisheries, no law for protecting fish

diversity (the Fisheries Act, 1897 deals only with edible species), no law for protecting river flows, no law for enabling fish migration, no law for compensating affected Fisherfolk, to list a few. These are very serious gaps, with impacts on ecology as well as sociology.

In this scenario, proposals for more dams which will fragment rivers further and divert flows away from the river have to be looked at very carefully. Unfortunately, most of the decisions taken during the meetings of Expert Appraisal Committee (EAC under the Ministry of Environment and Forests recommends environmental clearances to river valley and hydropower projects), and the number of dams receiving environment clearance at various stages, without adequate attention to impact on fish and mitigation measures, is very disturbing and needs to change.

EAC discussions and decisions are based on EIAs submitted by the proponent and these are routinely of a poor quality. Most of the EIAs severely underestimate fish diversity, for example Environment Impact Assessment of 200 MW Gundia HEP done by KPCL which concludes that there are 'no rare or endemic species

fish species in the river'. Not only does the region have endemic fishes, the region is one of the most important sites in India for protection of fish diversity as clarified by many studies in the region including one conducted by Indian Institute of Sciences, Bangalore. And this is just indicative, there are scores of such examples which can be readily provided.

The EAC needs to lay clear norms for EIAs about fish diversity in the region, dependant livelihoods, community conserved fish sanctuaries: impact of dams on all these, in situ mitigation measures, including eflows and only after that ex situ measures like hatcheries.

Unfortunately, an analysis of EAC decisions during the past nearly three years¹ reveals:

1. The EAC has demanded for fish passes and fish ladders at the time of recommending environmental clearance for only six projects out of 157 projects considered by it for clearance at stage I or II. Even in the six cases, this important condition is not clearly or strongly worded.

2. The EAC has demanded for fish passes/fish ladders at the time of granting/reconsidering Term of References for only nine projects and even here, the wording has been ambiguous. For example, in case of 50 meters high Mago chu Dam in Tawang Basin in Arunachal Pradesh, the EAC says 'fish pass may be considered'. Or for 128 MW Jalam Tamak in Uttarakhand, it says fish pass 'may' be provided.

3. For scores of dams, fish passes and ladders have not at all been recommended, though there is a strong reason to do so.

For example, in case of 36 MW Chanju I project whose barrage is only 16 metres high or 17 MW Chanju II HEP on Chanju Nallah in Himachal Pradesh, the EAC

has not recommended a fish ladder. It has simply taken the word of the developer that there are no fish in Chanju Nallah. Actually Chanju Nallah and Siul Nalla where the projects will come up are on the Negative List provided by the Himachal Pradesh Fisheries Department, recommended for In situ protection of fish².

In case of Baspa Barrage, which is on Baspa River, also on the negative list,

21ST NOVEMBER IS OBSERVED AS THE WORLD FISHERIES DAY

On this occasion, SANDRP made this submission to the Ministry of Environment and Forests, specifically it's Expert Appraisal Committee which sanctioned River Valley and Hydropower Projects on urgent need to pay attention to fisheries related issues while sanctioning dams.

The submission was endorsed by over 20 fisheries scientists, researchers, organisations and activists, including a member from National Board for Wildlife, a renowned Dolphin conservationists and many authorities of fish diversity.

the EAC have not recommended a ladder though the barrage is just 16 meters above river bed.

The EAC must immediately reconsider their decisions on Baspa, Chanju I and II projects, reject the projects and recommend strong punitive measures against the developer, as per the steps provided in EIA notification. EAC also needs to take steps to ensure that it does not get misled like this in future and take wrong decisions.

Same is the case with dams in Lahual and SPiti region, famed for its trout fishing. For many dams in Eastern Himalayan Biodiversity hotspot, no ladders or passes have been recommended.

200 MW Gundia Dam coming up on Gundia River in Kumaradhara

Netravathi Basin, where just in the past six months six new fish species were discovered³, no fisheries management plan is in place while recommending a very erroneous environmental clearance. This region is especially important for in situ protection of fish biodiversity and is a freshwater fish biodiversity hotspot in the World Heritage Site of Western Ghats.

In case of Renuka dam on Giri river in Himachal Pradesh, the Central Empowered Committee of the Supreme Court and the Supreme Court itself had directed that fish ladder be constructed, but the developer, EIA consultant, the EAC and the MoEF all ignored that statutory direction.

The above list is only an indicative list, fish ladders/ passes are not recommended for most dams at the time of granting TORs or Environmental Clearances (EC).

4. While some dams are recommended fish ladders or passes, some are not without assigning any reasons for such inconsistencies. Decisions of the EAC seem totally inconsistent, unscientific and erratic.

For example, in case of 50 meters high Mago Chu in Arunachal Pradesh, EAC has said fish pass may be considered, but for 42 meters high Dinchang Dam the EAC explicitly said: "The proposal for providing fish ladder in a 42 m high dam was not appreciated by the EAC as fish ladder in high dams is failure everywhere."

However, for the same dam, while reconsidering TOR for revised capacity from 90 MW to 360 MW, the EAC says "Committee felt that the issue cannot be left loose ended for a study. The Proponent needs to agree to provide fish passage for which the Proponent agreed." Firstly, EAC needs to ensure that decisions made one stage are not reversed at another without assigning

1 Analysis of decisions from 34th EAC Meeting: Jan 2010 to 61st EAC Meeting: Oct 2012

2 http://hpfisheries.nic.in/pdf/Negative_list_rivers_etc.pdf

3 <http://www.deccanherald.com/content/264870/researchers-stumble-species-fish.html> (SANDRP's submission to the EAC on Fish Diversity affected by Gundia Dam, October 2012)



Hilsa's fate hangs in a balance

Photo: Travel.outlook.com

any reasons. Such lack of consistency in EAC decisions for same projects but at different stages have been seen in other cases too like the Seli hydro project on Chenab River in Himachal Pradesh. Secondly, the EAC needs to define fish pass and fish ladder clearly as in normal parlance, the phrases are interchangeable and there are numerous designs for fish passes and ladders.

In many countries, including Bhutan, fish ladders are built effectively for high Dams. In Bhutan, for the 60 MW Kurichhu Dam built by India NHPC, a functioning fish ladder for Golden Mahseer Migration has been provided and is reported to be working well.

While the EAC has recommended fish ladder for some irrigation projects, it has not done so for many irrigation projects with comparatively low dams on biodiversity rich rivers like Kanhan, near Pench National Park in Maharashtra or Kundalia Major Irrigation Project on River Kali Sindh in Madhya Pradesh, a tributary of river Chambal, or the Indira Gandhi Sagar Project on Wainganga River, which is destroying the livelihoods of 15000 fisherfolk only in the upstream, while the downstream impacts are not even estimated. More than 4 lakh people depend on Wainganga River for fisheries alone.

The MoEF and EAC to be consistent in recommending fish passes and ladders, based on unbiased, scientific studies and local participation.

5. Hatcheries and Fish Farms are increasingly being recommended by EAC when impacts of these on riverine biodiversity are entirely unstudied and unmonitored by MoEF. When effectiveness of these measures is not known, millions of rupees are allocated for the purpose without an assessment of what happens to the money.

The mainstay of all Fisheries Management Plans for hydroelectric projects seems to be **hatcheries, reservoir fisheries and fish farms**. However, there has been no study commissioned by the MoEF or recommended by the EAC or by any credible agency to study the impacts of these measures on riverine fisheries, livelihoods of local fisherfolk which are destroyed by the projects or the fish diversity in the river.

In this process, state fisheries departments are receiving huge sums of money from the private developers as compensation and for developing hatcheries and fish farms. This seems to be the main reason for easily-acquired NOCs from State Fisheries Departments.

In Himachal Pradesh alone, the Department of Fisheries charges "compensation @ Rs. 0.50 lakhs per MW power capacity and Rs. 0.50 lacs per km from tail race to weir of the project in case of macro projects being envisaged on the run of the river development." Bajoli Holi Project envisages paying a

compensation of Rs. 97.75 lakhs to the fisheries Department, in addition of development charges for farms and hatcheries. Luhri Environmental Management Plan has an outlay of Rs. 346.57 Lakhs for fisheries management plan, to be paid to fisheries department. No wonder then that the Fisheries Departments are giving NOCs to most hydel projects, including those coming up in Negative List of Streams for in situ fish conservation.

What studies are conducted to ascertain the impact of these farms of riverine fish diversity? The EAC is fast in rubbishing fish ladders for high dams, though the same are being used worldwide after some serious research. But, the EAC does not seem to have any doubts about the efficacy of Hatcheries and Fish Farms.

However, it has been proved the world over that hatcheries help only a few targeted species (often exotic species) and not the biodiversity of the river. On the other hand, fish from hatcheries may actually be detrimental to wild riverine fish, as they may carry diseases⁴. In India too, hatcheries are breeding bigger species, commercial varieties and exotics like exotic carps and Rainbow Trouts in most of the Himachal Hatcheries. **They do not help fish biodiversity and natural population restoration, nor are they targeted to protect indigenous species.** They have impact on fish diseases, limit the gene pool, and affect invaluable biodiversity. Measures like Hatcheries, fish farms, reservoir fisheries also change the ownership of fisheries from a common pool resource to a controlled



Fish Ladder on 60 MW Kurichhu Dam in Bhutan for migration of Golden Mahseer built by Indian NHPC
Photo: drukgreen.bt



Population of Golden Mahseer is fastly declining due to its fragmentation due to dams and barrages on rivers that form their natural habitat.

Photo: Travel.outlook.com

resource, severely affecting security of the people who depend on riverine fisheries for nutrition and livelihoods.

In case hatcheries and fish farms are unavoidable and these and reservoir fisheries are the only option, they can be set up on the lines of community managed reservoir fisheries like on Dimbhe Dam near Pune organised by the efforts of Shashwat⁵.

Why is the EAC not recommending other options like innovative and well researched fish ways, fish passages and ladders and actual in situ conservation of fish by protected rivers? River Tirthan in Himachal Pradesh is the only example in India of a River protected for its rich fisheries. We urgently need to replicate such initiatives for other biodiversity rich rivers and stretches in all states and all kinds of aquatic ecosystems.

6. In situ Conservation of fish and aquatic biodiversity and protection of rivers needs to be looked at more seriously. For this, a number things need to be changed like:

a. Environmental flows: The current norm of recommending 20% of average lean season flow in a 90% year, 30% of average monsoon flow and 20-30% of flow for months in transition is too little, ad-hoc, unscientific and not river

and species specific. For many fish species which need flooding as a cue for spawning and upstream migration, 30% of monsoon flows will not help. Project specific, river specific eflows studies, based on the ecology and sociology of the river need to be undertaken by independent organisation, with local participation. State of art methodologies like the Building Block Methodology need to be explored instead of ad hoc, unscientific 'rule of thumb' methods currently adopted. In the absence of e-flows, fish passes and ladders will have no meaning.

It has been proved beyond doubt that fisheries collapse in most of the rivers have occurred due to absence of freshwater flows and spawning cues. Environmental flow allocation to estuaries like Krishna is extremely crucial. Maintenance of artificial floods has been practiced in many countries in Africa which has led to improvements in fisheries and have regularized high flow volumes well. These techniques need to be added to year-round regular maintenance of e-flows.

b. Release of environmental flows through fish passes/ ladders and not turbines: Eflows need to be linked with fish passes. While well researched

innovative designs of fish ladders/ passes need to be explored, all the eflows releases should take place through these fish ways and not additional, smaller turbines, as is being done now. It is well known that fish face high mortality and injuries even passing through turbines, so migration is impossible. If assurance of continuous flow is the concern then an ungated opening in the dam just below the MDDL (minimum Draw Down Level) adequate to assure lean season eflows should be mandated.

c. Distance between Dams: The current onslaught of cascade dams on biodiversity rich rivers like Alaknanda, Bhagirathi, Chenab, Sutlej, Siang, Dibang, Subansiri, Teesta, Tawang, Kameng, Lohit, Netrawathi, Narmada, etc., will be disastrous to fish biodiversity. The current norm of EAC (though the EAC does not accept it as a norm, is what is being recommended) of a mere 1 kilometre between two hydropower dams will have very serious impacts on fish biodiversity and fisheries. This distance should be based on study of fish and riverine biodiversity for each river by an independent credible agency (not EIA consultants paid by the project developers without ANY credible accountability mechanism) done before more than one projects start getting allocated on any river. The EAC itself has stated in its 56th Meeting that minimum 50% of the river should be left free flowing. **MoEF and EAC need to conduct studies about optimum distance between two dams, based on the carrying capacity, ecology and sociology of the basin. This study should be done prior to recommending environmental clearances (EC) and not delinked from ECs.**

d. Monitoring and compliance: Monitoring and compliance of actual eflows releases, functioning of fish ladders, impacts of hatcheries and fish farms on diversity and local livelihoods needs to be conducted by a legally empowered project specific team with 50% participation from local communities and civil society groups.

e. Exclusion of dams from EIA notification: The EIA notification of Sept 2006 that is currently being followed has excluded large dams for drinking and industrial water supply, hydroelectric projects below 25 MW and also control measures like embankments from its purview. The assumption that these are benign measures with low environmental

habitats along rivers and dams which play a crucial role in fish breeding and populations. Many fish are apex feeders in most riverine systems and fish diversity and abundance, along with vital population processes (migration, recruitment, spawning etc.) indicate the overall health of the river. **Freshwater fisheries, which are an**

WHAT EXPERTS SAY ABOUT FISH LADDERS AND PASSES

Fish ladders/ passes are a controversial topic in India. While the MoEF and EAC would like us to believe that fish ladders do not work for our high dams, ladders for much higher dams (Ex. Pelton am in Oregon, Kurichhu Dam in Bhutan) exist and have been functioning well. SANDRP interviewed several fish and conservation experts from across India and Bhutan about fish ladders and passes. Fisheries Scientists and Experts are unanimous in asserting that we do not have any studies to back the assumption fish ladders/ passes are ineffective in India. We need more studies for our species as "our fish are not Salmon".

Nor do we have studies about the functioning, monitoring, management and efficacy of the rare few existing fish ladders (like at Narora Barrage, Hirakud, Harike, older Bhimgouda Barrage, Farraka Barrage, etc.) we have.

Questions to CIFRI solicited a response that MoEF takes fisheries mitigation very seriously and that CIFRI is working on a report on ladders.

Interestingly, experts were also unanimous in stating that hatcheries should be used as a last resort, if all in situ mitigation measures fail. In their opinion, hatcheries help only few commercial species, while loss of original gene pool and indigenous biodiversity goes unnoticed. Some experts also raised questions about the unaccountable and opaque way of functioning of hatcheries like the Tehri Hydropower Development Corporation's hatchery for Tehri Dam.

Interviewed experts include Dr. Shivakumar from WII, Dr. Prakash Nautiyal from Garhwal University, Nachiket Kelkar from NCF, Dr. Shyam Bhat from Karnataka Fisheries Department, WWF India and Karma Choppel from Bhutan Environment Commission.

impacts (including on fisheries) is clearly wrong. Embankments on Brahmaputra have resulted in declined carp fisheries while small hydro projects in Western Ghats of Karnataka are seriously damaging invaluable fish biodiversity and community fish sanctuaries.

The MoEF urgently needs to change this to include all large dams (as per CWC/ ICOLD/ WCD definition), all hydro projects above 1 MW and all embankment projects for Environment clearance requirements. This will also help protect fisheries and riverine biodiversity. The River Regulation Zone (RRZ) Notification needs to be promulgated to protect riparian

important component of our rich freshwater biodiversity and a source of subsistence for millions of Indians, should be given their due by the MoEF.

This is even more relevant and urgent in the context of climate change which is leading to major hydrological changes and affecting habitats. Dams are compounding habitat loss leaving no adaptive options for people or biodiversity alike. Let us hope that the MoEF and EAC together look at in situ conservation of fish urgently and seriously and help protect rivers and communities in the process.

ENDORSED BY

1. Dr. A.J.T. Johnsingh, Eminent

Wild Life Biologist, Member National Board for Wild Life Standing Committee and Member, National Tiger Conservation Authority, Kerala, ajt.johnsingh@gmail.com

2. Dr. Sunil K. Choudhary, Principal Coordinator, Vikramshila Biodiversity Research & Education Center, University Dept. of Botany, T.M.Bhagalpur University, Bhagalpur, sunil_vikramshila@yahoo.com

3. Dr C.P. Shaji, Fisheries Scientist, Kerala, shajibarb@gmail.com

4. Dr. Prakash Nautiyal, HNB Garhwal University, Dehradun, lotic.biodiversity@gmail.com

5. Dr. R. Rajkumar, Associate Professor, Research and PG Dept. of Zoology, Govt. Victoria College, Palakkad, Kerala, drrajfilmmaker@gmail.com

6. Dr. Nilesh Heda, Fisheries Scientist, Karanja Lad, Washim, Maharashtra, nilheda@gmail.com

7. Dr. Shrinivas Badiger, Water, Land and Livelihoods Expert, Karnataka, sbadiger@atree.org

8. Dr. Latha Anantha, River Research Centre, Kerala, rrckerala@gmail.com

9. Dr. Biju Kumar, Associate Professor and Head, Department of Aquatic Biology and Fisheries University of Kerala, Thiruvananthapuram, Kerala, drbijupuzhayoram@gmail.com

10. Dr. K.H. Amitha Bachan, Research Director, Western Ghats Hornbill Foundation, Aranyak

Thrissur, Kerala, amithab@poetic.com

11. Nachiket Kelkar, Fisheries Scientist, work on Ganges River Dolphin, Nature Conservation Foundation, Karnataka, rainmakernsk@gmail.com

12. Panduranga Hegde, Shrishti, Karnataka, panduhegde@gmail.com

13. Nisarg Prakash, Otter Expert, Nityata Foundation, Karnataka, nisargprakash@gmail.com

14. Ranjan Panda, Water Initiatives Odisha, ranjan.panda@gmail.com

15. Jiten Umnam, Citizens Concern for Dams and Development, Manipur, jitnyumnam@yahoo.co.in

16. Committee on the Protection of Natural Resources in Manipur

17. Centre for Research and Advocacy Manipur

18. Ravindranath, River Basin Friends, Dhemaji, Assam, assamravi@yahoo.co.in

19. Shankar Sharma, Power Policy Analyst, Karnataka, Shankar.sharma2005@gmail.com

20. Samir Mehta, International Rivers, Mumbai, samir@internationalrivers.org

21. Himanshu Thakkar (ht.sandrp@gmail.com), Parineeta Dandekar (parineeta.dandekar@gmail.com), SANDRP

“FOREST ADVISORY COMMITTEE BLATANTLY VIOLATING FOREST RIGHTS ACT”

In a very significant letter to the Environment Minister dated 21st November 2012, Tribal Affairs Minister Kishore Chandr Deo stated that Forest Advisory Committee (FAC) has flouted not only the orders of its nodal ministry but also the law of the land by blatantly violating the Forest Rights Act 2006.

According to the above letter, “As per the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (Forest Rights Act of 2006), clearance for forest diversion for any project cannot be given without recognition of the rights of the people in and around the forests and consent of the gram sabha for such diversion. The Forest Advisory Committee hence should not be considering any project proposals unless there are gram sabha resolutions from the affected villages certifying that indeed forest rights have been recognised and that they are giving consent for the diversion. This is a statutory requirement under the Forest Rights Act.” In addition, environment ministry order of August 2009

aligning its processes to the Forest Rights Act requires that the FAC seek consent letters from affected tribals and forest-dwellers before giving over forests to the industry.

Despite these strong provisions, that letter stated that FAC continued to hand over forest patches to industry in disregard of the law. “I am anguished to find that even five years after enactment of FRA, the statutory FAC continues blatantly to ignore the existence of both this law and the 2009 order. How is it (the FAC) then continuing to ignore people's rights? Why is it misleading both project proponents and the public into believing that these projects are in compliance with the law when they often are not? The FAC's abdication of responsibility will produce conflict,

harassment, injustice, delays and litigation. We have already seen several such instances, resulting in either violation of people's rights or in delays and cancellation of projects.”

He condemned the FAC's recent practice of merely including a “condition” that the FRA should be complied with before final clearance is given. This is lip service that this committee has been doing to avoid the law. He notes that “this is only adding to the confusion ... project proponents will be placed in the odd position of having received “in principle” clearance as well as environmental and other statutory clearances, only to be denied at the very last stage as a result of FRA violations. This would result either in delay in final clearance, or in State governments and project proponents seeking to evade the law entirely.”

He has further said, “We are in agreement that this is a very disturbing scenario as it is a violation of the legal and constitutional rights of our country's poorest and most marginalised citizens. It is also resulting in growing conflict, protests, and litigation, and hence in delays in decision making.”

Significantly, he stated that the tribal affairs ministry too should be represented on the FAC. Asked about Deo's letter, Natarajan stated that she has received the letter and she intends to reply in detail to reiterate “that we are implementing the FRA stringently.”

In the meantime, in the upcoming FAC Meeting for Nov 26-27 makes no mention of the FRA or Gram Sabha resolution while considering clearance to projects. SANDRP and a number of organisations have written to the MoEF and FAC about this serious and continuing farce.

MARKETS NOT A SOLUTION FOR AN ECONOMY WHERE 47% OF ITS POOR RELY ON THE HARVEST OF NATURAL RESOURCES

47%-89% GDP of India's rural poor comes from natural resources: UN, In a report presented at the CBD COP 11 in Hyderabad in October 2012, the United Nations Environment Programme (UNEP) analysed income of 352 million poor Indians and found that 47% of their GDP comes from use of natural resources such as harvesting of forest produce, collecting medicinal herbs from forests and fisheries. The report estimated that the ecosystem services and other non-marketed goods account for between 47% and 89% of the 'GDP of the poor' for India.

Pawan Sukhdev, UNEP's Goodwill Ambassador and team leader of TEEB (The Economics of ecosystems and Biodiversity) said the markets were not a solution to social problems and some cases, they tend, to complicate the matters. “Conventional GDP is not relevant to poor as it does not benefit them as much as the rich”. India has about 380 million poor, half of whom are dependent on ecosystem services for daily sustainability. Even the Prime Minister said at the CBD that, “Biodiversity based livelihood options form the basis of rural survival. Living at the periphery of subsistence, the poor are the most at risk from biodiversity loss”.

At the same time, according to MoEF Press Release, India has diverted 11.44 lakh hectares of forest land, for projects since Forest Conservation Act came into force in 1980 for developmental projects. This means an annual average of 35,775 hectares of forest land diverted, we do not know the extent of its impacts on the rural GDP, wellbeing or ecological health. (*The Hindustan Times* 171012)

1 <http://timesofindia.indiatimes.com/home/environment/developmental-issues/Kishore-Chandra-Deo-accusesenvironment-ministry-panel-of-giving-away-forests-in-violation-of-laws/articleshow/17301883.cms>

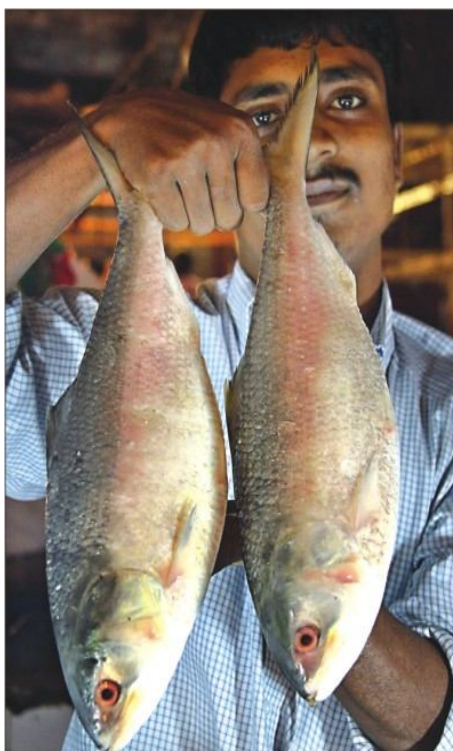
THIRSTY RIVERS, BYGONE FISHES, HUNGRY SOCIETIES

A young naturalist and fisheries expert writes about the bygone fish and biodiversity of Ganga, which nurtured many in her wake and how dams changed the ecology of the lower and middle Ganga basin beyond recognition.

More than seven decades ago, there used to be a facultative¹ clan of monsoonal fishers in the interfluvial region of the Ghaghra and Sarayu rivers in eastern Uttar Pradesh. They would be involved otherwise in farming and related activities, but a time would come in September when they would go seeking Hilsa, that tasty fish running up the waters of the Ganges and into the Ghaghra River, all the way from West Bengal. The Hilsa *Tenualosa ilisha*, a clupeid fish species, used to make annual migrations upriver for spawning in the monsoons, throughout the Gangetic rivers. With that migration it would not only symbolize an eternal and connected river, but also the arrival of a nature-borne delicacy for poor fisher folk. In the Ghaghra basin, that delicacy is not even in anybody's memory now. The Hilsa, except in estuarine Bengal, has become extinct almost everywhere today due to the construction of the Farakka barrage across the Ganges. This barrage was constructed in 1972-73 and thereafter led to a complete blockade in their spawning migratory routes upriver, eventuating in a collapse of the once-viable commercial Hilsa fishery upstream. That was why I was astonished on hearing from the Ghaghra fishers that the Hilsa ranged so north once. Even British records have not mentioned the occurrence of migrating Hilsa much north of Allahabad.

The Hilsa is just one tragic example of many of its cousins that have met the same fate because of large dams. The yellow catfish *Mystus menoda* used to be another such sought-after seasonal fishery. Most fishers have not seen the 'Belonda' as it is locally called, in several years. The trend of declines in 'yellow migrant catfishes', irrespective of actual

species, seems to be a mysterious yet common feature to all perennial rivers of India, from the Cauvery to the Himalayan foothill streams. Enormous declines have been noted for Mahseer in the southern region of the Ganges, to the tune of 'ecological extinctions', where these species are not able to



Last Hilsa of the day

Photo: sos-arsenic.net

perform their ecological roles or provide resources to fisheries anymore. Giant catfishes of our rivers, such as the Goonch *Bagarius yarrellii*, *Silonia silonia* and *Pangas pangasius* that once grew to 200 kilos and above, have been nearly lost too. The freshwater stingray *Himantura sephen* is now a creature of the imagination. The freshwater *Macrobrachium* prawn fishery of the middle and lower Ganges upstream of Farakka has breathed its last. Our native carps, so highly valued by one

and all that eat fish, have shown tremendous declines (up to 70%) due to dam regulation of river systems.

Fisheries collapse from dams has also acted in the reverse order, for species that migrate to the sea to breed and swim upriver to develop as adults. The most notable of these declines has been that of the *Anguilla benghalensis* eel or the Bannbir or Bannbouchh in local terms. This eel is not a sensitive animal.

Apart from being a good, powerful swimmer it can 'walk' on flooded rice fields and marshy wet grassland until it reaches the next water body. It uses surface water connectivity of flooded wetlands by powering itself with large air sacs. Despite this, fishers throughout north and central India report that these large eels have nearly vanished. If even the hardy eel finds no water, it says everything about the rate at which crucial fish habitats are being dissipated. Also, dams have seriously limited the influx of freshwater that maintains estuarine conditions and processes. 'The sea is already at the doorstep of people near Sonakhali' says an old fisher about 30 km inside from the Hooghly-Sunderbans delta mouths at the Bay of Bengal.

Historically important commercial fishes such as the sawfish or the 'comb fish' or Chiruni Maachh in West Bengal, have become extinct in the estuary. This fish was a predatory unique species with a side-barbed snout. The increase in salinity of estuaries because of low freshwater releases by dams across India is also leading to destruction of mangroves and increased coastal erosion. Thus dams have not only affected the fishes but also their homes and nurseries. Seeing the impressive pictures of these unique river giants, one often feels a sense of guilt, along with loss. The bygone fishes of the Gangetic



Dry Ganga downstream Farakka Barrage

Photo Courtesy: <http://riversandcommunities.wordpress.com/2008/>

basin serve as painful memory of the undammed past.

It is also difficult to imagine fishes now as more than food in the public psyche; especially less so as independent, charismatic entities of biodiversity, recognition they immediately deserve. But for the fisher community it is a memory of tastes that heralded a glorious, pristine past. It is folk lore, cuisine and grandfathers' tales of their times. For the young fisherman it is a borrowed, created experience, feeling those tastes without never actually feeling them. Being able to eat these fishes has been a sense of identity, now stepped over by a distant process of destruction.

Fishers who live off the Ganges strongly feel the pressure of dams everywhere. In north India, 'Farakka' – the word doesn't mean a village on the Bangladesh border anymore, but means destruction by dams. The local Hindi dialects have borrowed new phraseology: "Farakka hua, tabse hilsa toh bas bhabis (Farakka happened, and then Hilsa exist only in imagined future)". The same phrase repeats up to the Yamuna River! In my recent status survey of Gangetic fisheries almost 75-80% of fishers singled out 'Farakka' as the root cause of all their miseries. They actually referred to multiple barrages built on the respective rivers. But destruction had a common name.

The in-river scarcity of water is not limited to the loss of fish species alone. Having little water causes a cascade of effects – the collapse of fisheries (to

the tune of 90% in general, and almost 99% for migrant fishes) leads to destructive fishing methods being adopted in desperation and a boom-and-bust fishery begins. Mosquito nets are set up in the main channels of rivers (which would not withstand the flow of enough water), which cause indiscriminate capture and mortality of fish eggs and the smallest of juvenile fishes. How will the fish even grow as a population if the youngest of their lot die at the rate of thousands of tons daily? Invasive exotic species such as Tilapia, Chinese Carps, and (hold your breath) Red-Bellied Piranha, are taking completely over natural river fisheries in India by escaping from food fish culture ponds, as they can establish faster in low flows. Poisoning of shallow side-channels to capture fishes en masse is another horrible fallout of not having much water. The human capacity to degrade fisheries has only been exacerbated by dams and excessive, wasteful regulation of water. When the river flow is so impoverished, digging sand or gravel becomes much easier. And then there is the threat of

excessive sand mining that causes extreme destruction of alluvial floodplains and nesting habitats of several turtles, birds and crocodilians.

We are not much behind China in our freshwater biodiversity debacle. China has also had very similar species going almost extinct in the last 2-3 decades: broadly shads (Clupeids), large catfishes and sturgeons. The Three Gorges Dam on the Yangtze River has converted this mighty river into a large open sewer. Much has been lost in this human-made disaster, including remarkable wild species such as the Baiji or Chinese River Dolphin that are totally extinct, and the Chinese alligator and several endemic turtle species that are now extinct in the wild. It is a for-real forecast of what our species are likely to face given imminent 'complete devastations' of freshwater habitats in the form of proposals of hundreds of dams and river interlinking. The Ganges river dolphin, Gharial, soft-shell and Batagur turtles and several fishes are exact parallels to species that are only confined to human memory now in China. The devastation is in our



Anguilla benghalensis eel or the Bannbir or Bannbouchh

Photo: Wikimedia Commons



Fishing in Ganga Delta

Photo: <http://www.realmagick.com/ganges-delta-agriculture-and-fishing/>

face.

When will our dam builders, ministries of environments, fisheries developers and technocrats wake up? Dams on regulated rivers are supposed to provide timely releases of water in the river, as 'base flows' or 'minimum flows', 'environmental flows or e-flows' as per seasonal dynamics of pulsed flooding and flowing cycles of the rivers. There has however, been no commitment at all from the government

or the National Water Policy Draft, 2012, (or even the current NWP 2002) on the issue of 'e-flows', and of course, no action to maintain flow regimes similar to natural variation or even to maintain minimum flows to maintain hydrological continuity. In fact, recent studies on regulation of tropical rivers suggest that it is not enough to just maintain minimum or e-flows, but near-natural, adequate flows are required for a multitude of ecosystem

processes and functions apart from meeting irrigation, hydropower and industry needs. This is a difficult balance, but it has been suggested that it may still be possible to approximate these needs through regular releases that follow seasonal changes in natural flow regimes. Regular flow releases could actually entail significant benefits to local farm and fish-based economies, mostly practiced by marginalized resource users. Just allowing more water to flow in the river could be a far more effective subsidy than other 'intensive' allocations to these producers (e.g. fertilizers or imported gillnets). At the moment, there is virtually no water in the dry-season even in many large, mountain-fed rivers across the country, as dams have diverted it all away rather wastefully and cheaply, and there is no accountability on the rational use of water distributed. Wasteful, high-end use of water by urban areas, industry or hydropower projects is highly subsidized, whereas it is these uses that need to be charged for cross-subsidy benefits to marginal producers directly dependent on the rivers. These careless allowances have fuelled the pipe dream of technological capacity that our urban societies are still lost in.

If there is not enough water in our reservoirs and rivers, where is the question of mitigation measures for river fishes to migrate for spawning, as is assumed vehemently for a safeguard?

GANGA, FISH AND FARAKKA IN SOME RECENT PARLIAMENT DEBATE

Shri Prasanta Kumar Majumdar (Revolutionary Socialist Party MP elected from Balurghat, W Bengal) said during a discussion under Rule 193 on Situation arising out of the threat being posed to the very existence of River Ganga and the Himalayas in Loksabha on Dec 19, 2011³, "In my state west Bengal the Farakka dam obstructs the river and the Calcutta port is also in poor condition. So the Central Government must take steps in this regard. The fishing community of the basin is wholly dependent on Ganga. The river Ganga must be preserved in the interest of the fishermen also."

Bihar's RJD leader Shri Lalu Prasad Yadav said in the same discussion, "Right from Farakka to Uttar Pradesh lakhs of fishermen live along both sides of this river but today they are starving and have no work to do. Nobody is there to listen to their grievances. People have disfigured the geography of this nation and have also done a great damage to the rivers."

Shri Parbodh Panda (CPI MP from Midnapore in W Bengal) during a debate in Loksabha on Ganga River on May 17, 2012⁴ said: "Farakka project is creating problems in many respects. My suggestion is that, fast augmentation of water flow should be done and most of the dams should be bent and crushed. Steps should be taken against illegal mining. Stringent laws should be made against pollution causing activities. There should be a re-look at the international and several other agreements. There should also be a relook at the dams, canals and hydro plants. There are several options of providing electricity, but there is no alternate to the river Ganga. So, the Ganga should be protected now."

For instance, the Farakka fish lifts do not seem to have been of any help, for studies have been reporting Hilsa extinctions both upstream and downstream to the tune of 99.9%. If they were effective even up to a tidbit of what is claimed, poor fisher people wouldn't have singled out these extinctions so firmly. Some other dams in hill-streams and rivers in the Western Ghats and lower Himalaya have fish ladders that have been claimed relatively helpful, but there is absolutely no empirical demonstration of success available. For large rivers, fish ladders, lifts and passages have been a total failure of mitigation. The success of mitigation has to be assessed at least through the partial restoration of viable local commerce based on migrant fishes, not by touting the occasional flood-time crossover of a handful of fishes to reaches upstream of dams.

Most fish ladders have been completely ineffective as the water levels are simply too low for fishes to cross over their rungs. Tropical fishes have different strategies from species such as Salmon that migrate over dam passages in cold-water rivers and streams. Yet, there is hardly any research on the needs of migratory tropical fish species while planning 'engineering textbook designs' of these ladders and passes. There are many designs, ideas and trials, but what is really needed is enough flowing water. Furthermore, we need a whole body of research on what 'our' fishes actually need, for our fishes are no salmon, and the rivers are not bursting with rapids of icy water (our rivers are much bigger forces to reckon with). There has to be the context of specific address of livelihoods and biodiversity in dam engineering design, mitigation measures, through consultations with local farmers and fishers about the levels of water they desire to see in the river. It does take courage to conduct large-scale experiments on the effective and optimal flow release procedures, but it is needed urgently now if we

have to understand the dynamics of species responses to different flow regimes. Will dam engineers and ecologists sit together and conceive options for flow regime 'creation' by fixing timely releases? It will be of high value and take substantial bureaucratic courage to test experimentally, through treatments and controls with flow regimes for short time-periods in actual dams. Multiple new practices are being adopted in many tropical countries in Africa for the maintenance of artificial flooding to help wetland rice cultivation (IUCN, 2000, www.omvs-



Completely Dry Ganga downstream of Bhimgouda barrage in Uttarakhand
Photo: Parineeta Dandekar

hc.org). Artificial flood maintenance might be an important temporary solution to balance provision of enough water for replenishment of floodplain soils and hyporheic recharge.

River fisheries have been one of India's most underperforming production sectors over the last 3-4 decades. If one had to clinically investigate this decline, it coincides with the period of maximum dam building in India. Very few reports actually mention that the major cause of river fishery collapse has been dams, most reports point to river pollution. But dams have also played a role in massively concentrating pollution effects by reducing the dilution capacity of rivers.

States like Andhra Pradesh and West Bengal have become big on commercial carp production in managed ponds. This has contributed to India becoming

among the largest producers of inland freshwater fish in the world, registering a growth of something like 30-40% in inland fish production just over the last 15 years. But such ranking hides a lot of miserable facts about river degradation. Pond fisheries, due to their sudden (short-term) economic gains, have cornered all attention of fisheries development only to culture ponds and hatcheries. Hatcheries are even being recommended for helping fish grow, that could be released back into rivers to enhance production. But how will these fishes live out there in nature, without adequate, clean water and unblocked swim ways? Also, millions of fishers have no access or capital to start hatcheries, and continue to subsist on natural flows. With their only basis of survival taken away a mass exodus of fishing castes has been occurring; and eking it out as rickshaw-pullers and construction laborers in cities. One could argue that letting some more water flow in the rivers' natural courses could avert these severe economic collapses. Besides it will provide social, cultural, environmental, ecological and hydrological benefits, including groundwater recharge.

The heavy and criminal discounting of river water is going to hit back hard at us one bad day, a fitting price for our blindness as a society to the everyday impacts of dams we have right before us. In the process of denigrating river water, habitats and biodiversity, we would have sold short the lives of millions of Indians. Natural river courses with adequate water, are not only essential for humans, fishes and wildlife, but most critical for the survival of rivers themselves. It is said how we treat our thirsty rivers is a sign of how much we respect our culture and civilization. A look at the parched river courses points to the course our fish wealth has already taken, and our human resources will soon have taken².

NACHIKET KELKAR
(rainmaker.nst@gmail.com)

contd on page 30

- 2 Citations to studies referred to in this article have been listed in the bibliography.
- 3 <http://164.100.47.132/synop/15/IX/Sup+Synopsis-19-12-2011.pdf>
- 4 <http://164.100.47.132/synop/15/X/Sup+Synopsis-17-05-2012.pdf>

DAMSON CHENAB:

HOW MANY ARE TOO MANY?

Chenab (Chand Aab), Chandrabhaga, or the Moon River flows for 130 kilometres in Himachal Pradesh, which holds a tiny proportion of the basins catchment area: 7500 sq kms of its total 61000 sq kms. In this tiny area, Himachal Pradesh is constructing, implementing and planning 49 major hydroelectric projects on Chenab. While other rivers like Sutlej, Beas and Ravi as well as smaller streams and tributaries in Himachal are almost completely dammed or in the process of being finished off, Chenab was the last comparatively free flowing, healthy rivers of the State.

As things stand now, if all these projects are implemented, less than 10% of the river can be seen flowing at all. Dams are being constructed bumper to bumper in a very tight sequence, where water from one hydro project meets not the river, but reservoir of the next hydro project in line. This conversion of a living river into a series of puddles, alternating with dry stretches, bypassed by the tunnels has a profound impact on ecology, biodiversity, hydrology, sociology and water availability of the region.

Himachal is already facing all these impacts in the Sutlej basin where scores of projects are being implemented and where Luhri project, funded by the World Bank, will destroy the last remaining 50 kilometres free flowing stretch of the river. In the neighbouring state of Uttarakhand which is facing a fate similar to Himachal, such cascades on Alaknanda and Bhagirathi Rivers led to wide protests in the entire country. IIT Roorkie and Wildlife Institute of India were commissioned to conduct studies on the Cumulative Impacts of hydropower dams on Alaknanda and Bhagirathi Basins and the Prime Minister and Environment Minister stressed the importance of such studies.

But no one seems to be bothered about Chenab. Himachal Pradesh Government, on the other hand, is aggressively saying that condition of Cumulative Impact Assessment for projects in Chenab put by the MoEF

should be lifted as "it's unilateral and contrary to the state's interests". Chief Minister Shri. Prem Kumar Dhumal, in a letter to Environment Minister Jayanti Natarajan says, "As many as 28 hydroelectric projects of combined



Tandi, where Rivers Chandra and Bhaga meet to form the Chandrabhaga, or Chenab.

Photo Courtesy: Kishore Thakural

generation capacity of 5,800 MW are at an advanced stage of obtaining (Environment Ministry) clearances. All these projects are located on the Chenab. Such a condition would result in delaying the execution of the projects"¹. It seems as if the Chief Minister thinks that interest of the state lies only in execution of hydropower projects and nothing else. Services obtained from a River like water availability, groundwater recharge, fishing, irrigation through smaller streams, climate regulation, tourism and protection of lands, forests, mountains or biodiversity are not in the interest of the state and worthless.

Even as the entire world is making efforts to ameliorate impacts of

hydropower dams, when there is burgeoning literature pointing to the impacts of hydrological fluctuations on ecology, when USA has actually decommissioned more than 1000 dams, majority of them hydropower projects, for their impacts on ecology, the Power Secretary of Himachal Pradesh, said before a meeting of Expert Appraisal Committee (EAC) of the MoEF on Cumulative Impact Assessment study of Chenab that "so far there is no conclusive study indicating that the Hydropower projects have detrimental effects on the river health"². This is a completely wrong and unscientific statement demonstrating clear bias of the state government for hydel projects, most of them by private players. And the Expert Appraisal Committee, whose primary task is to look at environmental impacts of all major Hydro projects of the country and sanction projects based on the severity of these impacts, did not object to this statement!

Dams on Chenab in Himachal: In the ecologically and socially fragile, highly seismic District of Lahaul and Spiti, more than 20 projects are sanctioned or are under construction. Interestingly, most of these projects are being developed by powerful private players like Tata Power, Reliance, DCM Sri Ram, Moser Baer and L & T.

Impacts: Many of these projects are being opposed by locals. Lahaul and Spiti region is a secluded region with a population density of less than 2 people/sq kms at places³. The region is dotted with Buddhist Monasteries, is famed for its peas and potatoes, swift and scenic rivers and thriving population of trout fish. 300 MW Gyspa

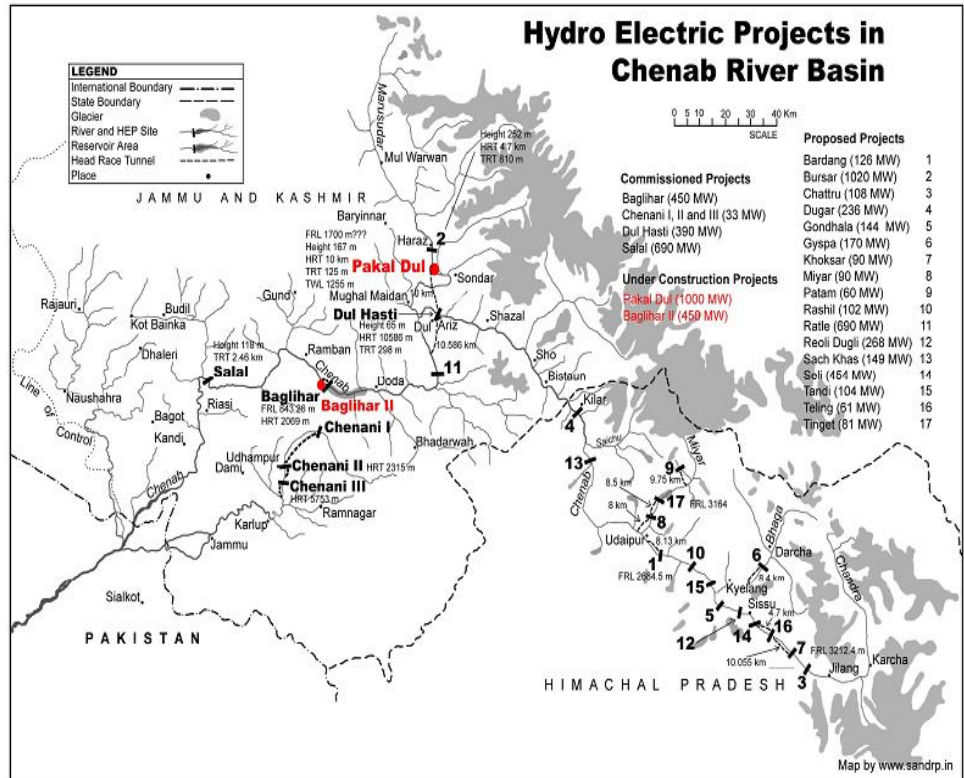
1 <http://thehimachalnews.com/himachal-asks-for-environment-waivers-on-chenab-river-projects/>

2 Statement by Shri. Deepak Sanan, 55th Meeting of the Expert Appraisal Committee of the MoEF

Project has been facing stiff local opposition because of its submergence and displacement of more than 100 families. The region has very few places fit for yearlong inhabitation and cultivation making rehabilitation is very difficult task for close knit communities. In addition to dams on Chenab, dams on Spiti River, tributary of Sutlej also fall in Lahual & Spiti region, adding to the unimaginable stress on the vulnerable and highly seismic region. Nearly all projects fall in seismic zones IV or V.

Cumulative Impact Assessment? The MoEF sanctioned TORs for conducting Cumulative Impact Assessment (CIA) of Chenab in February 2012. Very surprisingly, this critical task has been entrusted to the Directorate of Energy, Government of Himachal Pradesh. Can there be an agency with a greater conflict of interest than the Directorate of Energy to conduct this study? Can we expect this department, which has been hell bent on damming all flowing rivers, streams and nallahs in Himachal, to conduct this study in an unbiased manner? Even as the Directorate put out request for proposal for contractors to conduct this study, it did not mention that the consultant has to be an independent agency with credible track record. This was specifically instructed by the EAC. This seems to be just a beginning of a biased study, heavily favouring hydro projects.

The MoEF on its part, seems to have meekly accepted Himachal Pradesh Chief Minister's demand of delinking Environmental Clearances with Cumulative Impact Assessment Study without any questions asked. EAC and MoEF have been according clearances and TORs to projects on Chenab with great efficiency. **In the last 2 Meetings in Sept-Oct 2012, the EAC approved TORs and revised capacities for as many 6 Projects in Chenab in Himachal, without even mentioning that recommendations of the Cumulative Impacts Assessment Study will have to be adhered to.** As it is, we do not have a single example of a



project being dropped or modified significantly after Environmental Clearance has been granted. The EAC even finds changing E-flows release condition impossible after granting a clearance. So no independent action can be expected after this delinking.

Delinking environmental clearances from CIA study defeats the entire purpose of undertaking an objective CIA. If the assessment of cumulative impacts is not going to inform the decisions, heights, capacities and lengths of Head Race Tunnels for the project keeping in mind various aspects of impacts and carrying capacity, what is the use of the cumulative impact assessment? EAC and MoEF should immediately stop considering any projects in the basin for consideration before a credible, independent CIA is completed and assessed in participation with the Chenab valley residents and others concerned.

In addition to this, private project proponents are 'revising' (another term for increasing) capacities of hydel projects by leaps and bounds. The reason given is increased water

availability as indicated in Central Water Commission's revised hydrological studies. Urgent studies are needed to understand why water availability in these regions is increasing sharply. One of the most probable reasons is increased glacial melt due to Climate Change. This needs to be analysed further as it has many far reaching implications on water security and disaster management. This can lead to increased danger of extreme climate events like the devastating floods in Leh in 2010 which took a toll of over 115 lives. Impacts of such extreme climate events will be compounded by the scores of hydel projects. Local communities are also raising these issues in most of the public hearings, without getting satisfactory responses.

Hydel projects on Chenab in Jammu and Kashmir: As Chenab descends from Himachal and enters Jammu and Kashmir, it is dammed by even bigger projects operating, under construction or planned. Table 2 below lists hydropower projects of close to 9000 MW in Chenab basin in Jammu and Kashmir, this is not the full list.

Partial List of Large Hydro Projects Planned/Under Implementation in Chenab Basin in Himachal Pradesh								
SI No	HEP	CAP in MW	District	Tributary	Length of HRT (km)	Distance from U/s Project	Distance from D/s Project	Developer
1	Gyspa	300	Lahaul and Spiti	Bhaga	14.96			HP Power Corporation Ltd
2	Chattru	120	Lahaul and Spiti	Chandra	10.48	Not Applicable		DCM Sri Ram
3	Shangling	44	Lahaul and Spiti	Chandra				Reliance Power
4	Miyar	120	Lahaul and Spiti	Chandrabhaga				Moser Baer
5	Tandi	104	Lahaul and Spiti		7.4			ABG Shipyard
6	Rashil	130						ABG Shipyard
7	Seli	400	Lahaul and Spiti				Zero	Moser Baer
8	Reoli Dugli	420	Lahaul and Spiti		11	Zero		Moser Baer
9	Teling	94						Reliance Power
10	Bardang	126	Lahaul and Spiti					ABG Shipyard
11	Patam	60	Lahaul and Spiti		9.75 + km			
12	Tinget	81						
13	Purthi	300	Lahaul and Spiti					Reliance Power
14	Sach Khas	260	Chamba	Chenab	3.5 km		9 kms	
15	Dugar	380	Chamba	Chenab	8.5 km	9 km	3 kms	Tata Power SN Group, Norway
16	Gondhala	144	Lahaul and Spiti	Chenab				
17	Khoksar	90	Lahaul and Spiti	Chenab				
	Total	3173						

According to the Central Electricity Authority³, Projects totalling 4200 MW are planned in the 12th Five Year Plan while additional Projects for 2075 MW have been identified. Some projects are under consideration for forest and environmental clearance like 1200 MW Bursar project in Kishtwar district, which requires area 1665 hectares of land, including 1077 hectares of Forest, affecting more than 500 families in over 14 villages (Option 2 requires 4593 Ha of land!), and the 1200 MW Sawalkote Dam will require 1099 ha land, including 600 hectares forest. Some of these dams are submerging parts of the

Kishtwar High Altitude National Park. Here again, projects are planned bumper to bumper, no environmental mitigation measures like fish passes or ladders are included and social impacts appear to be huge, adding to the overall cumulative impacts.

Despite of this, no cumulative impact assessment study is being recommended of undertaken for Chenab basin in Jammu and Kashmir.

Cumulative Impact Assessment of the entire Chenab Basin: Chenab presently has more than 70 major hydel projects in various stages of planning,

construction and operation with a combined capacity of over 13000 MW and this is an under estimate in absence of full exact figures. This very high density of projects magnifies their impacts on all aspects: downstream hydrology, muck generation and disposal, cumulative impacts of submergence, resettlement, cumulative impacts of loss of forest land and habitats, impacts on fish like famous Chenab Trout by series of high dams, impacts on region's seismicity, silt discharge of the river, impact of blasting and tunnelling, transport and road construction, construction and management of workers camps and colonies, ambient air quality, disaster risk, impact on local water sources and groundwater, cumulative impacts on region's waters security, fragile cultural fabric, etc.

Cumulative impacts of cascading mega hydro projects of all the above issues are unequivocally huge, irreversible and negative. Most of the power generated in the basin will be going out of the basin, so will be the benefits of

Partial list of large hydropower projects on Chenab in Jammu and Kashmir			
SI No	Project	Capacity	River
1	Kirthai I	250	Chenab
2	Kirthai II	990	Chenab
3	Bursar	1200/1500	Marusudar
4	Pakal Dul	1000	Marusudar
5	Dul Hasti (Operating)	390	Chenab
6	Ratle (GVK)	850	Chenab
7	BagliharI (Operating)	450	Chenab
8	BagliharII	450	Chenab
9	Sawalkote	1200	Chenab
10	Salal (Operating)	690	Chenab
11	Chainani I, II, III	33	Tributary
12	Kiru	600	Chenab
13	Kwar	520	Chenab
	Total	8623/8923	

contd on page 20

3 <http://www.himdhara.org/2012/03/14/leave-the-chenab-alone-lahaul-residents-activists-appeal/>

4 The 30th meeting of the Standing Committee on Power System Planning of Northern Region, Central Electricity Authority, December 2011

INDIAN HIMALAYAS MOVING TOWARDS HIGHEST DAM DENSITIES IN THE WORLD

In a ground breaking paper published in May 2012, Conservation Biology entitled 'Potential Effects of Ongoing and Proposed Hydropower Development on Terrestrial Biological Diversity in the Indian Himalaya', authors Maharaj Pandit and Edward Grumbine, highlight the colossal impacts of maniacal hydro power development in the Himalayas on terrestrial diversity, forest cover and rates of species extinctions. The authors qualify these findings by saying that they have used conservative estimates and the actual losses may be much higher than this prediction.

The shattering findings of the paper say that if 292 proposed and under construction dams in Himalayas (including Jammu and Kashmir, Himachal, Uttarakhand, Sikkim, and the remaining North East, which is a huge underestimation, the actual numbers are closer to 400+) are built, then Indian Himalayas would have:

1. The Highest Dam Density in the World: Dam density of the region would be: 0.3247/1000 km², nearly 62 times greater than current average global figures; the average of 1 dam for every 32 km of river channel would be 1.5 times higher than figures reported for U.S. rivers.

Sikkim, the most species rich state in the country would have the highest density (4/1000 km²), followed by Uttarakhand and Himachal Pradesh (both 1.5/1000 km²). Dam densities in the Brahmaputra (0.5825/1000 km²), the Indus (0.2895/1000 km²), and the Ganga (0.1022/1000 km²) basins would be 110, 55, and 19 times higher, respectively, than the current global average.

Ganga basin would have the highest number of dams (1/18 km of river channel dammed) in the world, followed by the Brahmaputra (1/35 km) and the Indus (1/36 km).

2. 90% Himalayan valleys affected: Nearly 90% of Indian Himalayan valleys would be affected by dam building and 27% of these dams would affect dense forests. Out of 32 major river valleys, 28 would be affected by dam building and nearly 90% of the dams would be located between the subtropical and temperate zones.

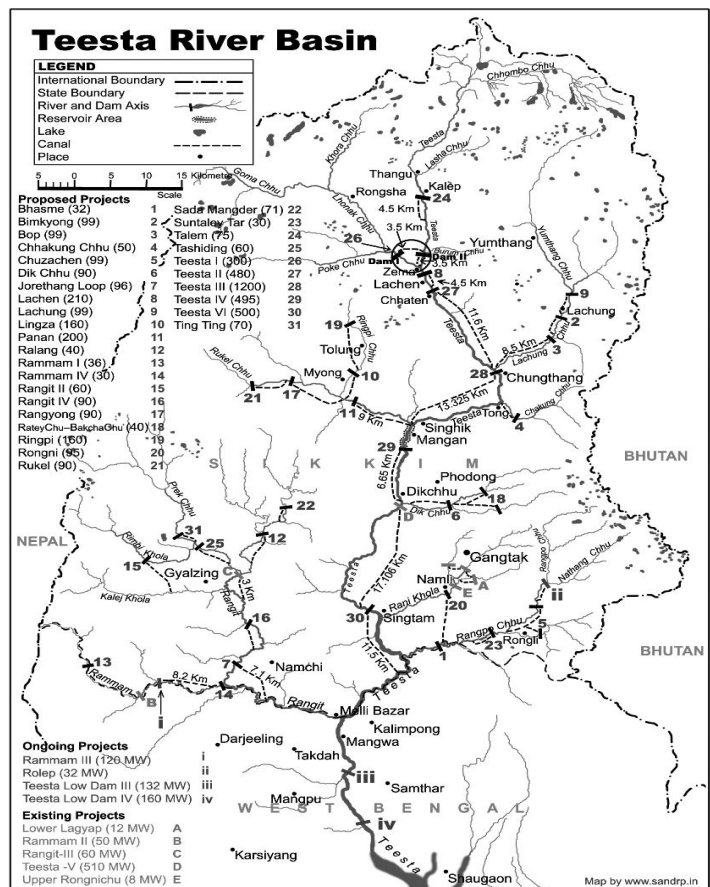
3. More than 54,000 hectares forest to be submerged: 54,117 ha of forests would be submerged and 114,361 ha would be damaged by dam-related activities. Most dams would be located in species-rich areas of the Himalaya.

A disproportionately high percentage (90%) of dams would be concentrated in species-rich subtropical and temperate zones in the Indian Himalaya. Yet at present, due to limited studies and little certainty about the likelihood of all projects being built, it is difficult to quantify precisely the full extent of ecological changes that may result from proposed dam building.

4. Accelerated species extinction: By 2025, deforestation due to dam building would likely result in extinction of 22 angiosperm and 7 vertebrate taxa projected. For this startling finding, the authors say "We have been cautious with these projections. Our estimates of forest loss from dam building are lower than those projected by the GOI and we selected the most conservative values"

Over the next 13 years, dam-building activity alone, if carried out in already-degraded forests, is predicted to lead to the extinction of 10 angiosperm and 3 vertebrate species. In scenario 2, haphazard dam building resulted in the loss of 114, 361 ha of forests (including 63,360 ha of dense forests) and in species extinctions doubling over the same period.

By 2100 extinction projections under conservative SAR estimates indicated the potential loss of 1505 angiosperms and 274 vertebrates driven by



Dams planned and under construction in the Teesta Basin
Photo: SANDRP

background deforestation and dam building combined

Disturbance due to dam building would likely reduce tree species richness by 35%, tree density by 42%, and tree basal cover by 30% in dense forests.

“These results, combined with relatively weak national environmental impact assessment and implementation, point toward significant loss of species if all proposed dams in the Indian Himalaya are constructed. It is unknown whether the public, once informed of the consequences, would be willing to choose social goods over ecological benefits. This situation is exacerbated by the fact that the GOI has never carried out studies of the country’s future energy requirements that examine alternatives beyond hydropower that may find a reduced need for so many dams (WWF 2007). And, according to a recent study from the Ganga basin, even the assumed social benefits of dams may have little



Baspa River Destroyed by the Baspa Dam in Himachal Pradesh

Photo: SANDRP Partners

scientific basis (Sadoff et al. 2011). Our results lend support to these claims, but in India, so far, there remains little attention paid to ecological evaluation of large-scale development (Bandyopadhyay & Gyawali 1994; Agrawal 2010).”

“EIA regulations in India do make assessment of biological diversity “a criterion” for project evaluation. However, lack of scientific studies and

poor implementation of EIA processes remain problems, and no projects have been rejected because loss of biological diversity has been cited, except in rare cases involving protected areas and flagship species such as the tiger (Singh 2006). In addition, there is no legal requirement in current EIA regulations for analyses of cumulative effects, but given the density of planned dams on all the major rivers in the study area, our results point toward the need to consider this standard in hydropower assessment (Menon & Kohli 2009; Choudhury 2010).”

What makes the findings of this study even more disturbing is the fact that the authors have severely underestimated the number of dams coming up in the Himalayas. They have considered only 292 dams planned or under construction. Whereas, In reality, the number would be closer to 460 dams under construction and planning stages in Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh. See http://sandrp.in/basin_maps/ for details and locations of planned, under construction and completed dams in these states.



Teesta III Dam in Sikkim

Photo : Samir

PARINEETA DANDEKAR

YAMUNA RIVER: INDIA'S NATIONAL SHAME

WHY THE APEX COURT COULD NOT IMPROVE MATTERS FOR 18 YEARS?

Continuing plight of Yamuna as it flows through Indian Capital is a matter of National Shame, indicating failure at several levels. Supreme Court too has been handling this issue for 18 long years. What has it achieved in the process and where does the problems lie?

The first thing that strikes you about the mighty Yamuna flowing through Delhi is that it is a National Shame. The river that is the largest tributary of the holy Ganges (in fact at confluence in Allahabad Yamuna annually brings more water than Ganga brings at that point) has been turned into a sewage drain by the National Capital. This has been the situation for decades. The National Capital has been unable to treat the sewage it generates and dumps mostly untreated and some at best partially treated sewage into the river. Such dumping of untreated and partially treated sewage into a river is supposed to be completely illegal according to a number of laws including the Water

Pollution Control Act of 1974, and the National Capital has been brazenly indulging in this illegal act for decades, in full view of all the law enforcing and monitoring agencies at state and central level. What else one can call this, except National Shame?

That the Yamuna River flowing through the National Capital has been turned into drain by Delhi is well known now for decades as even the Supreme Court was informed on Nov 9, 2012 by a committee appointed by the Apex Court itself. It signifies failure of the pollution control regime at Delhi state level and at the national level again for decades. What is even more troubling is that the case is before the apex court since 1994 when the court

THE MYTH

The tale in the 16th century Sanskrit hymn, Yamunashtakam, an ode by philosopher Vallabhacharya describes¹ the descent of the Yamuna river from its origin in Yamunotri to meet her beloved Krishna and to purify the world. The hymn praises her for being the source of all spiritual abilities: it is Yamuna, who being a holder of infinite love and compassion, can grant us freedom from even death, the realm of her elder brother Yama.

The question is who is going to help the Yamuna herself from a certain death?

took up the case suo moto, following a front page headline grabbing news report in The Hindustan Times then. So the court has been handling this matter for eighteen long years. What has the court achieved in the process?

The state of the river has gone worse in these eighteen years since 1994 when the Supreme Court of India took up the case of pollution in the river. The state of the river has worsened in terms of the Biological Oxygen Demand, Chemical Oxygen Demand, Dissolved Oxygen or even the length of stretch of Yamuna that is polluted downstream from Delhi. In every conceivable respect the state of the river has deteriorated even as the highest court of India monitored the state of the river.

It is not the first time that the court has been told that downstream of Wazirabad barrage in Delhi there is no water in the river as Delhi takes away all the water available (at least in 8-9



Goddess Yamuna atop her vehicle tortoise as depicted in Ellora Caves
Photo: blog.naver.com

1 See: http://en.wikipedia.org/wiki/Yamuna#Ancient_literature_and_history for details



Yamuna, as it emerges from Uttarakhand

Photo: Ravindranath

non monsoon months) in the river there for its use. Downstream from the Wazirabad barrage there is just sewage of Delhi, mostly untreated as mentioned above. Upstream along the Yamuna River, downstream of the Hathnikund barrage, as the barrage diverts all the water from the river into Western and Eastern Yamuna canal, the river is left dry in 8-9 months of the year.

In fact in January 1998 the Supreme Court in the ongoing Yamuna case appointed a High Powered Committee (HPC) "To assess the requirement of a minimum flow in the river Yamuna to facilitate restoration of the desired river water quality". The committee chaired by the chairman of the Central Water Commission (CWC) told the court, without any real study that the river needs 10 cumecs of water. In the first place, the court should have asked the HPC/ CWC to study the needs of the river at various points along the river.

However, the SC, based on above recommendation of the HPC ordered later in 1998 that 10 cumecs of water

should be released for the river all along the river stretch all round the year. That order of the Apex court remains unimplemented till date. The Central Water Commission, acting like a lobby for big dams, has been saying that the river cannot have water until mega dams have been built in the upstream! This is remedy to further kill the river. The CWC has never shown any interest in allowing freshwater flow in any river any where in India. Even in the case of Yamuna, the CWC has been telling the court that minimum flow in the river is being maintained! For example, as recorded in the order of the Supreme Court in IA 17 in WP 537/1992 on 13.5.1999, "Mr A D Mohile, Chairman, Central Water Commission stated that minimum flow in River Yamuna is still being maintained and there is no need to release any further quantity of fresh water in the river." Nothing can be farther from truth.

In fact, making joke of the SC order for release of 10 cumecs of water all round the year all along the river, the CWC has been repeatedly saying in affidavits

before the SC that Haryana is already releasing 160 cusecs (4.54 cumecs) water downstream of Hathnikund and another 140 cusecs (3.9 cumecs) into Najafgarh drain, which confluences into the Yamuna River downstream of Wazirabad barrage, thus making up for the 10 cumecs! The SC should have taken the agency to task for completely misinterpreting and misrepresenting its order. Firstly, these flows cannot be added as CWC is doing. Out of the 160 cusecs released at Hathnikund (even if this is released, which in reality is not released as there no credible monitoring agency to ensure that) almost nothing would reach Wazirabad. At Wazirabad, Delhi is already taking away all freshwater, and no freshwater flows downstream of Wazirabad in lean season. Secondly, as clearly stated in the order of SC dated 13.05.1999, the 4 cumecs that Haryana transfers to Najafgarh drain is for irrigation purposes in South Delhi. This is NOT for ecological needs of the river. In any case to add up such small quantities released at various points to

contd on page 31

WHITE PAPER ON IRRIGATION IN MAHARASHTRA

WHO IS THE MAHARASHTRA GOVT FOOLING?

A quick critique of the so called white paper on Rs 75000 crore irrigation scam in Maharashtra. The white paper does not answer any of the questions raised, including in the SANDRP initiated letter carried in Sept Oct 2012 issue of Dams, Rivers & People. Only an independent investigation will help. This status paper is for bringing Mr Ajit Pawar back into the cabinet and white wash the scam.

Long overdue & much awaited White Paper (WP) on Irrigation in Maharashtra has finally been issued by Water Resources Department (WRD), Government of Maharashtra (GoM) on 29th Nov 2012. It is available on WRD's website (www.mahawrd.org) in Marathi language. WP consists of two volumes. Volume-I (129 pages) presents the Achievements & Prospects part. Project-wise details regarding Time & Cost Overrun are given in Volume-II (794 pages). This article is a quick & preliminary response & thus, has obvious limitations. In-depth analysis will take some more time. Point-wise brief comments are only given here.

As only to be expected, WP is absolutely

silent about the alleged irrigation scam in Maharashtra. It does not take the cognizance of the reports of various committees [Vadnere, Mendhegiri, Kulkarni, Upase, etc] constituted by WRD, GoM to enquire into the charges of corruption & irregularities. It keeps mum about the allegations made by RTI (Right to Information) activists, politicians & media. Though the whole attempt appears to be to not bring any "inconvenient truth" on record, the argument in WP is full of lame excuses & unwarranted, uncalled for & unnecessary explanations. Such excuses for delays and cost escalations have already been rejected by the Comptroller and Auditor General (CAG). Points of investigation

like accuracy of costs, claims of escalations, water-availability reports and violations of Maharashtra Public Manual and other norms have not been addressed.

"The WP is more like a status report as CM had said and that it is not a white paper, a white paper is supposed to be a result of wide consultation with key people.

But one thing is clear. The usual engineering arrogance is missing & irrigation-bureaucrats are on defensive. That is a good omen for water sector, to say the least!

In order to prove its innocence WRD, GoM in this WP points fingers at other departments / organizations in

TABLE1: COMMENTS ON WHITE PAPER ON IRRIGATION IN MAHARASHTRA

Organizational Structure of WRD: WRD, GoM is a top-heavy organization with 3 Cabinet Ministers, 3 Minister of States, 2 Secretaries, 5 Executive Directors, 2 Director Generals, 21 Chief Engineers & 67 Superintending Engineers.
Expenditure on Establishment: WP is silent about other establishment (Exec Engr to Junior Engr & supporting staff) & total annual expenditure of complete establishment & its percentage as against expenditure on works.
Conflict between Direct Class I officers (Exec Engr and above) & others is one of the reasons of WRD's poor performance. Powers have been concentrated in the hands of Direct Class –I officers & actual experience of work on site, barring exceptions, is mainly with the officers below the rank of Executive Engineers. Indifference towards grass root level functionaries & subordinate engineers has taken its toll.
Administrative Approval: Para 3.3 gives information regarding empowerment in respect of Administrative Approval. It suggests that more autonomy was given to Irrigation Development Corporations on demand from opposition parties & as per Governor's directives. Alleged misuse of that autonomy has, of course, not been discussed.
Sec 11F of MWRRA Act, 2005: The latest decision of bringing in MWRRA – an independent regulatory authority- in the process of Administrative Approval is noteworthy, in absence of any reference to Sec 11F of MWRRA Act, 2005 & Integrated State Water Plan (ISWP). ISWP was supposed to be ready within six months from the date of bringing in force the said Act. MWRRA has been sanctioning projects even in absence of ISWP which, prima facie, appears to be a violation of MWRRA Act.
Irrigation Management: Irrigation Status, Water Auditing & Benchmarking reports officially published by WRD don't substantiate tall claims made in WP.
Rapid appraisal of performance of WUAs (including those under MWSIP) recently done by a reputed NGO brings out the sorry state of affairs in respect of Participatory Irrigation Management. The NGO has sent its report to the authorities & has demanded joint inspection of WUAs. WRD & MWRRA, so far, have not accepted that challenge.
It is claimed that Maharashtra is the only State where the recovery of water tariff is more than Operation & Maintenance expenditure. If WRD does not provide adequate funds for M&R (Maintenance & Repair) to all projects, its expenditure will always appear to be less. M & R scenario in the State is reflected in the Overall Project Efficiency which is hardly 20-25% as against 41-48% assumed in the design.
Amount of arrears of water tariff is approximately Rs. 1000 Crs. The percentage recovery of irrigation tariff is hardly 12-13% & that of non-irrigation is 45-50%. Can this situation be described as satisfactory?
Reforms in Water Sector: Contrary to the general impression the reality about the so called reforms is as given below:
1. Rules have not been framed in respect of Maharashtra Irrigation Act, 1976 (MIA 76) even after 36 years.
2. No formal decisions have been taken regarding most of the recommendations of Maharashtra Water Irrigation Commission Report, 1999

COMMENTS ON WHITE PAPER ...TABLE CONTD...

3. State Water Policy adopted in 2003 has not been revised after 5 years as was supposed to be done in 2008. Though the priority of water use has been changed (irrigation now gets second priority instead of industry), it has not been implemented in actual practice.

Basin/sub basin-wise development & management of water resources still remains to be done. Issue of regional imbalance is very much alive.

Current controversy regarding release of water for Jayakwadi project from upstream projects speaks volumes about the actual implementation of water policy & water laws.

MWRRRA has virtually become ineffective for all practical purposes because following remains to be implemented even after 7 years of its existence:

- Irrigation Development Corps to act as River Basin Agencies & issue water use rights
- Preparation of ISWP by State Water Board under the chairmanship of Chief Secretary
- Approval of ISWP by State Water Council under the chairmanship of CM
- Approval to new projects by MWRRRA with reference to ISWP
- MWRRRA to carry out its legal responsibility towards backward areas & removal of regional imbalance.
- Agreements within WUAs & delineation of WUAs for LIS under MWSIP as per MMISF Act, 2005.

Economic Aspects: This chapter is surprisingly very brief. It deals mainly with various liabilities like balance cost of tenders, land acquisition, resettlement, NPV, etc. Total liability as reported is Rs.31742 Cr. The picture is incomplete due to lack of following information:

- Yearwise funds available from all sources (State budget, central assistance, World Bank, Bonds issued by Irrigation Development Corporations, etc)
- Yearwise expenditure done under various heads wrt sources of funds.
- Norms & actual cost of potential created in per ha & per M cum terms
- Irrigation Development Corporation wise information of 1, 2 & 3 above. (There are complaints that though budget provision is made, funds are not actually

MERI and Waghad: MERI has successfully used applications of remote sensing in water sector. But the irony is management wing of WRD has failed to take advantage of MERI's work. MERI studied silting in live storage of 44 projects & prepared revised capacity tables. Management authority in 41 projects simply did not take cognizance of the study & did "management" & prepared even water audit report without considering effects of silting.

Waghad project in Nashik district is an exception, the real credit of success story at Waghad goes to WUAs & people's participation. WRDs' efforts, if any, to replicate Waghad can hardly be described as sincere. Praise Waghad, showcase it & conveniently forget about its lessons is the strategy adopted by WRD since long.

Analysis of time & cost overrun: WRD has given an impressive list of factors (of course, excluding corruption) which according to WRD contribute in time & cost overrun:

1. Statutory Clearance regarding issues related to forest, wild life, environment
2. Land acquisition
3. Resettlement
4. Inadequate funds
5. Time required to prepare detailed designs
6. Changes in scope of projects
7. Increase in schedule of rates
8. Escalation in prices of land
9. Increase in royalty charges
10. Increase in establishment charges

However, starting projects without land or approvals is illegal as per CAG. This comment takes care of many points listed above. It appears that lack of good governance in WRD has taken its toll. In absence of ISWP, it is free for all & might is right in water sector. Organizational & procedural changes appear to be urgently called for.

Important Decisions Taken and Reforms: WRD had to take following decisions which in itself is an indirect admission of charges of corruption, irregularities & inordinate delays:

1. Land acquisition on priority basis.
2. Submit detailed estimate for administrative approval only after carrying out detailed survey, investigation & design
3. To initiate process of tendering only after land acquisition
4. Not to pay mobilization & machinery advances
5. To restrict the use of tender clause-38

Potential created & utilized: WRD is not in a position to conclusively prove on paper that development has really taken place thanks to the non-measurement of area irrigated. Readers are requested to study the details presented in Reference 2 & 3 in this respect. Scientific evidence to arrive at certain percentage of increase in area is not available. WRD itself is to be blamed for this situation.

Roadmap for water resources development: There is nothing new in most of the points suggested in this chapter.

Maharashtra Water & Irrigation Commission, 1999 had given at least 7 specific recommendations regarding the priority of completion of ongoing / incomplete projects. Those were to be implemented within one decade i.e. by 2009. Nothing has happened.

State Planning Board had suggested a way out in 2007. WRD ignored that practical advice.

Roadmap suggests that drip irrigation may be made compulsory for perennial crops. There is already a specific provision in this respect in MWRRRA Act, 2005. Why that was not brought in force?

The fact that WRD had to give a suggestion regarding reduction of financial powers of Irrigation Development Corps speaks volumes.

Maharashtra (Public Works Department, Maharashtra Jeevan Pradhikaran, Maharashtra Industrial Development Corporation, City and Industrial Development Corporation, Brihanmumbai Municipal Corporation) & even uses examples from other States in India (AP, Karnataka, Goa, Gujarat). It claims that schedule of rates of Maharashtra is on lower side as compared to that of said departments & the States. It also cites examples of gigantic Lift Irrigation Schemes (LIS) in other States to justify unviable & controversial LIS in Maharashtra.

WP gives lots of procedural details regarding project formulation & implementation which the critics, activists & media people already know very well. In fact, it is they who have pointed out the violations in the procedures & have filed petitions in the courts of law.

WP also presents voluminous project-wise data in Volume –II. Its accuracy & hence, credibility has already been questioned & a steady flow of reports bringing out discrepancies have started appearing in media. Knowledgeable &

generally reliable sources from WRD, GoM confirm the trend & predict a flood of RTI applications in this matter in very near future. Pandora's Box has been opened.

WP presents a roadmap of water resources development in Chapter -9. It suggests that in order to avoid thin spreading of funds, projects on which expenditure incurred is less than 25% may at present be suspended & projects in advanced stage of completion may only be completed on priority basis. This has generated a serious political controversy. People from backward regions (Marathwada, Vidarbha, etc) feel that this move may further increase regional imbalance. They complain that expenditure incurred is less because adequate funds at proper time have not been given in the first place. Some analysts, however, point out that the said suggestion is a clever move to divert attention from charges of corruption & irregularities.

There are also rumors that smart officers under the guidance of even smarter politicians have reported inflated figures of expenditure (greater than 25%) in some of the projects to safe

guard their interests. Truth may prevail in due course of time through RTI.

On this background, an attempt is made in accompanying table to present comments on some of the issues discussed in Volume –I of WP. The comments are self explanatory & perhaps, speak volumes. It is sincerely felt that WRD has lost an opportunity of introspection. Absence of soul-searching makes white paper an exercise in futility.

PRADEEP PURANDARE

1. WRD, GoM, "White Paper on Irrigation Projects in Maharashtra", 29th Nov 2012
2. Pradeep Purandare, "Canal Irrigation in Maharashtra: Present Status"; Dams, Rivers & People, July-Aug 2012. http://sandrp.in/irrigation/status_of_Canal_Irrigation_in_Maharashtra.PDF, http://sandrp.in/drpf/July_August_2012.pdf
3. Pradeep Purandare, "Water Auditing of Irrigation Projects in Maharashtra: Myth & Reality"; Dams, Rivers & People, Sept-Oct 2012. http://sandrp.in/irrigation/Irrigation_Projects_Audit_Mah_Pradeep_Purandare_Nov2012.pdf, http://sandrp.in/drpf/Sept_Oct_2012.pdf

Chenab..... contd from page 13

increased revenues, profits, employment and contracts. In Chenab basin there is the additional issue of limitations imposed by the Indus water treaty of 1960 with Pakistan.

Although India has been aggressively pushing for cascade hydropower projects in rivers like Lohit, Siang, Kameng, Tawang, Subansiri, Bichome, Teesta and Dibang in North East; Alaknanda, Bhagirathi, Kali in Uttarakhand; Sutlej, Ravi, Beas,

Yamuna and Chenab in Himachal, all our CIA studies or basin studies till date (if done at all), have been routinely poor and biased⁵. In rare cases where consultants have showed the courage and integrity of recommending dropping projects, their reports have been ridiculed and 'saviour' committees have been appointed to look into these reports again to make 'all ills go away', like the B.K. Chaturvedi Committee which is now looking at WII Study which recommended dropping 24 projects planned in the Upper Ganga. The MoEF decided to dump the recommendation of the Teesta Cumulative Impact Study when it said that no projects should be built upstream of Chungthang.

It is high time that India takes impacts of cascading mega projects seriously. These rivers are not merely power producing channels, they have been



Women's Protest March against 300 MW Gyspa Project in Lahaul Spiti. 2010
Photo: viewphotos.org

providing and continue to provide millions of other services to the local communities and our ecology. Departments and agencies cannot simply push ahead their own big dam agenda at the cost of the environment and communities, in the absence of unbiased scientific studies and good sense.

PARINEETA DANDEKAR

An indicative list of capacity revision of projects in Chenab basin			
SI No	Name	Initial Capacity	Revised Capacity
1	Miyar	90	120
2	Gyspa	170	300
3	Dugar	236	380
4	Sach Khas	149	260

5 http://www.sandrp.in/hydropower/Pathetic_Cumulative_Impact_Assessment_of_Ganga_Hydro_projects.pdf
http://sandrp.in/rivers/Lohit_Basin_Study_by_WAPCOS_A_mockery_of_e-flows_and_cumulative_impacts.pdf

INTRA STATE WATER DISPUTES IN MAHARASHTRA

SEEDS OF BIGGER PROBLEMS IN FUTURE ALL OVER INDIA?

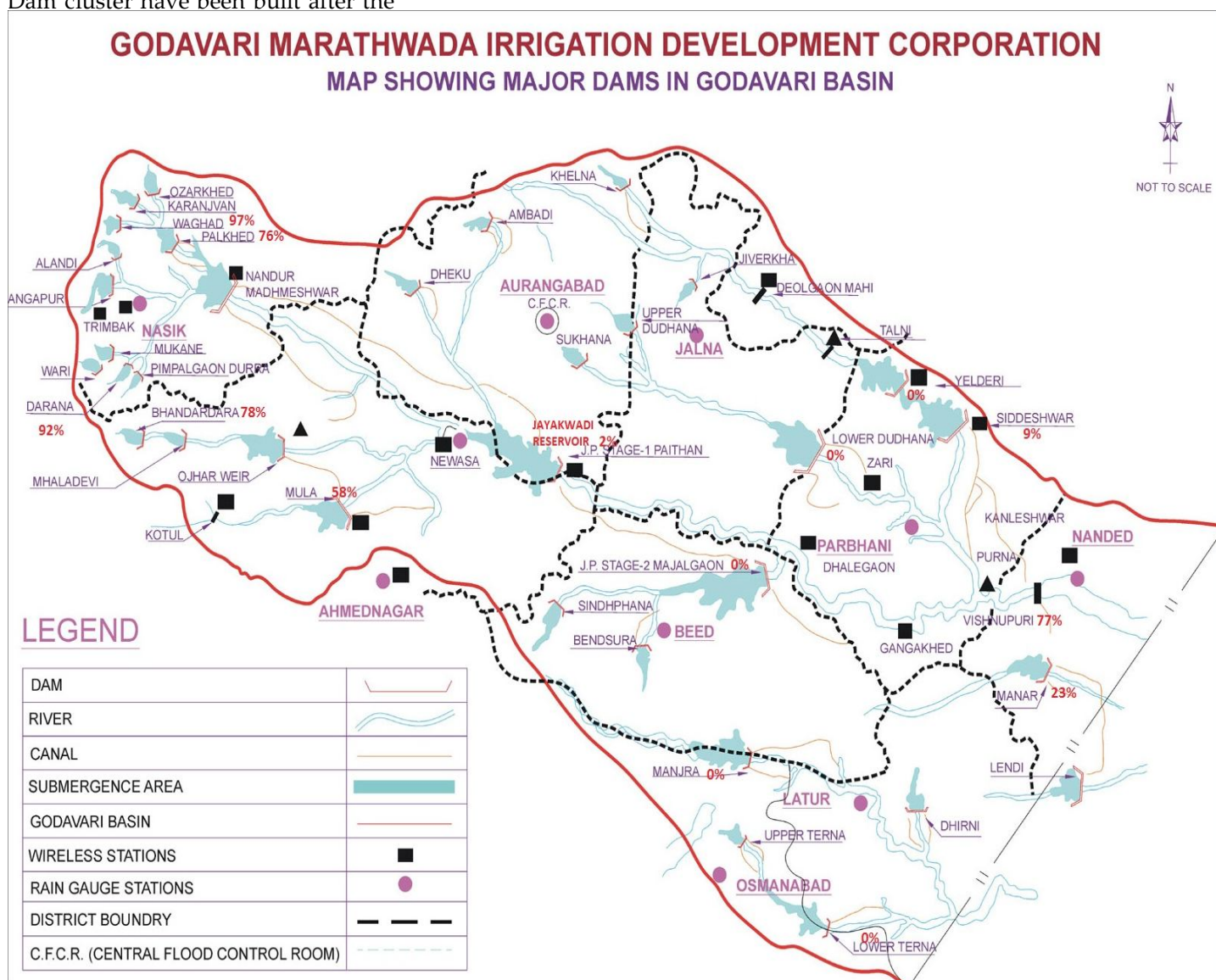
Reservoir storage levels in Marathwada region of Maharashtra, consisting of 8 districts, are scary. Of the 11 projects, 6 projects have a live storage capacity of 0. The huge Jayakwadi Dam on Godavari, which supplies drinking water to 4 Municipal Corporations and over 200 villages, has mere 2% live storage as on 26th November 2012. While weak monsoon and upstream dams in Nashik and Ahmednagar districts are to blame for this alarming situation, there is a bigger problem of management at the heart of the issue.

After Jayakwadi was completed in 1976, numerous medium and large dams came up in the upstream Godavari. Many dams on the Pravara and Mula Basins and Darna Dam cluster have been built after the

Jayakwadi Project. These dams intercepted and diverted flows to Jayakwadi. All was well in surplus or normal years, but in the current year with deficit rainfall, Maharashtra is on

the threshold of perhaps the worst intra state water protest that it has seen.

Jayakwadi supplies drinking water to urban centres of Aurangabad, Paithan



and Jalna, Beed, more than 200 villages and Maharashtra Industrial Development Corporations (MIDCs) including the 1130 MW Parali Thermal Power Plant. For the past few months, Aurangabad has been facing the worst water shortages, with water being supplied once in three days at times. Government Medical College and hospital had to postpone surgeries due to water scarcity. The Chief Minister (CM) has made it clear that sufficient water cannot be supplied to Parali TPP¹ and Maharashtra should brace itself to more power cuts.

Poor storage in Jayakwadi was not an overnight situation, nor is it a new situation. For the last decade, the dam has not been filled to its capacity due to scanty rains and upstream projects.² Marathwada region has received a poor rainfall and since September 2012³, protests started with demands up for more water from the upstream dams⁴. But no water was released from the upstream regions.

However, things went from bad to worse after October as water cuts became more and more pronounced in Marathwada. There were increasing protests in Aurangabad in which all political parties participated, demanding more water releases from upstream dams. This was vehemently opposed by upstream Nashik and Ahmednagar regions. It was only after the Chief Minister intervened and

ordered that 9 TMC water should be released to Jayakwadi from Darna group of Dams (Nashik Region), Bhandardara and Nilwande Dam (Ahmednagar region) and Mula Dam (Pravara River, Ahmednagar region) that water releases actually started. As expected, the announcement and subsequent releases faced stiff protests from political parties and farmers in the upstream. In case of Mula Dam

on Pravara River in the drought prone Ahmednagar district, farmers groups did not allow water release for an entire day and actually stood in the river as water was released in the river channel, threatening Jal Samarpan⁵. The irrigation department then reluctantly conceded in making one irrigation rotation through the canals for this region. Interestingly, only 1.55 TMC was released from Darna Dam in Nashik region, which is 92% full as of 26th November 2012.

For water releases within the same state, tremendous security checks were put in place. Hundreds of police were deployed, gates of KT weirs were forced opened, canals and river banks were constantly patrolled to curb lifting and to top it all, the electricity of the region was cut off to stop electric pumps of the region from siphoning off water! Though some people believe this was needed, it is indeed shocking and saddening to see this. There were numerous protests at places. Water

Sl No	Dam	Basin	Live Storage Capacity MCM	Live Storage Capacity on 26 Nov 2012 %
1	Jayakwadi	Godavari	2171	2
2	Mazalgaon	Godavari	312	0
3	Manjara	Godavari	177	0
4	Purna Yeldari	Godavari	809	0
5	Lower Terna	Godavari	91	0
6	Seena Kolegaon	Bheema	76	0
7	Lower Dudhna	Godavari	242	0
8	Purna Siddheshwar	Godavari	81	9
9	Manar	Godavari	138	23
10	Upper Penganga	Godavari	964	60
11	Vishnupuri	Lower Godavari	81	77

sharing within a state reached a new level of mistrust and hostility.

WATER RELEASED TO JAYAKWADI TILL 3RD DECEMBER 2012

Whither MWRRA? Lest we forget, Maharashtra gets the distinction of being the first Indian state to have promulgated the Maharashtra Water Resources Regulatory Authority Act in 2005, following which the MWRRA Authority was formed. This was at the behest of World Bank under its Maharashtra Water Sector Improvement Project (MWSIP). The Authority was explicitly created in 2005 "to meet the pressing need for an institutional mechanism to regulate the allocation, management and utilisation of the state's limited water resources through a participatory approach"⁶.

Some relevant provisions of the MWRRA Act (2005) include:

Section 11: Power, functions and duties of the Authority states:

to determine the priority of equitable

Sl No	Dam	Quantity of water released for Jayakwadi (TMC)	Distance from Jayakwadi Dam (Kms)
1	Mula	2.5	52
2	Bhandardara	2	210
3	Nilwande	2.5	
4	Darna	1.55	170

1. www.thehindubusinessline.com/industry-and-economy/economy/water-woes-plague-parli-power-plant-in-maharashtra/article4093497.ece
2. aurangabad.nic.in/htmldocs/District_Vision2020/C.%20Index.pdf
3. articles.timesofindia.indiatimes.com/2012-09-07/pune/33675858_1_major-dams-water-storage-release-water
4. articles.timesofindia.indiatimes.com/2012-09-07/pune/33675858_1_major-dams-water-storage-release-water
5. www.afternoondc.in/city-news/marathwada-water-woes-threaten-to-divide-state/article_70151

distribution of water available at the water resource project, sub-basin and river basin levels during periods of scarcity;

Section 12: General Policies of the Authority states:

“in order to share the distress in the river basin or sub-basin equitably, the water stored in the reservoirs in the basin or sub-basin, as the case may be, shall be controlled by the end of October every year in such way that, the percentage of utilizable water, including kharif use, shall, for all reservoirs approximately be the same”. (Emphasis added.)

This has been completely violated in the Godavari basin this year. The MWRRA has entirely failed in meeting its explicitly mandate and most important social role in this regard. Even now, it is not taking any proactive steps to try and put things in order, to give some semblance of ‘integrated river basin management’.

Ironically, when there were strong protests in Aurangabad over water releases, MWRRA was in Aurangabad holding meetings on water tariff proposals, not on this pressing issue! This is the same institution that is being put forth as an example to be followed throughout the country. The State Water Authority formed under the MWRRA has not had a single meeting since the formation of the authority! This only goes on to prove the inability of imposed from outside, strait jacketed institutional structures, working with a top down and unaccountable manner and with no perspective to take any equitable, participatory and useful decisions.

The limited water releases that have happened till now in Godavari basin from dams upstream of Jayakwadi have happened because of Chief Minister’s orders and not the MWRRA or the Godavari Marathwada Irrigation Development Corporation (which was supposed to have a water allocation plan for the Godavari basin). This is indeed a very serious issue with far reaching implications. Water scarcity will intensify in the coming months and

unless basin authorities take timely and proactive steps, it will not take much time for a protest to become a movement. For decisions to be backed by upstream or downstream communities, the composition, the mandate and functioning of such an authority would have to be participatory, transparent and accountable. Unfortunately, this is not what the MWRRA ever aimed to be.

In Krishna basin, similar situation is emerging, where Ujani dam on Bhima River, the third largest reservoir of Maharashtra and lifeline for Solapur city and numerous villages, has only 7% water in live storage as on Nov 26, 2012. Similar to the situation in Jayakwadi, upstream dams in Pune region like Temghar, Panshet, Warasgaon and Pawana have storages ranging from 95% to 81%. Here too, there has been a strong opposition from the upstream to release water for downstream users and here too MWRRA has been unacceptably silent. What makes the situation more alarming in Ujani is the extremely poor water quality of the water due to untreated sewage from upstream Pune. It seems, in near future, this situation will get more volatile as here the competing users are politically influential urban areas of Pune and Pimpri Chichwad in the upstream and an equally strong and politician-backed sugarcane lobby near the dam. Solapur city and the Tail Enders of Ujani have been suffering historically.

In case of both Ujani and Jayakwadi, the dams have huge dead storages, and some experts, including senior officials of MWRRA, have argued that the dead storage can be used for drinking water supply. But there is no policy or mechanisms to achieve that. Aurangabad Municipal Corporation has been contemplating installing common head works at Jayakwadi Dam, to utilise the dead storage from the dam for drinking water and industrial purposes.² According to Aurangabad Vision 2020 Document, “In Jayakwadi reservoir, the quantity of water available between Dam sill level

and level 4 M below sill is 232.53 mm³. It is proposed to have a common head work for lifting water from the dead storage of Jayakwadi to ensure all time water availability for drinking water.” Maharashtra Jeevan Pradhikaran has estimated the cost of this to be around 106 Crores, the scheme is yet to take off. Options like these may have to be explored in the current situation.

Here it may also be noted that Godavari Basin is supposed to be a surplus basin as per the National Water Development Agency’s calculations. Andhra Pradesh is building huge projects to transfer water from Godavari to Krishna basin. The question is, how such projects are sanctioned when the upstream of the same basin is in such dire straits. It is high time such projects are shelved. Else, in climate change scenario, they will provide fresh battle grounds for interstate and intra state conflicts. Same goes to water allocations to over 71 Thermal Power Plants in the Vidarbha region of Godavari Basin. Ironically, MWRRA has been instrumental in changing water allocations of irrigation projects from farmers to Power Plants in this case. This and the contested water tariff seem to be the only contributions of MWRRA so far.

It is now time to show that the state can and will take strong steps to work towards equity and deficit sharing. MWRRA has proved its inability in dealing with this and it is time for a truly participatory process to emerge. Let us not forget that India’s massive water infrastructure, the biggest in the world, has been put up at a huge social, economic and ecological cost. Jayakwadi Dam submerged 118 villages and displaced 70000 people when it was completed in 1976. It is time to review and reconsider the existence, dimensions, functioning and usefulness of such dams. And make functioning of those existing structures that are found necessary, more responsive, efficient and equitable.

PARINEETA DANDEKAR

(This article was published in *India Together.org*)

SUSTAINABILITY AND FINANCIAL VIABILITY OF URBAN WATER IN DRYLAND AREAS A CASE STUDY OF INDORE CITY

The simultaneous attainment of financial, environmental and social sustainability of urban services is an important requirement of development. Huge investments are being made in the improvement of urban infrastructure and services in India. Within urban infrastructure the supply of water and its disposal after use has become one of the most problematic aspects of planning and management. Water has to be brought from distant sources and the wastewater needs to be treated before being discharged into natural water bodies or rivers. In dryland areas which are physically water scarce and constitute some 70 per cent of the country, the problem becomes even more acute as the costs associated with setting up and running Water Supply and Sanitation (WSS) services go up exponentially.

The simultaneous attainment of financial, environmental and social sustainability of urban services is an important requirement of development. Huge investments are being made in the improvement of urban infrastructure and services in India. Within urban infrastructure the supply of water and its disposal after use has become one of the most problematic aspects of planning and management. Water has to be brought from distant sources and the wastewater needs to be treated before being discharged into natural water bodies or rivers. In dryland areas which are physically water scarce and constitute some 70 per cent of the country, the problem becomes even more acute as the costs associated with setting up and running Water Supply and Sanitation (WSS) services go up exponentially.

The situation is particularly problematical in Indore which is the largest city of Madhya Pradesh. The city is situated on the dry Malwa Plateau which is naturally water scarce similar to most parts of western, northwestern, central & peninsular India. The city has a fairly long history of urban planning from the early 20th century providing rich material for a study: <http://www.scribd.com/doc/115030982/Indore-WSS-Critique>. This study is based on a secondary review of the documents of the Indore Municipal Corp (IMC) and other sources and suggests remedial measures. The

study does a detailed analysis of actual expenditure and revenue of the IMC for five years to show the extent of the unsustainability of the water supply and sewerage systems. The main conclusions and recommendations are as follows:

1. The finances of the IMC as a whole are unsustainable. Property taxes which should constitute the major source of income because they are a progressive tax that is borne proportionately more by the more affluent citizens, contribute only 11% of the own revenue of the IMC and 9% of the total revenue. The actual per capita property tax revenue in 2006-07 was a meagre Rs 131 as against the national average of Rs 486 and even in 2010-11 it was only Rs 225. The debt service ratio in 2010-11 was 7.1 per cent and it is slated to go up even further once the principal payments for the Asian Development Bank (ADB) loan begin in 2015. This will put further pressure on the finances.

2. The revenue model of the Water Supply is on an even more unsustainable footing. The solid waste removal and sewerage sector's finances are in the red. The actual recovery of costs through water taxes, charges and state government grants is only about 45%. The collection of water taxes is about 50% of what the minimum should be. The major cost item is that of the electricity bills for pumping water up from the Narmada to Indore. Despite the increase in average monthly

water taxes per connection to Rs 225 in 2011 the situation has not improved. The electricity bills are slated to go up in future.

3. The status of the WSS sector is extremely poor. Non revenue water in the water supply system is very high due to leakages and theft. The actual supply is only 243.5 Million Litres per Day (MLD) against the design of 391 MLD. As a consequence the cost of water is also high. The water supply from the Narmada is the costliest at Rs 17.76 per Kilo Litre (KL) while the Yashwant Sagar and Bilawli supply is the cheapest at Rs 2.25 per KL. The actual average supply is 113 litres per capita per day (lpcd) as opposed to the norm of 135 lpcd. This too is skewed with 54 per cent of the population receiving piped water supply at 171 lpcd and the rest 46 per cent having to rely on standposts, open wells and handpumps for a supply of 46 lpcd. The poor IMC supply has resulted in a proliferation of private and commercial groundwater supply which has seriously depleted the aquifers in Indore. An affordability analysis shows that the recovery of the full costs of water supply will lead to water taxes constituting 7 per cent or more of the monthly expenditure of 43 per cent of households living above the poverty line assuming that water will be supplied free to those living below it.

4. The waste water system is grossly inadequate and so most of the waste water is disposed of untreated into the

streams running through the city which have unacceptable levels of biological oxygen demand (BoD) and are highly polluted. There is no proper storm water drainage and since the natural drainages have become blocked due to construction the city suffers from extensive flooding in the monsoons.

5. Despite the pre-project review of the water supply system done by the ADB having clearly shown that the current supply from the Narmada is financially unsustainable no other alternatives were explored for providing water to the city. Instead a third phase of the Narmada supply has been implemented at a huge cost with the ADB loan. Later analysis shows that the internal economic rate of return (IERR) and the financial internal rate of return (FIRR) calculated at the time of sanction of the loan on the basis of certain assumptions are grossly inflated. This will push the IMC into a severe resource crunch. The ADB it appears, has wilfully manipulated the economic and financial data to push through the loan for the third stage of costly water supply from the Narmada to benefit big companies which supply and construct centralised water supply and sewerage systems.

6. The poverty pockets in the city which are home to 27 per cent of the population are very poorly served in terms of WSS facilities and given the high cost of these services they are not in any position to pay for them. The special projects for the provision of basic services to the urban poor under the ADB, Jawaharlal Nehru Urban Renewal Mission (JNNURM) and Department for International Development (DFID) projects are not being implemented properly.

On the basis of the above review the following recommendations are being made:

1. The Governance of the Water sector needs to become more transparent,

participatory and accountable, more democratic in short. A clearly defined City water policy needs to be evolved to begin with.

2. A Geographical Information System must be used to map all the properties within the municipal limits and then grade them according to zones and building quality for determination of adequate property tax rates. The share of property taxes must increase to at least 30% of revenue receipts and the per capita tax realisation should reach Rs 700. The tax collection system must be improved drastically and penal measures taken against defaulters.

3. A Proper inventory of the WSS systems in the city has to be prepared including both surface and ground water and the storm and waste water disposal systems. Currently there are radio frequency sensor based instruments and computer softwares to accomplish this quite easily. Only then can an authentic water demand and waste water and storm water generation scenario be chalked out for planning of services. Despite clear directions from the ADB and the Central Groundwater Authority (CGWA) in this regard no progress has been made so far.

4. The Water Sustainable Urban Development (WSUD) principles, which have now been recommended by the National Mission for Sustainable Habitat, should be used to design a hybrid ground cum surface water system. These principles involve rainwater harvesting, groundwater recharge, protection of local water system, demand side management, curbing wasteful use, penal provisions for higher water use, looking for options to recycle and reuse treated wastewater, treating wastewater in a decentralised way and a road map for achieving full recycle. This hybrid system will be much more sustainable in financial, social and environmental terms than the wholly centralised

system being used at present. The centralised systems should be used only where necessary to provide services to the congested poverty pockets where there might not be space available for decentralised solutions.

5. This alternative system would put the onus on the more affluent citizens, corporations, private commercial establishments and government institutions who are in possession of a considerable portion of urban land to tackle their water supply and waste water disposal needs in a decentralised manner from their own resources. This would then free the IMC resources for provision of free or subsidised WSS services to the poor and the lower middle class who are not in a position to pay for them fully. This is something that the ADB, JNNURM and DFID have wilfully ignored so as to favour big companies that set up and run centralised WSS systems.

6. Detailed surveys and design should be carried out to determine the actual benefit/cost ratio of such an alternative plan and then compare it with the surface water only alternative that has been implemented so far. This alternative plan should be implemented forthwith if found more appropriate.

7. The detailed plan for artificial recharge in the Gambhir and Shipra River Basins drawn up the CGWB should be implemented without any delay so as to improve the overall availability of water in the catchment of Indore city.

8. Solar power should be used for pumping the Narmada water supply and other power needs to the extent cost effective.

RAHUL BANERJEE

(The author is associated with Dhas Gramin Vikas Kendra and can be contacted at aarohini@yahoo.com)

CLIMATE CHANGE & WATER

World Bank's mischievous Report 'Why 4 C rise should be avoided' The report, prepared by the Postdam Institute for Climate Change Research for World bank deals with observed changes and impacts of Climate change, Projections for 21st Century with a focus on sea level rise and extreme temperatures and looks at sectoral impacts on agriculture, water resources, ecosystems and biodiversity and human health.

The report refuses to delve into industrialisation, thermal power plants, dams that have fuelled climate change, and which have been pushed by World Bank. The report goes on to say that impact of climate change will be severe for developing countries which are lacking in adaptive capacities to cope with these impacts. World Bank has been furthering this by funding and pushing projects like 4000 MW Tata Mundra Project, the Rampur Hydro project, the Vishnugad Pipalkoti HEP or the Luhri HEP, all in India. There is not a single word in the report about hydropower or thermal power plants. It is also surprising of WB publication

even to suggest a rise of about 4 C, when IPCC talked about need to limit it to 2 C.

Port cities vulnerable to intense monsoon climate change and unsustainable growth are leaving cities like Mumbai and Kolkata increasingly vulnerable. A report on an ongoing climate study places Mumbai sixth in a list of 20 port cities worldwide at risk from severe storm-surge flooding, damage from high storm winds and rising seas. By 2070, an estimated 11.4 million people and assets worth \$1.3 trillion would be at peril in Mumbai due to climatic extremes. The study by Organisation for Economic Co-operation and Development, reveals that many of the susceptible port cities are in Asia like Kolkata. Rampant concretization in global cities is leading to fluctuations in temperatures worldwide and shifts in microclimates. These changes are likely to build up into disastrous scenarios and excessive rainfall. In cities like Mumbai, where poor urban planning has left little space for water to get absorbed into the ground, the impact may be severe. A big portion of Mumbai is concretized. Solar radiation is absorbed by concrete,

triggering urban heat island effect and extreme weather conditions. OECD study in 2010 on flood risks, climate change and adaptation in Mumbai predicts a 3.6° Celsius increase in the mean temperature in Mumbai by 2070 or 2080 as a worst case scenario.

The report also points towards pathetic adaptation strategies in Indian cities. Large areas of reclaimed land are situated just above sea level and below high-tide level. This inhibits natural runoff of surface water and impacts the complex network of drains, rivers, creeks and ponds that channel water into the sea. (The Times of India 121112)

CDM HYDRO PROJECTS

Crashed Carbon Credit Market The Carbon offset credits have fallen to a new all-time low amid oversupply and signs of a possible ban on some credits in the European Union system. The price of one carbon credit, nearly Euro 24 (Rs 1,500) in 2008, was Euro 0.83 in late November 2012. It has been reported that many Indian companies have sold their carbon credits before Durban talks (UN Climate Change Conference, December 2011). After Durban, Europe, one of the major buyers, put a brake on purchase of credits, citing recession and a financial crisis. Indian firms were holding on to the remaining credit points with the hope that the market would rebound but it did not even in Dec 2011. As of November 2011, India had 2,123 approved CDM projects. Of these, 738 were registered with the UNFCCC. (Business Standard 231112)

ALTERNATIVES & INNOVATIONS

Chouka system in Laporiya Anupam Mishra's new book on Chauka system (literally meaning 'a square courtyard') of rainwater harvesting from Laporiya, Jaipur district, Rajasthan, Gochar ka Prasad Baantata Laporiya explains the simplicity and beauty of these structures. A chouka system is made out of a series of shallow rectangular dug areas that work together like sponges, collecting rains and passing water from one chouka to the next. By constructing the pits at intervals across the slope, runoff is intercepted and retained on the field until it is absorbed, increasing

CUMULATIVE IMPACT OF HYDROPOWER GREATER

A paper by scientists Philip Fearnside and Salvador Pueyo in journal Nature Climate Change dispels the myth that hydropower dams are clean. Authors illustrate different neglected pathways of methane release from both upstream and downstream of dams. Reservoir emissions mostly constitute of methane which is about 21 times more potent a greenhouse gas than carbon dioxide over 100 years.

Siting an example of Brazil, the authors write "Various mathematical errors have resulted in Brazil's electrical authorities estimating the magnitude of emissions from reservoir surfaces at a level of only one-fourth what it should be." This was also said by a team of Canadian Researchers regarding dams in Canada recently.

The paper also states that Dams in the tropics have two principle greenhouse gas emissions sources: One-time emissions of "fixed sources" of carbon, which are released from soil carbon stocks and dying vegetation when the reservoir is flooded and Methane formed when "renewable sources" of carbon originating from various inputs of organic matter end up in reservoirs and then decay at the bottom, making them into a Methane Factory. Governments are not only promoting hydro projects for their supposed benefits in mitigating global warming, but also to take advantage of mitigation funds such as the Kyoto Protocol's Clean Development Mechanism.

Shattering the "clean-green-sustainable" myth, authors say "These tropical dams are expected to have cumulative emissions greater than those of fossil-fuel plants for several decades to come, making them indefensible on the basis of global warming mitigation".

ground water recharge. Choukas have transformed the dry wasteland surrounding Laporiya into grassy village common lands perfect for grazing, multi tiered biodiversity. Around 1,600 hectares of new choukas have been built through Gramin Vikas Nav Yuvak Mandal, Laporiya, a civil society organisation. The system has helped villages around Laporiya in many ways. Now there is less migration, more crop diversity and improved milk yields. The low budget innovation has great applications for all of India's water scarce areas.

SANDRP has visited Laporiya and this system finds mention in SANDRP's Report Water Sector Options for India in a Changing Climate. (http://sandrp.in/wtrsect/Water_Sector_Options_India_in_Changing_Climate_0312.pdfview?searchterm=Water%20sector%20options)

The book by Anupam Mishra can be downloaded from India Water Portal: <http://hindi.indiawaterportal.org/sites/hindi.indiawaterportal.org/files/lapodiya-water-Village3.pdf>

Inspiring micro hydro projects through sustained , inspiring efforts, IIT-Delhi alumnus Yogeshwar Kumar has set up environment friendly micro hydroelectric plants (capacity below 1 MW, most only a few kilo watts) in the hilly regions of Uttarakhand, Kargil, Ladakh, Meghalaya and parts of Orissa for supplying power to households as well as to set up small enterprises and creating jobs through his NGO Jansamarth. In the past three decades, he has built 15 hydel projects which are manned and operated by villagers, who use the power to run rural enterprises like flour-mill, oil-mill, sawmill, and welding workshops. Electricity from one of the first plants he installed was also used for a night school for children who were busy in grazing cattle during the day.

Kumar has found it difficult implementing programmes through government agencies. Though government funds for building of hydel-plants for remote villages in Leh is available, there is no allocation for repairs and maintenance. He says there is imperative need to build strong

cooperative units in villages with an emphasis on capacity building in rural areas.

He is now training villagers in operation and maintenance of power plants. Their wages are paid from income of the plant, which is collected from consumers as per their meter reading. In 2009 Agunda village in Tehri district of Uttarakhand opted for a 40 KW micro-hydro power plant even though the village was going to be connected to the state grid. The villagers find their plant more reliable and which can be repaired immediately – with their own trained manpower - unlike the government line that takes days.

Ironically, the very existence of this plant, which the villagers want to upgrade to 100 KW, is threatened by an upstream hydel project, the proposed 12.5 MW Jhalakoti Hydel Project, by a private company. The Agunda project not only provides electricity for lighting, wool carding, rice and wheat processing, but also irrigates 60-70 fields. Similarly, the 22.5 MW Bhilanganga Project in the same region has led to severe problems for the community including displacement, impacts of blasting, reduced water flows, etc. (See: SANDRP's comments on 12.5 MW Jhalakoti MHPs application for Carbon Credits: http://sandrp.in/comments_CDM_HEPs/Objection_to_Jhalakoti_HEP_in_Uttarakhand_SANDRP_submission_to_UNFCCC_on_CDM_proposal_June_2012.pdfview?searchterm=jhalakoti) It is important promote and encourage truly sustainable micro hydel project like the ones being set up by Yogeshwar Kumar, while opposing the green farce of small hydel projects which have significant, un-assessed and unaddressed impacts on ecology and society.

Power of Positive Actions It is pleasantly surprising to see the power of small, inspired local actions. Devyani Lake, 70 kms from Jaipur in Rajasthan near the famous saline Sambhar Lake, is one such example. Once fondly called as 'sab teertho ki naani' (grandma of all holy waters), the lake has been dry in most living memory. Government

DAM DRAWDOWNS LEAD TO METHANE EMISSIONS

Research from Washington State University has revealed that temperate reservoirs can produce significant surge in emissions during drawdown periods: when the water level in a reservoir drops rapidly, thereby exposing a "drawdown zone" of decayed plants that can be a continuous source of methane. Researchers found in experiments that methane emissions jumped 20 to 36-fold when the water level was drawn down.

While emissions from drawdown regions have long been recognized, this is the first study to actually demonstrate and quantify the relationship between water-level drawdowns and greenhouse gas releases that too in temperate regions. With 54000 + dams globally, continuing to overlook reservoirs as a carbon source and treating dams as a "carbon neutral" energy source is no longer a viable option. According to Katy Yan from IR, an important first step is for governments and dam builders to recognize that dams have a carbon footprint. Next, countries must report their reservoir emissions in their national greenhouse gas inventories. The IPCC must fast adopt strong guidelines for this. (International Rivers, Washington State University August 2012, International Rivers).

restoration plans remain resolutely on paper.

In such scenario, a group of youths as diverse as local Volley ball club, friends groups and Khatik Samaj joined hands to see the Devayani lake lotus-filled for themselves. Overflowing waters from nearby Sambhar Lake, which would have otherwise affected salt-pans were diverted by digging storage tanks. Water from these two storage tanks was actually pumped into the Devayani Lake, whose water level reached 9 feet in just 7 days. The parched lake is now brimming with water and all that it brings: festivals, celebrations, rising

ground water levels and good cheer. (The Hindu 281012)

The groups had no technical knowledge, no funds, no restoration manuals at their hand, and their actions may not be the most refined. But the effort shows the power of small collective positive actions. Devyani is now brimming and the mark of this will remain on the minds of the youth and children of this area. Hope comes in small sizes.

Small Ponds, Huge benefits Lakholaav, a small pond in Marwar Mundwa town in Nagaur district, Rajasthan is a telling example of community conservation and benefit sharing. As ponds in other towns have shrunk due to encroachments and dumping of garbage, Lakholaav is providing drinking water to a population of 15000 people, the whole year round. Citizens as well as the municipal committee take utmost care ensuring cleanliness and efficient management.

While groundwater is heavy with fluoride, tap water supply is every alternate day, making rainwater harvesting a must. Around 50 per cent homes harvest rain water in a small underground structure called tanka. Like Devyani lake, Lakholaav is also a great social binder and the ghats host the entire town during festivals, like Teej and Dussehra.

There is a ban on bathing, washing clothes and entry of animals in the pond. Boards warning against open defecation within 2 km of its catchment area have been erected and there are guards to check activities in this region. Several modifications have been made in Lakholaav's structure over the years. A 3 km long channel has been constructed connecting the catchment area on a nearby hillock with Lakholaav ensuring good water inflow even during weak monsoon as was the case this year. A natural treatment plant further cleanses the inflowing water. A few years ago when the pond dried up due to drought, the municipal committee decided to desilt the pond. Local farmers chipped in with their tractors and used the fertile soil in their fields.

Though Lakholaav Pond and many such tanks, ponds, baavdis, johads,

maybe small, their significance as decentralised, community managed and eco-friendly water harvesting structures is immense. They continue to offer the most sustainable options to destructive large dams and canals in India. (GOI Monitor 151112)

25% German Power grid on renewables Since 2000, Germany has converted 25% of its power grid to renewable energy sources such as solar, wind and biomass. The proportion of power from renewable sources keeps rising and is expected to reach 80-100 % by 2050. At the same time, Germany is talking about phasing out its nuclear energy plants by 2020. (Truthdig Nov 15, 2012)

If Germany can do it, why can not India with its much larger solar power potential? Tamil Nadu is now launching a program to add 1000 MW solar power each of next three years and each distribution company will be obliged to buy 3% of its power from solar sources, with the percentage going up each year. This is only happening through projects of over 1 MW, unlike Germany where it is happening through roof top solar projects. India too needs to incentivise small, roof top solar projects.

Unfortunately, global investment in renewable power in first three quarters of 2012 is down to \$ 164.2 Billion from \$ 196.4 B last year, largely due to 62% decline in the most polluting country US and 29% decline in Europe, both attributed to economic slow down. (Business Standard Nov 12, 2012)

Interesting to see this recent paper from Prayas Energy Group, Pune on Roof top photo voltaic (RTPV) solar in India, it says: "Further, instead of subsidizing RTPV, we propose that tariffs of commercial and high-end residential consumers should be aligned with those of RTPV costs, thereby incentivising them to shift to solar or pay higher tariff. Policy should help create an enabling eco-system for RTPV and focus on the removal of procedural hurdles and other barriers in order to facilitate the quick adoption and deployment of RTPV systems. Finally, we believe that such a net-metering approach to RTPV promotion is ideally

suited for India, since it is socially equitable, economically viable, and environmentally sustainable." (http://www.prayaspune.org/peg/index.php?option=com_k2&view=item&id=186%3Asolar-rooftop-pv-in-india)

California Coalition for decentralised options The California Roundtable on Water and Food Supply, in a new report From Storage to Retention: Expanding California's Options for Meeting its Water Needs, calls for more retention ponds and other small reservoirs on farms and farmland, more groundwater storage on private lands, and other overlooked approaches. "The value of working lands in helping to sequester water for later use while achieving many benefits, such as food security, flood management and habitat restoration, represents a critical missed opportunity for improving water security," the report says. The coalition has members affiliated with irrigation districts, utilities agencies, USDA, State Water Resources Control Board, and other public and private interests. The group wants water storage in the state to become more diversified and inclusive so that the full range of options available — such as canals, small man-made ponds and floodplains — are used to augment the state's existing system of large reservoirs. The report says more water storage is necessary because California's water supply will diminish due to climate change factors and population growth. (www.acwa.com 171112)

GROUNDWATER

Groundwater abstraction leading to sea level rise! According to research by Utrecht University and Deltares, Large-scale abstraction of groundwater for irrigation of crops leads to a sea level rise of 0.8 mm per year, which is about one fourth of the current rate of sea level rise of 3.1 mm per year. From a database of the International Groundwater Resources Assessment Centre (IGRAC), scientists extracted country-based statistics on groundwater abstraction, combining these statistics with estimates of water demand based on maps of population density and the location of irrigated areas, a global map

of groundwater abstraction and recharge could be derived. By subtracting groundwater abstraction from groundwater recharge they arrived at a global map of groundwater depletion.

The results show that the areas of greatest groundwater depletion are in India, Pakistan, the US & China. In these areas food production and water use are unsustainable and serious problems are expected. The hydrologists estimate that from 1960 to 2000 global groundwater abstraction has increased from 312 to 734 km³ per year and groundwater depletion from 126 to 283 km³ per year. Contribution of groundwater depletion to sea level rise could be calculated as most of the groundwater released from the aquifers ultimately ends up in the world's oceans. **This turned out to be 0.8 mm per year, which is a surprisingly large amount when compared to the current sea level rise of 3.1 mm per year as estimated by the IPCC.** It thus turns out that almost half of the current sea level rise can be explained by expansion of warming sea water, over one quarter by the melting of glaciers and ice caps and slightly less than one quarter by groundwater depletion. (Deltares Release May 2012)

This highlights not only the connection between groundwater abstraction and sea level rise, but more importantly the intricate connections of the global water cycle and how impacts of unsustainable action at one place can have far reaching and severe impact for the entire planet. Parts of India is already abstracting double the amount of groundwater that is being recharged, while depending heavily on groundwater sector for not only irrigation, but urban and rural drinking water and industrial needs.

HYDRO PROJECTS

Cumulative Assessment for SHPs demanded Brazilian court has suspended construction of small hydroelectric dams along the Paraguay River until their possible environmental impacts have been fully assessed. Unlike the case in India, in

Brazil environmental impact assessment of small dams is carried out, but prosecutors are saying that combined effects of all of the small hydropower projects together must be evaluated. In Brazil, Small Hydros are upto 30 MW with reservoir area of less than 300 Ha.

The court ruled that small hydroelectric plants can cause irreversible damages, by modifying the annual cycles of flooding and drought in the Pantanal, one of the world's largest wetland systems. This could in turn affect the 4,000 families who depend on Pantanal for survival, through tourism, farming and fishing. The Pantanal, a national park, was declared a World Natural Heritage site by UNESCO in 2000. There are 113 small hydropower dam projects along the Upper Paraguay River alone, including 30 that are already operating, in addition to 10 larger dams.

Experts say that small dams are a hotly debated in Brazil as their impacts are proportionately larger than those of large dams, taking into consideration indicators such as the ratio of area flooded per kilowatt of electricity, or the number of fish species affected per kilowatt. (IPS News 100912).

WATER POLLUTION

Ganga: Now a Carcinogenic River Research by the National Cancer Registry Programme (NCRP) under the Indian Council of Medical Research shows that the Ganga river is now thick with heavy metals and lethal chemicals that cause cancer.

The incidence of cancer was found to be some of the highest in the country in areas drained by the Ganga. The worst-hit stretches are east Uttar Pradesh, the flood plains of Bengal and Bihar. Cancer of the gallbladder, kidneys, food pipe, prostate, liver, kidneys, urinary bladder and skin are common in these parts. These cases are far more common and frequently found here than elsewhere in the country, the study says. Gallbladder cancer cases along the river course are the second highest in the world and prostate cancer highest in the country. "This is the consequence of years of abuse. Over years, industries

along the river have been releasing harmful effluents into the river. The process of disposing of waste has been arbitrary and unscientific. The river and those living along its banks are paying a price for this indiscretion," Chittaranjan National Cancer Institute director Jaideep Biswas said. The Kolkata-based cancer institute is an associate of the National Cancer Registry Programme. (The Times of India 171012)

The Bihar Pollution Control Board has said this year on Chhath that Ganga is not fit for aachman or dip at any of the 21 points monitored by it, the bacteriological count is higher than acceptable everywhere. Will this wake up the National Ganga River Basin Authority chaired by the Prime Minister?

RIVERS

MLAs in Kerala launch drive to save rivers A group of legislators of the Kerala United Democratic Front have launched a campaign for protecting the 44 rivers in the State. The objective of the campaign is to prepare a model legislation that will lead to the setting up of a river basin authority with statutory powers. The campaign has begun from Neyyar in Thiruvananthapuram and will conclude at Chandragiri in Kasaragod. The campaign was flagged-off by Medha Patkar. MLAs have planned for interactive sessions and debates on the banks of the rivers during the campaign, bringing together activists of various river protection committees, social workers, writers, cultural personalities, and scientists. (The Hindu 131112)

Murray Darling basin reserves water for Environment In drought prone Murray Darling Basin, 2760 MCM (Million Cubic Meters) water has been reserved for environmental flows as the basin plan becomes an act. Already 1577 MCM water has been secured this year, as compared to 65 MCM in June 2009. Most of this water has been secured by increasing efficiency and not buying water alone, which was a cheaper option. One hurdle remains. The Plan needs to be tabled in

parliament for 15 days, during which it could be voted down. (Climate Spectator Australia, 261112)

Recognising Rights of Rivers A movement to advance the rights of waterways is happening now around the world, with advocates calling for water rights for rivers as part of human right to water.

New Zealand recently recognized the Whanganui River (third longest river in NZ) and its tributaries as a legal entity with rights to exist and flourish as an "integrated, living whole." Guardians will be appointed to oversee the rights of the River pursuant to this new legal recognition. The decision follows a long court battle initiated by the Whanganui River iwi, an indigenous community with strong cultural ties to the river. Under the settlement, the river is regarded as a protected entity, under an arrangement in which representatives from both the iwi and the national government will serve as legal custodians towards the Whanganui's best interests. It is recognised as 'an integrated, living whole' and will have its rights, just as any corporate entities or companies.

Ecuador has similarly taken action to protect the rights of waterways. A successful 2011 lawsuit over injury to Ecuador's Vilcabamba River from waste dumping led to the first implementation by court the country's Constitutional provisions recognizing the rights of nature. Pittsburgh, Pennsylvania similarly has adopted an ordinance recognizing that "natural communities and ecosystems, including water systems, possess inalienable and fundamental rights to exist and flourish." In California, Santa Monica's Task Force on the Environment approved a proposed Sustainability Bill of Rights that recognizes the rights of natural systems, including coastal waters. (Tree Hugger 060912, The Huffington Post 15x12)

Looking at the huge social, cultural, economic and ecological significance of Indian Rivers in hearts and minds of millions of Indians, an overarching

river protection law is an urgent need for India.

FISH AND FISHERIES

Water discharge: Driver for Fish Diversity In a recent paper entitled: Elevation Gradients in Fish Diversity in the Himalaya: Water Discharge Is the Key Driver of Distribution Patterns by Jay Bhatt, Kumar Manish and Maharaj Pandit published in PLoS One Journal (Sept 2012), the authors conclude that species richness of freshwater fish in Himalayan river systems depends on freshwater flows. Authors collated taxonomic and distribution data of fish species from 16 Himalayan rivers and carried out empirical studies on environmental drivers and fish diversity and distribution in the Teesta river along elevation gradients 50–3800 m and sought to understand the drivers behind the emerging patterns. The study indicates that water discharge is the best predictor of fish species richness patterns in the Himalayan Rivers and showed a strong linear relationship of species richness with water discharge.

According to the authors, "Our results assume more significance because of the on-going large-scale hydropower development in the Himalaya with nearly 300 dams being built across these rivers. The river regulation activity would result in significant reduction of water discharge and alteration of natural diurnal flows, habitat fragmentation and barriers to fish migration. The cumulative effects of water withdrawal are known to reduce freshwater biodiversity and lead to extinction of fish. Worryingly, the zones of high species richness and endemism are also the sites of concentrated dam building and river regulation in the Himalaya." (www.plosone.org)

Onslaught of dams in Himalayas will be disastrous for fish diversity and endemic species. The suggested mitigation measures come only in form of highly inadequate minimum flows and artificial, unproven measures like

hatcheries and fish farms.

Need for River Sanctuaries to Protect Mahseer Madhya Pradesh State Biodiversity Board has recommended declaring Barna and some other rivers as 'fish sanctuaries' to conserve the endangered Mahseer Fish which, once abundant in Narmada and Tapti basins in MP, is now on the brink of extinction. To strengthen the gene pool of Mahseer, Biodiversity Board has recommended declaring Bandrabhan, Sethani Ghat, Omkerashwar and Maheshwar Ghat of Narmada as Biodiversity Heritage Spots under Section 37 of Biodiversity Act 2002.

The state was so rich in Mahseer that, according to experts there were six seed collection sites around Hoshangabad from where seed of Mahseer was collected and transported throughout the country. (The Times of India 111112) Mahseer swims upstream in a river to spawn (lay and fertilise eggs) this migration route is blocked by dams like Sardar Sarovar, Narmada Sagar, Omkareshwar, Maheshwar, Bargi and Tawa which do not have any fish mitigation measures like passes or ladders, neither do they release freshwater flows in the downstream for the river. Dams have been the primary cause of near extinction of various species of Mahseer in India.

Thirsty rivers...contd from page 10

REFERENCES:

1. M. Banerjee, A Report on the Impact of Farakka Barrage on the Human Fabric. Report. World Commission on Dams – Thematic Review. South Asia Network on Dams, Rivers and People, New Delhi, India, 1999.
2. A.I. Payne and S.A. Temple, 'River and Floodplain Fisheries in the Ganges Basin. Final report R.5485.' Marine Resources Assessment Group Limited, Overseas Development Administration, London, 1996.
3. K.K. Vass, S.K. Mondal, S. Samanta, V.R. Suresh and P.K. Katiha, 'The environment and fishery status of the River Ganges', Aquatic Ecosystem Health and Management, 13, 2010, 385-394.
4. S. Turvey, 'Witness to Extinction: How we failed to save the Yangtze River Dolphin'.

Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, UK. 2008.

5. J. Bandyopadhyay and S. Perveen, 'The interlinking of Indian rivers: some questions on the scientific, economic and environmental dimensions of the proposal'. Occasional Paper No 60, SOAS Water Issues Study Group, School of Oriental and African Studies/King's College, London, U.K.

6. N. Kelkar, and J. Krishnaswamy. Keeping Rivers Alive. Seminar, 613, 2010, 29-33.

7. S. Choudhary, S. Dey, S. Dey, V. Sagar, T. Nair and N. Kelkar, 'River dolphin distribution in regulated river systems: implications for dry-season flow regimes in the Gangetic basin', Aquatic Conservation: Marine and Freshwater Ecosystems, 22, 2012, 11-25.

8. B.D. Richter and G.A. Thomas, 'Restoring environmental flows by modifying dam operations', Ecology and Society 12, 2007, 12.

9. S.E. Bunn and A.H. Arthington, 'Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity', Environmental Management 30, 2002, 492-507.

10. D. Dudgeon, 'Large-scale hydrological changes in tropical Asia: prospects for riverine biodiversity', Bioscience, 50, 2000, 793-806.

11. D. Dudgeon, 'River rehabilitation for conservation of fish biodiversity in monsoonal Asia', Ecology and Society, 10, 2005, 15-19.

12. A.H. Arthington, S.E. Bunn, N.L. Poff and R.J. Naiman, 'The challenge of providing environmental flow rules to sustain river ecosystems', Ecological Applications, 16, 2006, 1311-1318.

River Yamuna...contd from page 17

show that 10 cumecs is released in the river as per SC order is making a mockery of the SC order as the order was for the whole stretch of river all round the year.

Moreover, Delhi had assured the SC in 1998 that by the end of 2000, Delhi will have adequate capacity to treat all its sewage and after Dec 31 2000, no untreated effluents would flow into the river from Delhi. That is yet to happen. Delhi today does not sufficient capacity of STPs to treat the sewage it officially generates. Secondly, none of the STPs are functioning at even 50% of the capacity. Thirdly, Delhi generates much more sewage that officially assumed due to the additional 200-300 MGD groundwater used within the city. The claim that unauthorised colonies are

responsible for the sewage not reaching STPs is clearly unacceptable, these colonies did not spring up overnight. The Delhi govt, the Delhi Jal Board and the MEF should be made answerable for this situation and all concerned must be held accountable.

The HPC's long term suggestions of Renuka dam, Kishau Dam, and river linking proposals are not necessary for Yamuna to get freshwater all round the year. In fact, these projects and other hydropower and dams planned in the Yamuna basin are more likely to destroy the river further. The MOU of Upper Yamuna River Board suggesting that even the erroneously proposed 10 cumecs flow into the river would be possible only after these big dams on the Yamuna are built is trying to mislead the Supreme Court and every one else and is only an instrument of non action and attempt to push unjustifiable projects.

What can the SC do? Well there is a lot that can be done to spare water for the river, and spare the river from dumping of untreated sewage and effluents. A large number of steps are possible including adoption of more appropriate cropping pattern in Yamuna basin in Haryana and Uttar Pradesh, adoption of water saving techniques like System of Rice Intensification, and incentives for organic farming that can help build up soil capacity to hold moisture. In Urban areas like Delhi and elsewhere, time bound rainwater harvesting plan, groundwater recharge, protection of local water bodies, flood plain, ridge and forests, demand side management measures including avoiding unnecessary and wasteful water using activities, ensuring that existing Sewage treatment plants work to their optimum capacity in quality and quantity of output through participatory and accountable



Yamuna in Delhi

Photo: India

governance, ensuring that new STP capacities are set up in time bound manner and are decentralised and use biological treatment methods that require less inputs of power, materials and land and that make recycle of water easier at local level, to name just a few measures. All of these are known steps, but the governments have shown no will to take any of these with the required seriousness. Only transparent and accountable mechanisms can ensure these are actually taken up with required seriousness.

In an order on January 12, 2011 the Allahabad High Court (in PIL no 4003 of 2006 in the matter of Ganga Pollution Vs State of UP and Others) has said that from any river, not more than 50% of available water should be diverted and rest should be allowed to remain in the river. This principle needs to be applied in case of Yamuna at every location, but particularly at the Hathnikund and Wazirabad barrage.

If all this is done and if the dumping of untreated sewage and effluents into the river is stopped, along with other practices mentioned above, there is a possibility of rejuvenating the Yamuna almost immediately. The Supreme Court seems the only body to ensure these steps are taken with seriousness and implemented with of participatory governance. The Rs 12000 crore (the estimated amount spent on Yamuna cleaning over the last 18 years by all agencies put together) question is, will this happen?

HIMANSHU THAKKAR

(This article was published in Civil Society in Dec 2012)

New Publication from SANDRP: Book Review**RIVER BAGMATI: BOUNTIES BECOME A CURSE**

by Dr D K Mishra

Published in: August, 2012

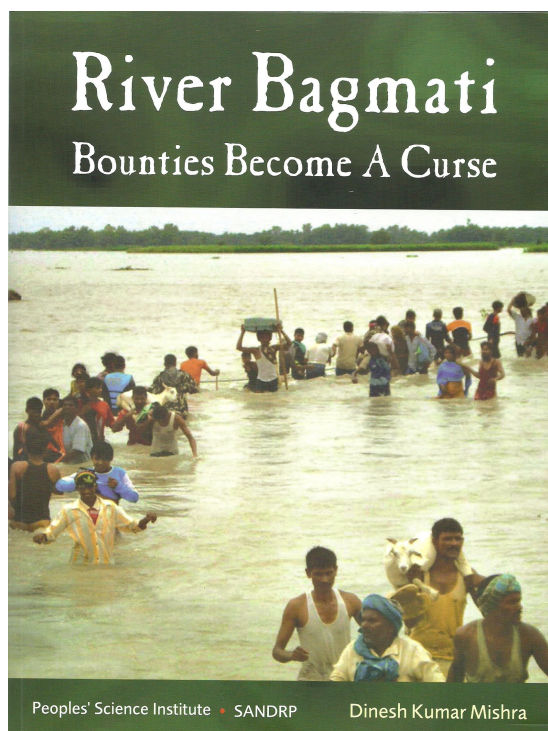
Published by: SANDRP and Peoples Science Institute

Pages: 196 + xii (8.5"x11" size)

Reviewed by

Sudhirendar Sharma

(www.d-sector.org 30 Nov 2012)



The resolute perseverance with which Dinesh Kumar Mishra has chronicled major rivers, flowing through the flood plains of Bihar, during past three decades makes one realise if this civil engineer could have been anything but a 'river biographer'. Meticulous with details, ranging from mythology to hydrology, the narrative weaves people as victims of hydrological madness. Multiple voices and divergent perspectives only testify what Voltaire had long said: 'The progress of river to the ocean is not as rapid as that of man to error.' The story of Bagmati is no different!

While the river has preserved its status of a free-flowing drain in Nepal, caging it between embankments has forced the river to roar occasionally in Bihar. Largely unnoticed, the embankments have breached no less than 58 times over last 35 years. Notable aspect of this rather familiar story across major river basins in the sub-continent is that 'neither have lessons been learnt nor are there any

intentions.' Not surprising, therefore, that the narrative reflects author's pain and anguish in equal measures.

Mishra's relentless documentation on rivers may not have gone unnoticed but it has not been able to capture popular imagination as yet. Bereft of detailed prescription, the diagnostic narrative has seemingly remained restricted to researchers and academics. Being critical of structural development along river course and the consequences thereof, his books have remained on the periphery of political discourse on flood plain management. Like his previous biographies, River Bagmatimay not be a game changer yet but has essential elements to challenge history.

One may well argue that the world is not at the tipping point for a change in managing our rivers yet. Should that be so, these river biographies have surely been written ahead of their times. However, the time is not far for the 'business-as-usual' scenario of (mis)managing the rivers to transform. It is then that wise, witty, patient, persistent and persuasive anthology by Dinesh Kumar Mishra will merit serious consideration.

For copies of the book, contact dkmishra108@gmail.com/ ht.sandrp@gmail.com/ psiddoon@gmail.com. Price Rs 595/- + Rs. 60/- (for postage). Pl send a check or demand draft to SANDRP, C/o 86-D, AD Block, Shalimar Bagh, Delhi - 110 088, Ph: 011-2748 4654/55.

Information on other publications of SANDRP could be accessed at sandrp.in/pubindex

Dams, Rivers & People The annual subscription for the DRP is Rs 125/-. Please send a DD in favour of "Dams, Rivers & People", payable at Delhi, to our address (DRP, c/o 86-D, AD block, Shalimar Bagh, Delhi 110 088). Or, you can send by bank transfer, contact SANDRP for details. Subscriptions can be sent for multiple years at the same rate. The DRP is also available in electronic versions and can be accessed at www.sandrp.in/drindex.

Edited, Published, Printed & Owned by Himanshu Thakkar at 86-D, AD Block, Shalimar Bagh, Delhi - 88.

Printed at Sun Shine Process, B -103/5, Naraina Indl. Area Phase - I, New Delhi - 110 028