Ecological Management of Rivers in India: A Long road ahead

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Right: A dry Satluj, 10 kms downstream of 1500 MW Nathpa Jhakri Hydel Project, Himachal Pradesh
What is Ecosystem Approach?

- According to the Convention on Biological Diversity, ecosystem approach is a strategy for integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.
- Ecosystem approach in watersheds is based on the notion that water, biodiversity, and environmental protection require establishing interdisciplinary, inter-sectoral and inter-institutional initiatives. (UNEP)
- These initiatives focus on livelihoods and economies, as well as ecosystem services essential to water supply, groundwater recharge, erosion control, and water purification.
- In 2005, the Millennium Ecosystem Assessment (MA) made a strong case for using an ecosystem services approach.
- MA stated that a future scenario consistent with improved ES provision is one in which “regional watershed-scale ecosystems are the focus of political and economic activity” (Millennium Ecosystem Assessment 2005).
- Local institutions are strengthened and local ecosystem management strategies are common; societies develop a strongly proactive approach to managing ecosystems.
- Tools like Payment for Ecosystem services through community based approaches, not market based approaches.
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<td>- Genetic resources</td>
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<th>Supporting Services</th>
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<td>Services necessary for the production of all other ecosystem services</td>
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Ecosystem-based Management of Indian Rivers

- Unfortunately, Indian rivers have been viewed at as only providers of water and receivers of waste water and effluents.
- The ecosystemic links between upstream, mid stream, floodplains and riparian areas have not been the focus of any river improvement schemes or developmental projects.
- National Water Policy accords 4th Priority to Ecology and states that
  - “Water is part of a larger ecological system. Realising the importance and scarcity attached to the fresh water, it has to be treated as an essential environment for sustaining all life forms.”
  - “Minimum flow should be ensured in the perennial streams for maintaining ecology and social considerations.”

Above: Muck disposal, a few kms downstream Karcham Wangtoo HEP, HP
However, it also states that:

• Water should be made available to water short areas by transfer from other areas including transfers from one river basin to another, based on a national perspective.

With contradictions like these, ecosystem based management of rivers in India, which lays stress on all the services provided by rivers is still a distant dream.

• No credible or effective action has been taken to implement the minimum flow provision of NWP,

• In costs benefit analysis there is no cost of destroyed river services,

• In options assessment there is no attempt to find non river based options.
Major Ecosystemic Challenges faced by Indian Rivers

• Quality:
  – Around 33,000 MLD sewage is discharged into rivers from Class I and Class II cities (NRCP 2010, CPCB 2009)
  – Out of which, treatment capacity exists for only about 12,000 million litre per day (36.3%)
  – Out of which, 39% plants are not conforming to the general standards prescribed under the Environmental (Protection) Rules for discharge into streams as per the CPCB’s survey report!
  – 15,644 Millions Liter Per Day (MLD) of sewage is generated from 35 metropolitan cities. Treatment capacity for treating 51% waste water
  – However, CPCB itself claims that there is a huge gap between treatment capacity and actual sewage treated.
  – According to CAG 2011 Report, barely 10% of waste water generated in India is treated
Impacts of deteriorating quality on communities and ecosystems

- Fisheries have been impacted severely due to sewage and industrial effluents.
- Fish kills are a common phenomenon and indigenous fish species are becoming locally extinct.
- In coastal areas of Maharashtra, with more than 6 Chemical Industrial Development Corporations, estuarine fisheries are on the verge of collapse.
- Chromium and Aluminium have been found in samples of human milk, above permissible limits in Lote Parshuram area. Health issues like asthma, gastrointestinal disorders have been documented to be significantly higher.
- CETPs installed in these Industrial belts have a consistent record of absolute inefficiency, absence of transparency and participation.
- This is happening in the Western Ghats, which is a global biodiversity hotspot.
- Fishing villages like Dabhol near the Vashishthi estuary have seen increasing rates of migration and traditional fisheries livelihood has been abandoned.
- Six mega ports and coal based thermal power plants have been planned at the estuaries, which support rich fisheries and unique ecosystems. Negative impacts are already evident.
- Downstream rural communities are bearing the brunt of polluting cities in the upstream. Villages downstream of Ujani reservoir have recorded sharp increase in water borne diseases in summers.
Ecosystem Management of Rivers and Water Quality

• While Water (Prevention and Control of Pollution) Act 1974 Act talks of preventing pollution, it does not address the need for ecological management of rivers or even address the issue of ecological restoration.
• We do not have biological indicators or keystone species associated with rivers and all we know from CPCB and State PCB are the pollution levels, not their link with the ecosystems.
• All the projects funded under National River Conservation Program focus entirely on city-based sewage treatment plants and cosmetic beautification, and do not address the ecosystemic, basin wide issues.
• After 37 years of creation of the act and PCBs, we do not have a SINGLE success story of river revival.
  – **CAG 2011:** “River cleaning and control of pollution programmes for our polluted rivers are being implemented since 1985.
  – The programmes seek to address pollution from point and non-point sources through construction of Sewage Treatment Plants, low cost sanitation, electric crematoria etc. **However, the data on the results of these programmes are not very encouraging.**
  – Ganga in certain stretches, Yamuna, Gomti, Godavari, Musi, Cauvery, Cooum, Mahananda, Khan, Kshipra, Vaigai, Chambal, Rani Chu, Mandovi, Sabarmati, Subarnarekha, Bhadra/Tungabhadra, Pennar, Pamba, Betwa, Krishna, Sutlej etc., continue to be plagued by high levels of organic pollution, low level of oxygen availability for aquatic organisms and bacteria, protozoa and viruses which have faecal-origin and which cause illnesses.”
  – Programs like NRCP and NLCP have not shown any ground breaking results **in the past 25 years.**
Governance: Water Quality issues for ecosystem based management of rivers

- There is no participation of local communities in monitoring the functioning of sewage treatment plants in cities.
- Local stakeholders are not a part of functioning and monitoring of CETPs in rural areas, on the other hand, they are actively excluded.
- Survey Report of CETPs by CPCB, 2005, : “In general, the performance of CETPs has been found to be very unsatisfactory, largely because of poor operation and maintenance.”
- Conventional programs focus on energy intensive, centralised sewage treatment plants which have not functioned historically.
- Options like decentralised bioremediations, root zone treatment through riparian zones, etc not explored.
- There are no guidelines about riparian belts to be maintained along streams and rivers in urban areas.
- Channelisation of streams and rivers in urban areas is the only response to flood control.
- Gram Sabha resolutions against polluting industries do not hold good.
- Even at the central level, the National River Conservation Authority, chaired by the PM has not met since 2003!! Standing Committee, Steering Committee, Monitoring Committee have not met 4-8 years.
Challenge of Quantity

• Quality problems cannot be addressed without addressing Quantity issues
• While challenges related to water quality seem to be somewhat manageable, water quantity challenges seem very difficult to surmount
• Flow of the river is the ‘master variable’ which affects nearly all natural processes in the river, thus making it a key variable in ecosystem based management of rivers
• However, natural flow of nearly all Indian rivers has been severely distorted, resulting in major ecosystem and social impacts.
Muck Disposal, downstream of Karcham Wangtoo Project in Baspa River
Muck disposal in Baspa River: Karcham Wangtoo Project
Challenge of Quantity

• Dams:
  – With more than 5100 Large Dams across all our major and minor rivers, India is third in the world in dam building
  – Though our National Water Policy states minimum ecological flows will be maintained in perennial streams, none of these dams are operated, intended or planned to release eflows for downstream social and ecological needs.
  – They do not have fish ladders or passes.
  – Apart from their impact on indigenous and poor communities, they have fragmented rivers many times over, submerged thousands of hectares of prime forests, driven native fish species to extinction and have had a severe impact on ecology
  – Actual benefits from large dams (irrigation, hydropower) are extremely over stated
  – Performance appraisal of India's large projects show: Diminishing generation from large hydro projects, large hydro projects not providing peaking power, large storage capacities remaining unutilised, Stored water remains unutilised, creation of unviable storage capacities, high costs of irrigation from large projects when less expensive options exist & large dams providing hardly 10% of the food grains production, when options could have provided greater output.

• Outfalls of peninsular basins are falling sharply, with some approaching near zero
• Coastal sedimentation has become a grave problem due to trapping of sediments behind dams like in the case of Godavari river delta
• Native fish species which migrate in the upstream are becoming locally extinct and endangered
• Local livelihoods based on fishing and riparian farming has been gravelly affected
Of the 30 basins marked as Global priority for the protection of aquatic biodiversity by Jenkins and Groombridge (1998), nine are from India due to their extensive and continuing development.

These basins include Cauvery, Ganga-Brahmaputra, Godavari, Krishna, Indus, Krishna, Mahanadi, Narmada, Pennar and Tapi.

With the exception of Ganga-Brahmaputra basins, all others are marked as 'strongly affected' by flow fragmentation and regulation. (Nilsson et al, 2005)

Above: In River Krishna, before 1960s, the discharge into the ocean averaged 57 BCM per year. Since 1965, it has steadily decreased at an average of 0.8 BCM per year to reach 10.8 BCM in 2000, which is less than 15% of its historical runoff, while it was almost nil in 2004 (0.4 BCM).
Source: Venot et al, 2003
Dams on Siang, Dibang and Lohit Rivers
Environmental Flows: Only a debate

- We have not agreed upon a single methodology for calculating and releasing efflows downstream of existing dams or dams under construction.
- Working Group on Minimum flows was constituted under the WQAA, CWC, but their report was not accepted by the MoWR. **No attempt at implementation.**
- Some Tribunals awards like Cauvery Award have allocated certain figure as ‘minimum flows’ (10 BCft), but there is no scientific justification behind that figure.
- Some states have issued orders like Himachal Pradesh HC states that all dams must release 15% of the minimum flow downstream of the dam at all times.
- Expert committee report indicates that neither is this adhered to, nor are any provisions made for any such releases.
- The figure of 15% of minimum flows is an arbitrary figure, without an scientific justification.
- On main stem of Satluj, more than 30 large hydro projects are under construction/planned/proposed. Cumulatively, they will entirely skew the hydrograph of the river.
• **Impending hydropower boom** in Himalayan states of Uttarakhand, Himachal Pradesh and North Eastern States, especially Arunachal Pradesh raise very crucial questions about ecosystem based management of our rivers.

• Cascades of hydropower/irrigation projects are constructed/ under construction on rivers in states like Satluj in HP, Alaknanada and Bhagirathi in Uttarakhand and Subansiri, Dibang, Siang and Lohit in Arunachal Pradesh, Teesta, Chenab, Ravi, Beas, Narmada, Nethravathi, Chalakudy, etc.

• Though called innocuously as **Run of the River** projects, these projects have a huge storage component which will affect downstream ecology. They kill the river continuum by diverting the river from the course for upto 40 kms through tunnels.

• Most of these projects are also heralded as **peaking power projects**, holding back water for upto 20-22 hours and releasing it for generation in 2-3 hrs.

• Such releases have a severe deleterious impact on downstream ecosystems and communities, however, esteemed organizations like IITs are giving clean chits to these project, without looking at the ecological angle at all.

“In response to a series of RTI applications filed by Himdhara the department has revealed that in villages located in the area affected by the Karchham Wangtoo project, by 2009 almost 43 out of 167, ie almost 26%, of water sources had dried up and in 67 sources, ie almost 40%, the discharge had reduced. Similar data has been provided for four other project sites in different parts of the state -- all revealing that villages located above the tunnel are indeed being impacted by the construction of these hydropower projects.”
• For example, dams planned across Dibang, Lohit and Siang, which together form the mighty Brahmaputra will cause **water level changes of upto 7 feet in a single day at Dibru Saikhowa National Park, which is on an average 100 kms downstream from these projects!**

• This region is home to proposed **Ramsar site, National Park, Important Bird Area and a habitat of Gangetic Dolphin, our National Aquatic Animal**

• Eflows calculated for this section claim to be using a world class methodology called building Block Method, which rests on the premise of meetings with experts and stakeholders to arrive at a consensus, no such meetings have been held or consensus arrived upon.

• The most worrying fact behind eflow calculation and release is that pro dam organizations are using **exclusive methodologies without any local participation or involvement of multidisciplinary experts**

• For calculating eflows to be allocated, these organizations assume **degraded river status for rivers as pristine** as Alaknanda, Bhagirathi and then go on to allocate ridiculously low figures of eflows for them

• Multiple uses of river like **cultural and social use, ecological uses, groundwater recharge, pollution dilution, etc are not even being considered.**
Does the present institutional/governance mechanism pay heed to ecosystem management of Rivers?

- **EIA notification** 2006 excludes Dams for Industries and water supply, flood control and also Hydro power dams less than 25 MW
- More than 10 dams are planned in ecosensitive area of Western Ghats to provide water for SEZs, industries and unplanned growth of Mumbai. NONE of these dams, which are set to displace nearly 25000 tribals and submerge more than 10000 hectares of WG forests, need EIA, public hearing or Environmental Clearance! There will be NO Environmental Management Plan in place even to mitigate impacts of these dams.
- Hand in glove with powerful private contractors, government ahs started work on dams like Kalu ILLEGALLY without any permissions in hand
- EIAs have become utterly false documents which do not reflect the ground realities at all. Former Minister for Env. Has also accepted the fact
- EIA consultants have been openly, blatantly advertising the fact they will handle ‘Everything from EIA report to Environmental Clearance’
- Though are a corner stone of the clearance process, projects are **Public hearings** continuing despite total local opposition during public hearings
- **There is no monitoring to check if the EMP is implemented and functioning, participation of local communities in monitoring, which can bring some democratic governance, is absent**
Cumulative Impact Assessment and Basin Studies: NO ecological considerations

AHEC, IIT R Cumulative Impact Assessment of projects on Upper Ganga:
• In case of our ‘National River’ Ganga which has more than 135 projects proposed, planned and under construction in the upper stretch on Alaknanda and Bhagirathi, MoEF had asked the AHEC, IIT Roorkee to study the Cumulative Impact of such a huge number of dams on the ecology of the river
• The Cumulative Impact Assessment Study is a greenwashing document which does not address the cumulative impacts in form of changed hydrology, sedimentation, deforestation, muck disposal, blasting and mining, etc.
• It has no comments on the impact of blasting and tunneling on local groundwater supplies, when it has been documented that they have negative impacts on local water sovereignty in Uttarakhand and HP
• Eflows assessment is not done using the best available methodology of building blocks, the Environment Management Class of these pristine rivers which are ecologically and socially so very important for India is taken as C and D.

WAPCOS Lohit basin Study and Cumulative Impact Assessment of Dams on Siang, Dibang and Lohit on Dibru Saikhowa
• Does not even mention the social impacts of these dams on livelihoods, does not include impacts of seven dams on the tributaries of Lohit, relegates lowest range of ecological sensitivity to the basin and does not disclose what meetings were held to arrive at eflow figures through Building Block Methodology
• The daily lean season fluctuation downstream of Lohits last project, Lower Demwe in the month of February will be between 88 cumecs and 1729 cumecs will still be ecologically disastrous for ecologically sensitive habitats in the downstream as is obvious from existing global literature on the impacts of peaking hydropower projects
Length of free flowing rivers between dams in a cascade

- Cumulative impact assessment and basin study which should be the basis for planning, decision making, and implementing cascade hydropower projects is being for namesake, when the projects are *fait accompli*

- Distance between two dams in a cascade in becoming smaller and smaller. For example, distance between 180 MW Bajoli Holi HEP and 240 MW Kuther HEP in Himachal Pradesh is ZERO. The Tail race channel of BH HEP ends at the reservoir tip of FRL of Kuther HEP.

- Same is the case with Hutong Stage I and Hutong Stage II on Lohit river and projects on Subansiri River

- The Expert Appraisal Committee, RVP, constituted by MoEF sates that minimum distance between two projects in a cascade should be 1 kilometer. Expert committee in HP states this should be at least 5 kms, pending studies.

- But what is the ecological basis for these figures? Can there be a blanket decision for all Indian Rivers? Where is the Ecosystem Approach or even consideration??
Is Climate Change factored in current management paradigm?

- Scientific studies published in research journals show that large dams emit significant amounts of methane, which is 21 TIMES more potent than CO2 in global warming.
- Methane is emitted from reservoir area, from spillways, from turbines and from downstream rivers.
- Indian large dams, even by conservative estimates, emit 17 million tons methane a year, which is equal to emission of 357 MT of CO2.
- This is about 18% of India’s TOTAL official emission of 1889 MT in 2000; or almost same as the total power sector emission of India in 2004-05.
- We don’t measure methane emission from large dams, even though planning commission has been asking for it for the last five years.
- The proposed 3000 MW Dibang HEP in Arunachal Pradesh, for example, even by conservative estimates, would emit at least 3.3 MT CO2 equivalent methane every year.
- Tipaimukh: GHG emissions to be studied after the clearance.
- The National Action Plan ion Climate Change does not pay heed to poor and vulnerable sections and their participation.
Local Initiatives

- Local initiatives, because of their direct and strong local links with ecosystems, generally function through an ecosystem approach.
- In Kathani in Vidarbha, a dying river was revived through the constitution of no fishing zones, riparian zones, and forest preservation. This resulted in increased fish and firewood, while protecting the river.
- In the neighboring Adan River basin, NREGA funds are being used by the community for river restoration works, resulting in improved fodder and firewood and improved fish diversity.
- In Kolwan Valley in Pune, 16 villages have revived a river Walki, improved its base flows through extensive soil and water conservation works, formed farmers cooperatives for organic farming and are reaping benefits from employment generation, self-help groups, and improved water security.
- In a small village of Golap in Konakn, Maharashtra, NSS students and villagers desilted their river and reused the silt to plant local trees along highway. They have been doing this for past two years.
- Examples of rejuvenation of Arvari through efforts of diffuse villages in Alwar and revival of the Kali Bein through community participation is well known.
Traditional Conservation Practices

Dev Doh, a sacred pool of Kathani from which fishing is prohibited
The report was a result of an exercise in which majority of commissioners were supporters of large projects. This was the first ever and most transparent, open, inclusive process to assess the development effectiveness of large dams and it came out with a unanimous report in November 2000. The Report offers a framework for decision making process on Large projects and options.

Unfortunately, none of Indian dams confirm/follow the framework prescribed by the report.

Even worse, some dam proponents perform false studies to claim that their dams follow WCD Framework, when they don’t. (Ex. Rampur Hydro Project)
• **Conclusions:**
  
  – Ecological management of rivers seems to arise from a democratic and sustainable approach to natural resource management in which science has a critical part to play, but the overarching motif seems to be governance.
  – Unfortunately, we do not seem to be making any efforts towards ecological management of our rivers, on the other hand, with each passing day, we are degrading our rivers further, by polluting them, drying them, destroying natural biodiversity and river continuum
  – Local communities who are facing the brunt of this situation are having NO say in the happenings. Example: Hul HEP, Himachal, Shai Dam, Murbad
  – We are neglecting not only ecological management of rivers, but also social and cultural aspects of river management

• **Way Forward:**
  
  – Protection of headwaters, riparian areas, floodplains through a strong, forward looking policy which looks beyond pollution
  – Ecological assessment of rivers and water bodies to create a baseline information about biodiversity and ecosystem goods and services obtained from these ecosystems
  – Protection of rivers of significant ecological, social and cultural values as free flowing rivers, devoid of dams and polluting infrastructure projects
  – State of art environmental flow assessments and implementation for existing, planned and proposed dams, with community participation
  – Cost benefit analysis of developmental projects, which look at the full range of benefits accrued from ecosystems to all stakeholders
  – Exploring options like payment for ecological services, though with caution
  – Decision making powers about governing their ecosystems to ecosystem dependant communities
  – Integration and synergy between academics, governance and implemenation
A few question for the audience

• Looking at the importance of geomorphology, fluvial geomorphology, geology, etc., in shaping rivers and their dependant goods, what should be elements which should be studied while performing studies like an Environmental Impact Assessments (for projects like dams, hydel projects, embankments, ports, etc.,) Basin Carrying Capacity Studies, Cumulative Impact Assessments of projects which are set to change the ‘evolutionary character’ of rivers through a Command and Control Approach?

• What are the impacts of changed sediment loads, trapping of sediments, flushing and sudden release of sediments, etc., on downstream river character and eventually the goods and services from a river?

• Looking at the army of projects in the Himalayas on nearly all major Himalayan rivers, how are the scientists planning to affect the real time studies which will be affecting rivers at all possible scales?

“Adequately Stirring Existing Ingredients Together for Sustainable River Governance”
Thank You!

South Asia Network on Dams, Rivers and People

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