

The Central Role of Dams in Destroying our Rivers¹

There is no doubt that dams are the single biggest impediment in ensuring continuous freshwater flow in rivers. Most of India's major, medium and minor rivers have been dammed several times, thus affecting the freshwater flows downstream from such dams, particularly in the non monsoon months. There is no legally mandatory norm in India that rivers must have freshwater flows and when a dam, diversion or hydropower project is taken up, they ensure that downstream rivers continues to have constant flow of freshwater.

Definition: Environment Flows are defined² as: "the flows required for the maintenance of the ecological integrity of the rivers and their associated ecosystems, and of the goods and services provided by them". The Govt of India working group report (June 2005, see below) only includes the low flows and flushing flows in its report in this regard. The working group adopted a methodology "wherein certain percentages of the annual flows are prescribed as minimum flows as well as flushing flows during the monsoon".

1992 The Guidelines for sustainable water resources development and management from the Central Water Commission (CWC) of government of India in 1992³ suggested that the minimum flow in the river should not be less than the average of 10 days minimum flow of the river in its natural state. Unfortunately, this did not have force of law and the CWC itself has not been adhering to these guidelines while giving techno economic clearance to irrigation and hydropower projects.

Sept 1999: In the report of the Govt of India's National Commission for Integrated Water Resources Development⁴ a provisional projection of the environmental needs has been given as 5 Billion cubic meters (BCM), 10 BCM and 20 BCM in the years 2010, 2025 and 2050, respectively. However, no basis is given for these figures, the report accepts, "Estimation of fresh quantity of water needed for managing ecological standards for all water bodies including lakes and rivers on sustainable basis is not possible at present." Unfortunately, the Ministry of Water Resources of the government of India, which constituted this commission, took no further action to take up the issue of environmental flows for further studies and implementation.

May 29, 2001: WQAA created The Govt of India constituted the Water Quality Assessment Authority (under the section 3 (1) (3) of the Environment Protection Act, 1986) with effect from May 29, 2001, through a notification published in the Gazette of India on June 22, 2001. The authority was constituted "on the advice of Ministry of Water Resources"⁵. One of the terms of reference of this authority is, "To maintain minimum discharges for sustenance of aquatic life forms in riverine system." The authority was created for an initial period of three years. The 12 member committee had no non government members. The WQAA cell within the *Hydrology Project and Minor Irrigation Wing*, Ministry of Water Resources provides secretariat assistance to the authority. The WQAA has met at least five times (on 26.9.01, 14.5.03, 09.12.05, in July 2005 and the fifth meeting date not known), but it is not clear if it has taken any action about its TOR on ensuring minimum flows in the rivers, except setting up the working group, whose report WQAA has not accepted, see below.

It seems WQAA has completely failed in its mandate in this regard.

¹ Draft paper for the workshop on Environment Flows in India, at Bangalore on January 3-4 2009

² Workshop Resolution from the Indian National Workshop on Environment Flows, held at New Delhi on 23-24 March, 2005, see April 2005 (Vol. 2, issue 1) issue of *Environmental Flows*, published by International Water Management Institute.

³ See page 49 of the report of the working group report on minimum flows set up by the WQAA, see below for details.

⁴ Published by Ministry of Water Resources, Govt of India, Sept 1999, see Vol. 1, page 68

⁵ <http://wrmin.nic.in/index3.asp?subsublinkid=718&langid=1&sslid=708> as seen on December 21, 2008

May 2003 During the second meeting of the WQAA on May 14, 2003, the WQAA constituted a Working Group to advise the authority on the *minimum flows in the Rivers to conserve the ecosystem*⁶. The 9 member working group had just one non government member, namely Prof Brij Gopal of Jawaharlal Nehru University.

2002: India's National Water Policy The NWP states that, "minimum flow should be ensured in the perennial streams for maintaining ecology and social considerations". However, when we asked the Union Ministry of Water Resources (MWR) under RTI as to what the MWR has done to ensure continuous flow of freshwater in perennial rivers, the ministry essentially, by implication said they have done nothing. Their reply was, "Water Resources projects are planning, implemented and operated by the respective State governments." But most of the major water resources projects in states are funded through central grants. Through this and various other ways, centre could have played a role to ensure that the rivers continue to have freshwater flows.

June 2005 The Report of the Working Group on Water Resources for the 11th Five Year plan, dated Dec '06 says (page 22), "In 2004-05, the Ministry of Environment and Forests appointed a committee headed by Member (RM), CWC to develop guidelines for determining the EFR (Environment Flows in Rivers). The committee submitted its report in 2005." The report submitted by *the Working Group to advise WQAA on the Minimum flows in the river* to the Water Quality Assessment Authority (WQAA) in June 2005 was made available to SANDRP in September 2007, following an RTI application. In a response dated August 14, 2007, RC Sharma, Director (WP & P Coordination Directorate, CWC), informed, "The report has not yet been approved by WQAA." The latest status of the report is not known.

It is interesting to note that while the TOR of the working group was to advise the WQAA on the *minimum* flows in the rivers, the report of the working group title used the term environmental flows. This is typical of the mixing up of the terms by the government in this regard. Some of the main recommendations of the working group are:

- ❖ **Himalayan rivers** Minimum flow to be not less than 2.5% of 75% dependable annual flow, all flows expressed in cubic meters per second. One flushing flow during monsoon with peak not less than 250% of 75% dependable Annual Flow.
- ❖ **Other Rivers** Minimum flow in any ten daily period to be not less than observed ten daily flow with 99% exceedence. Where ten daily flow data is not available this may be taken as 0.5% of 75% dependable Annual Flow. One flushing flow during monsoon with peak not less than 600% of 75% dependable annual Flow.

It is clear that these recommendations are in violation of the CWC guidelines of 1992 mentioned above. Unfortunately, the WQAA and the MEF did not take up even these recommendations for implementation, over 7 years after the WQAA was set up, over 3.5 years after the report of the working group was submitted.

Let us look at how the minimum flow has been treated in some of the recent projects in India.

Allain Duhangang In case of this World Bank funded 192 MW hydropower project on tributaries of Beas river near Manali in Kulu district in Himachal Pradesh, the project authorities have designed to release just 150 liters per second (lps) water downstream from the Duhangan barrage, and the river is to be diverted to another stream, never to return to the original stream. An agitation has been going on against such a diversion. As an official study by the Foundation for Ecological Security, for the project noted, "Mountain streams having beds that would need to be saturated and rendered hydric by larger and constant flows, and be highly permeable towards subsurface flows in places, would not take these 150 lps very far".

⁶ TOR dated Sept 9, 2003, for constitution of the working group, signed by member secretary (WQAA & Commissioner (GW & MI), MWR).

Cauvery Tribunal decision 2007 In February 2007 the Cauvery Tribunal gave its final award, in which it has made provision of 10 BCft (Billion Cubic Feet) for environmental protection out of the annual availability of 740 BCft. Karnataka has to release 192 BCft from Billigundulu, out of which 182 BCft is for Tamil Nadu and 10 BCft for environmental protection. This legally stipulated environmental flow is a welcome move, but it is not clear how this figure has been arrived at or how it will be enforced.

Narmada: Gujarat demanded water for river in 1970s While arguing before the Narmada Water Disputes Tribunal, Gujarat demanded that it also needs for water for the river downstream from the proposed dam site, besides for other purposes. It argued that water for the river is required for sustaining navigation, for the water needs of people staying on the banks of the river, for arresting salinity ingress and for fisheries. NWDT in its award provided 9 million acre feet of water to Gujarat and said that Gujarat can provide water for the downstream river from its share. However, Gujarat government has allocated NO water for the downstream areas and has plans to use up all the water in the command area. These plans were also endorsed by the World Bank, when it signed agreements to fund the project.

However, recently, in the 45th meeting of the Environment Sub Group of the Narmada Control Authority, it was decided that “minimum flow of 600 cusecs (cubic feet per second) towards environmental requirement for downstream areas has the endorsement of Environment Sub Group”. Gujarat agreed to this stipulation only on the condition that this water “would not be accounted towards the utilizable flow of Narmada river or reckoned against the use of Govt of Gujarat or any other state.” The Narmada Control Authority in its 80th meeting on Aug 12, 2008 agreed to this⁷. This is tantamount to changing the NWDA award as Madhya Pradesh protested at the meeting, but it is not known if MP will protest against this decision.

On the lack of study of the downstream environment, the first paragraph from the chapter on this issue from the report of the Independent Review of the instituted by the World Bank is worth quoting in full⁸:

“From the Sardar Sarovar dam to the ocean, the Narmada River runs for 180 kilometers through a rich lowland region which represents about 10% of its catchment area. In the course of our environmental review we sought information that described the ecology of this lower reach of the river, the estuary, and near shore region in the Gulf of Cambay. We hoped to find a description of the aquatic ecosystem, including parameters indicating the quality and quantity of water and its seasonal changes, biological species, processes, and resource linkages. We looked forward to finding a systematic treatment of flow regimes and geomorphology. We expected to find systematic documentation of resource use, from drinking water to fisheries. We thought there would be documents establishing the kinds of physical, biological and socioeconomic changes to be expected as the Sardar Sarovar Projects are brought on stream and more and more of the natural flow is stored, used or diverted out of the river. We looked for a set of ameliorative measures that would be implemented to mitigate impacts. We thought these measures would be scheduled to begin with phased development of the Sardar Sarovar Projects. We hoped they would also be related to the cumulative effects of other developments on the Narmada further upstream, in particular the Narmada Sagar Projects, and to the expansion of industrial activity in the downstream river basin in Gujarat itself.

In all our expectations we have been disappointed.” (Emphasis Added.)

Uri This 480 MW hydropower project on Jhelum in Jammu and Kashmir was funded with aid from Sweden, one of the most progressing countries on environmental issues. One would have hoped that this project would have stringent and well studied norms on environmental flows, with credible mechanisms in place to ensure their implementation. Unfortunately, that did not happen. See Annexure for the details.

Tirthan River: the only example of protected river in India? Tirthan river, (a tributary of Larji river, which in turn is a tributary of the Beas river) in Himachal Pradesh, is possibly the only river of India has been, by a government decision, protected from development of Hydropower project. The decision was taken by the state govt to protect this river basin in Kully-Mandi districts, on May 31, 2004, in the interest of brown trout

⁷ Minutes of the 80th meeting of the Narmada Control Authority, page 14-15

⁸ Page 277, Sardar Sarovar: The Report of the Independent Review, Resource Futures International Inc, Canada, 1992

fish⁹. However, in 2007, when the Himachal Pradesh government started awarding some small hydro power projects in Upper Seraj (Jibhi-Hirab) Valley, the southwest part of the Tirthan valley, the decision was challenged by some of the local people in the High Court and the case is still going on.

State-wise perennial riverine length in India One of the parameters of ensuring sustainable existence of rivers in India would be to ensure that those rivers that are perennial, remain perennial when a dam, diversion or hydropower project is built on the river. According to the latest report from the Central Pollution Control Board¹⁰, the perennial riverine lengths in different states in India are as given in the table below. Of course it would be important to ensure that the rivers carry freshwater flow and not polluted waters.

State	Perennial Riverine Length (in Km)
Jammu and Kashmir	2290
Himachal Pradesh	1094
Punjab	1071
Haryana	348
Uttar Pradesh (including Uttarakhand)	5618
Rajasthan	841
Madhya Pradesh (including Chhattisgarh)	6090
Bihar (including Jharkhand)	2525
West Bengal	1163
Orissa	2250
Andhra Pradesh	4017
Maharashtra	4612
Gujarat	1155
Karnataka	2868
Kerala	1407
Tamil Nadu	2028
Assam	2042
Meghalaya	556
Manipur	758
Arunachal Pradesh	706
Sikkim	753
Nagaland	502
Mizoram	234
Goa	65
Delhi	48

Recent studies The International Water Management Institute has been doing several studies and estimations of environment flow requirements in India, including their papers of 2006 and 2007. However, some IWMI papers have also been saying that excessive groundwater use, rainwater harvesting and watershed development in the upstream catchments also have impacts on the downstream river flows and also availability of water at the downstream reservoirs. In fact some of the IWMI authors have been advocating restrictions on such upstream uses so that downstream reservoirs are filled. Such advocacies go against the rights of the people in the upstream areas and can have dangerous and unacceptable implications of giving priority to existing big reservoirs over decentralized and local water systems.

Sweden Policy for free flowing rivers Sweden has had a long history of agitations against large hydropower projects. That agitation, ultimately, lead to the Swedish govt declaring in its Natural Resources Act of 1987 that explicitly prohibits construction of new hydropower dams on “those rivers that had been designated for protection in the Physical Plan for Sweden, including the last four large free flowing rivers:

⁹ See <http://himachalpr.gov.in/cabinetdes1.htm> and <http://www.tribuneindia.com/2007/20070415/himachal.htm#4>, for example.

¹⁰ “Status of Water Quality in India- 2007”- CPCB, July 2008

The Torne, Kalix, Pite and Vindel rivers. In fact, not only is construction of dams in new sites prohibited, but so is enlargement of existing dams that can cause negative environmental effects. For most of the streams and rivers that are out of bounds for hydro exploitations, this protection extends to both the mainstream and all the tributaries, writes Ann Danaiya Usher¹¹.

Decommissioning of dams for River Restoration Many countries in the world, including US, Spain, France have decommissioned hundreds of dams over the years. In the United States alone, the WCD report said, a total of 467 dams were removed by the year 2000, of which at least 28 were large dams. Among the many reasons for taking up dam removal, restoration of the river was an important objective. In each case a study was done that established that it was economically more beneficial to remove the dam rather than let it continue to exist. This shows that if right value is given to the flowing rivers and the benefits it gives, many of the dams may not be taken up or in case even after the dams are built, rivers would continue to flow.

State of India's Rivers Indians are supposed to have great cultural, religious value for rivers. Rivers have prominent place in the scriptures, prayers and rituals of almost all religions, particularly in Hindu, Sikh, among others. People actually worship rivers, but think of nothing about throwing all kinds of filth into that worshipped body. They seem to imagine that the rivers have the power to purify all the filth that we can throw into the river. That assumption is grossly wrong, of course.

The state of Indian rivers is one of the worst in the world, and is deteriorating further with every passing day.

Is that a Paradox?

In a sense it is. Because in the same country, the governments, most politicians, bureaucrats and construction engineers believe that water flowing in rivers to sea is a waste. So it is true that Indian state is as much responsible for the state of India's rivers and one can in fact identify many acts of commissions and omissions by the governments in India that has lead to this situation. However, the fact that we people allowed this state of affairs to happen, continue and reach today's situation, makes us equally responsible.

But first, what is the state of India's rivers?

The water quality management in India is performed under the provision of Water Pollution Act of 1974. The basic objective of this Act is to maintain and restore the wholesomeness of Rivers by prevention and control of pollution. However, the Act does not define the level of wholesomeness to be maintained or restored in rivers of the country. The Central Pollution Control Board (CPCB) had declared in 1985 that no river in plains area of India has water that can be used for drinking water directly. The report of the National Commission for Integrated Water Resources Development noted that almost 80% of the river stretches in India fall in class C or lower, signifying that the water can be used neither for drinking, nor for bathing. The situation there after has been only deteriorating with increase in population, urbanization, industrialization, damming of rivers and increased consumptive use of water. The climate change impacts is making things worse. The latest report from the CPCB, namely, *Status of Water Quality in India 2007*, published in July 2008 shows, even with the limited data and non serious analysis that it gives, that indeed, more stretches of the rivers falling in the same status.

In this regard, following paragraph from a study¹² on *Environmental Compliance and Enforcement in India: Rapid Assessment* by OECD in Dec 2006 provides useful overview: "India's rivers and streams suffer from high levels of pollution from waste generated primarily from, industrial processes and municipal activities. Untreated sewage and non-industrial wastes account for four times as much pollution as industrial effluents. While it is estimated that 75 percent of the wastewater generated is from municipal sources,

¹¹ *Dams as Aid: A political anatomy of Nordic development Thinking*, Routledge, 1997, p 29

¹² <http://www.oecd.org/dataoecd/39/27/37838061.pdf>

industrial waste from large and medium-sized plants contributes to over 50 percent of the total pollution loads. In major cities, less than five percent of the total waste is collected and less than 25 percent of this treated.”

More significantly, India has no policy that rivers must have freshwater. Read that sentence twice, it is quite important. Thus, when a dam, a hydropower project or any other diversion structure is built on a river, the project need not allow any water for the river, for the social or ecological uses in the downstream stretches. The only state in India that has a clear policy on this is in Himachal Pradesh. In Sept 2005, the HP govt came out with a notification that said that all (existing, under construction and planned) hydro projects should release at least 15% of the minimum observed flow in the river, at all times. This was far from adequate, since to preserve the rivers for its social and environmental flows, much larger flows are required, but this was certainly a step in the right direction. That notification was challenged in the Himachal Pradesh High Court by a Govt of India body, the NHPC limited and by the Punjab State Electricity Board. PSEB is from the downstream state, which won't suffer if no downstream flows are released. The challenge in the High Court in fact said, among other things, that no law of India requires that rivers should have freshwater flows.

And guess who supported the challenge in the High Court?

Govt of India's Ministry of Environment and Forests (MEF).

India's federal ministry that is supposed to be guardian of environment, including rivers, one supposes. It is supposed to have policy for preservation of rivers, since rivers are also one of the largest repositories of biodiversity. But MEF has no policy for the rivers to have freshwater flow at all times. But when one of the states comes out with a policy for river flows, that ministry supports the challenge to that step!!

However, lately, while giving clearances for run of the river hydropower projects, the MEF has started stipulating that certain minimum flow must be allowed in the rivers at all times. However, the stipulated flows are ad hoc and inconsistent, and at the most 10% of the observed minimum flow in the river on which the project is proposed. This is completely unacceptable. Even more importantly, there is no credible mechanism to ensure that indeed the stipulated flows are released at all times. For example, in case of the NHPC's recently commissioned 510 MW Teesta V hydropower project on Teesta River in Sikkim, the stipulation was that the project will ensure release of 1 cubic meter per second at all times. When we asked MEF through an application under the RTI (the Right to Information Act) as to who is ensuring this flow, the answer was amusing: "A regular monitoring is being done by the project itself". In fact the regional office of the MEF visited the project just once a year, that too with full prior information to the project authorities! So the agency that stipulates the norm for freshwater flow has neither the capacity, nor the will, it seems, to ensure that its stipulations are implemented. What is then the use of such stipulations?

Even more recently, while giving clearance for a projects involving pumping water from the Chambal River for providing drinking water to 926 villages and 4 towns of Karauli and Sawai Madhopur districts in Rajasthan, the Supreme Court stipulated that flow of minimum of 4.78 cusecs (cubic feet per second) of water will be maintained at all times, downstream from the pumping point. This was the minimum observed flow in the river in the last twenty years. So now the river will possibly have no more than that amount (*if* that norm is adhered to, this time there is a monitoring committee involving forest department) for most of the non monsoon months, in most of the years. The once in 20 years minimum observed flow would be the norm now. And what impact this will have on the river, the downstream biodiversity and so on is not even assessed; it is assumed, without any study, that this once in 20 years flow should be sufficient for all those purposed downstream!!

That takes us to the basic question. Why have freshwater flows in river? Is water flowing in the river waste, as the pro big dam proponents have us believe? This brief note does not have space to elaborate on usefulness of freshwater flowing in rivers. Briefly, it is helpful for social, including cultural and religious

needs, fisheries, groundwater recharge, biodiversity, pollution dilution, stopping salinity ingress, navigation and so on. In fact the first criterion for a healthy river is to have freshwater flowing in the rivers at all times.

Fortunately, in recent years, there is increasing awareness and agitations to ensure that we indeed have some healthy rivers. Such agitations can be seen for Bhagirathi, Ganga, Yamuna, Damodar, Chalakudy, Alaknanda, Narmada, Brahamaputra, Arwari, among other rivers. While there have been some successes in some of these campaigns, unfortunately, these campaigns have not yet yielded effective policy wide results.

One of the main reasons for this is the total apathy of the governments on this issue. Governments in India still consider freshwater flowing in the river as a resource to be completely exhausted. It took a letter from UPA Chairperson Mrs Sonia Gandhi, no less, recently to make the Union Ministry of Water Resources to initiate a study of the impacts of hydro projects on the Ganga River. The government's pollution control architecture is a den for corruption, where there is no role for the local people, transparency or accountability. Under the circumstances, all its current initiatives, including the proposed National Ganga River Water Authority are going to remain ineffective and suspect since they do not touch the core problems.

Mindset that sees flows in rivers as only costs, no benefits If one interacts with the official agencies, if we read the official reports and communications, including the working group reported cited above, they all see flows in the rivers only as a COST, and they do not seem to see the benefits of freshwater in the river at all. Secondly, they keep throwing the increasing demand, needs for cities, agriculture, power generation, industries etc, giving an impression that if we want freshwater in rivers, none of this is possible, in fact no development is possible. Thirdly, due to this mindset, the cost of stopping freshwater flow in the rivers does not even enter the cost benefit or environment impact assessments at any stage of planning or decision making process. The biggest hindrance to freshwater flow in the river is this mindset and this mindset will have to be changed if the rivers are going to have any hope of freshwater flow in them.

WCD on how EFR can help The report of the World Commission on Dams has noted that Environment flow releases (EFR) can help minimize the impact of large dams on the river downstream from the dams¹³:

“At least twenty nine countries seek to minimize ecosystem impacts from large dams by using the EFR to meet predetermined ecosystem maintenance objectives. The practice of EFRs began as a commitment to ensuring a ‘minimum flow’ in the river (often arbitrarily fixed at 10% of the mean annual runoff). It has since grown to include a definition of ecosystem requirements and a planned flow release programme, which may vary annually or seasonally, to meet downstream needs for both the environment and people. The level of EFR required is determined by the need to maintain particular ecosystem components downstream, often with reference to national legislation. The countries that use this method have recognized that a short term reduction in financial returns from a project often leads to improved long term sustainability and attainment of broader societal objectives for a healthier environment. Still, this represents a re-distribution of the benefits of a dam project and thus existing beneficiaries such as irrigators and operators of hydropower facilities may resist EFRs.”

So the increasing number of campaigns is good news. Bad news is that it is going to take a lot of efforts before we see change.

Himanshu Thakkar (ht.sandrp@gmail.com)
South Asia Network on Dams, Rivers & People (www.sandrp.in)

December 2008

¹³ *Dams and Development: A New Framework for Decision-Making*, The Report of the World Commission Dams, Nov 2000, p 81

**URI Hydro Project on Jhelum River in Kashmir
NO Downstream flows:**

The project mandated 6 cumecs of flow downstream from the diversion, mainly through the fish pass but there is no basis for such a figure. Moreover this minimum flow has not been ensured.

The following quotes from the review¹⁴ (by Swedish International Development Cooperation Agency, since SIDA provided large proportion of the funds for the project) in 2005 of the project performance are revealing:

- Page 3-50: “At a general level, some maintain that the minimum flow release into the 11 km long bypassed channel should not be less than the minimum recorded flow in the record (36 m³/s in 1956). It was reported before construction took place that constant release of this flow rate would make the project unviable (Sida, 1989).”
- Page 3-41: “Responsibility for determining compensation flow rates at Uri barrage for the 11 km bypassed channel – **usually the principal issue in any barrage or dam project environmental management plan** – was divided. Reading of POE and Monitoring Team reports indicates that **neither NHPC nor the POE¹⁵ would accept releases of minimum flows recommended** by the Institute of Freshwater Research which had been commissioned by Sida to carry out an aquatic impact assessment study. IFR recommended releases of 5 – 10 m³/s in its report dated September 1995.” (emphasis added.)
- Page 3-7: “It appears that the energy production estimates have not been revised to take account of the flow in the fish pass and compensation releases.”
- Page 2-17: “Detrimental impacts on the aquatic ecosystem were foreseen but were not ascribed any value.”
- Page 2-17 “It appears that the Department of Fisheries of J&K was not involved.” And “It is noted that no minimum flow was stipulated.” And “Thus in terms of compensation flow for the Jhelum bypassed channel, from the toe of Uri barrage to the tailwater discharge portal, engineering provision is made for a maximum release of about 6 m³/s through the fish pass and lure water conduit. Any additional release would require opening a spillway gate. **In this 2005 review, no daily records of fish pass and lure water flows have been seen.**” (Emphasis added.)

If Jhelum received minimum flow of 36 cumecs in recorded past, than minimum downstream flow of that quantity in addition to the required for irrigation, drinking water, groundwater recharge for the downstream stretch should have been maintained. That was not done. Even the recommended 6 cumecs flow through fish pass has not been maintained.

This is deplorable state of affairs and shows that NHPC and SIDA failed to ensure this minimum monitoring of the water flow in the 11 km stretch of Jhelum River dried up due to the URI project. This also reflects very poorly on NHPC and SIDA.

Additional recommendation in the SIDA report on evaluation of URI HEP after the consultation¹⁶:

“Recording fish pass and compensation flows and making such records available: When supporting projects which abstract water and thereby reduce downstream river flows, special attention should be given in project design and during operation to making engineering and instrumentation provision for measuring all discharges which comprise compensation flows. Also, encouragement should be given to the owner to maintain these records and make them available to the public so that all interested stakeholders, may have continuous quantitative records of the component flows which make up the total downstream water releases made by the project. Where there is no legal framework to support this, encouragement should be given to the appropriate government ministry to enact legislation which would require the owner to carry out such measurements make the records made public.”

¹⁴ “Uri Hydro-Electric Project, India: Evaluation of the Swedish Support”, Draft Final Report, Nov 2005

¹⁵ POE: Panel of Experts

¹⁶ Evaluator’s Responses to Questions from SANDRP of December 2005, sent to SANDRP by SIDA.