

## **Heavenly River: Assessing the instream flow requirements for the Ganga to satisfy spiritual and cultural as well as ecological needs.**

*It is now recognised that a regime of environmental flows that attempts to closely mimic the natural flow cycles of a river is essential for conservation. Riparian communities are dependent on adequate instream flows that are compatible with its natural flow regime, and their existence is threatened by changes to this flow cycle. This paper examines the concept of environmental flows and the work being done in India. It argues for the need to include the cultural and spiritual importance of a river while assessing its environmental flow requirement. Methods used to incorporate the spiritual and cultural component of instream flows while assessing the environmental flow requirement of the Ganga are described.*

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Close your eyes and think of a river. The chances are high that you have seen a river you loved as a child, perhaps something close to a place that will always mean 'home' to you. It will have had water in it- living, flowing water that reflects the mood of the atmosphere. And it would be teeming with life. It would have had fish in it, insects on its surface, birds and animals around it, and of course, people- washing, worshipping, drinking, and playing on its banks.



**Defining a river:** So what defines a river? All this and more. A river is not a receptacle of water, nor is it a conduit. A river is that which gives birth to and nurtures civilizations and ecosystems. At the most basic level however, a river is that which flows. Far too many of our rivers do not do that anymore. Why is that? Well, ironically, it is because humans these days tend to consider a river as just the water that flows in it. Once disconnected from the complex web of life it belongs to, a river becomes just another water resource. This leads it to be considered as we consider any other commodity- to be used to the maximum possible. In the frugal sub-continent, it acquires another dimension: of it being irresponsible to waste a resource as precious as water. It is a commonly held notion that water that flows into the sea is wasted.

But rivers flowed long before humanity came along and saw the world as something that was created for its exclusive use and enjoyment. The reason for the existence of the components of this planet, whether living or not, is not to serve humanity. It is merely to exist. That said, everything does have a role to play.

**What does a river do?** The primary function of a river is not to provide water for irrigation or drinking or hydroelectricity. This is merely the use to which people put the water from a river. The function of a river in its entirety is to nurture the life that depends on it and to create the landscape. It is rivers that erode mountains and create land. Rivers balance the salinity of the seas and make them

liveable. If rivers were not to 'waste' water by flowing into the sea, marine life as we know it would cease to exist.

Over the centuries, humans established themselves by the banks of rivers. They appreciated the value of these rivers and created practices to protect them. In ancient cultures, one way of ensuring conservation of a geographical entity was to imbue it with sanctity. Most religions and cultures have rituals that worship the rivers. In addition, humans naturally have an affinity for flowing rivers. People tend to gravitate towards rivers for play and contemplation.

We see then that the Earth, its biodiversity, and human cultures all depend on the existence of a river *as a river*. A river in its totality is more important than the water it carries, or the fish that swim in its water, or the sand that its floods bring down. A river is all this and more. The 'riverness' of a river is hard to pin down, but a close approximate is the naturalness of a river.

The most easily quantifiable element of this naturalness is the water that flows in the river. This is also the most easily monitored and regulated. A further feature is that flow also has great influence on the other aspects of a river. If diminished and altered flows are modified to again mimic natural flows, then the chances are that within limits other elements like biodiversity and hydrological characteristics are also recovered. However, natural flow is not just the quantum of water, but a flow regime.

**Flow Regimes:** In India, as in other parts of the world, dam planners have been working with the concept of 'minimum flows'. These are releases that are quantified as 10% of the low flows. This is clearly inadequate as not only does it not make allowances for the variable flows required to sustain a healthy ecosystem, it is also insufficient to even allow the river to fulfil its basic functions. In addition, the concept of



'minimum discharge' only addresses quantity and not periodicity. This leads to the development of a totally artificial flow regime that bears little or no relation to the natural world or to the requirements of the communities that live along its banks.

Unlike minimum flows that are merely expressed in terms of discharge volume, a flow regime has several components to it. Quantum of discharge is a key component, but rather than a single figure, the flow regime has a schedule of flows. These include seasonal floods to inundate floodplains, annual floods to flush the river bed, and lean season flows. The flow regime also considers the availability of water for rituals practiced by the riparian communities. This schedule attempts to mimic as closely as possible the natural flows of the river.

Environmental flow recommendations also advocate not disrupting the contiguity of a river. It is recommended that dams allow for the transport of nutrients and sediments downstream and for the upstream movement of migratory fish. Thus the aim of a sensitive environmental flow regime is to

strike a balance between instream and off-stream needs without seriously compromising either one aspect.

**Rivers in India:** In the Indian Subcontinent, rivers can be broadly classified into Plains rivers and Himalayan rivers. Plains rivers are monsoon fed and tend to exhibit high variability in flows with some of the smaller streams being ephemeral. The rivers are characterised by floods in the monsoons, full flows in winter and very low flows in the summer. The ecosystem and the people have adapted to this regime. However, this is being changed with increased consumption for agriculture. Floods are contained in the monsoons, and water impounded for irrigation. This means very low flows in the winter and slightly increased flows in the summer when water is released for farming. These changes not only play havoc with the ecosystem, but also do not respect the cultural sensitivities of the region. Pilgrims to riverside holy towns like Alandi are disappointed and their pilgrimage left 'incomplete' when they see a dry river.

The Himalayan rivers are fed by both the monsoons and by glacier melt. As their flows are replenished twice a year, they tend to exhibit less variability in flows and to be extremely sensitive to changes in flow regime. These rivers originate in the youngest and most sacred mountains of the world and flow through extremely fragile ecosystems. However, increased consumption of water and impounding for hydroelectricity is converting these mountain rivers into alternating series of dry stretches and stagnant pools.

Thus we see that both Himalayan and Plain rivers are being degraded due to impounding and insufficient, untimely releases. Increased importance given to off-stream uses for the water is leading to severe neglect of the instream uses of the water in a river.

**Environmental Flows:** The flow regime that is necessary to sustain the instream functions of the water in a river is defined as 'environmental flows'. This concept is gaining importance the world over as people realise that the 'Development vs. Environment' struggle is unnecessary, and that with a little planning, it is actually possible to have one's cake and eat it too. Work has been done in several countries on the concept of environmental flows. Several countries have also passed strong resolutions and acts that attempt to preserve the living river. Notable among these is the South African Water Act and the Australian Wild Rivers Act.

**Environmental Flows in India:** In India too, considerable exciting and new work is being done in this regard. This work takes the form of both research and advocacy. Several grassroots organisations, especially in the hill states are fighting to keep their rivers free. This is largely because of an increasing certainty that dams and disrupted flows threaten the very existence of riverside communities that are dependent on the natural ebb and flow of a river. Also, most communities consider their rivers sacred, and damming them is an assault on their spiritual beliefs and cultural values.

Assessing environmental flows is a relatively new science and very little is known about assessing flows for glacier fed rivers. This research is now being done in India, on the Himalayan rivers. These

rivers pose a challenge for the researcher with their low tolerance for disrupted flows, fragile ecosystems, high cultural value, government determination to maximize hydropower generation and lack of access to data.

In India, work on assessing environmental flows is being primarily carried out on the Ganga. On this river, it is necessary to allow for the spiritual and cultural importance attached to it. Including the spiritual requirement in the assessment of environmental flows is a relatively new concept that is being explored while assessing environmental flows for the Ganga. While indigenous cultures across the world have a spiritual and cultural connection with their rivers, few attempts have been made to include the needs of tribal and other communities living by the river into the calculation of environmental flows.

**Does culture need water?** A question that does arise is the need for allocating water for cultural needs. It is sometimes argued that cultural needs are human, and so do not have place in environmental flows.

- It is important to acknowledge that riparian communities are part of the environment. Traditional communities' livelihoods and existence depend on the rivers they live close to. Not acknowledging this will be unfair to the communities.
- Most rural and tribal communities lifestyles are so closely intertwined with the river that any changes to the flow regime place the continued existence of these peoples in jeopardy.
- In addition, cultural needs are for instream flows, and are usually in sync with the natural flow regime of a river.
- Finally, the successful conservation of rivers depends almost entirely on the support and participation of the local communities. Not acknowledging and including their needs will only serve to alienate them. Thus, it defeats the purpose of allocating instream flows.

Adding the cultural angle to the assessment poses an additional set of challenges to the researcher. A lot of these stem from the intangibility of spiritual beliefs. How does one quantify faith? How does one attach a number to the importance of a dip in a river?

**Assessing cultural needs:** The process of determining the environmental flows required by a river begins with determining the various factors that require instream flows. These include but are not limited to biodiversity, hydraulics and cultural needs. Once these are selected, a system of ranking is set up to broadly define the environmental status of the river considering each factor, ranging from A (pristine) to E (dead). These classes are described in some detail for the various topics. A desired future state is also decided and described.

The variables that are linked to flows are selected for further study. The study begins with a reconnaissance survey. The variables selected are measured and monitored over time. And finally, these are linked with flow requirements. This entire process is carried out in consultation with various

stakeholders including members of riverside communities, scientists, policy makers and downstream dwellers.

**Reconnaissance Survey:** In October 2008, a team from the People's Science Institute, Dehradun conducted a preliminary reconnaissance to explore the inclusion of spiritual parameters in environmental flow assessment. The trip was taken along the mountainous stretch of the Bhagirathi, from Gangotri to Dharasu.

During this visit, it was attempted to make contact with diverse stakeholders. Their views on the cultural importance of the Ganga, the relationship between flows and rituals, and the concept of environmental flows were sought. The number of temples and ashrams along the banks of the river were noted. Rituals that are dependent on the river and on instream flows were documented and icons and oral history connected with the river were also noted. It was also attempted to estimate the number of visitors (religious and adventure tourists) that visit the river, and the extent to which the riparian communities are dependent on the river for their livelihood.

Some of the main observations made during this survey are as listed below:

- The Ganga, more than other rivers, is considered to be holy and an integral part of the local culture. Despite increasing urbanization, this still holds true in the upper reaches. While not unanimous, it was the opinion of a considerable number of people that the Ganga should flow unhampered.
- Instead of merely meeting the cubic requirements for conducting rituals, it is necessary that the river satisfy the devotee's concept of a river. This vision encompasses all the senses. It is necessary that the Ganga should sound like and look like a tumultuous, playful river that has descended from the heavens.
- Sound seems to play an important role in the spiritual satisfaction derived from a river. Several people settled on the banks of the river reported meditating to the sound of the river, and of feeling disconnected and lost when they could not hear it on dammed stretches.
- There is great dissatisfaction with the unnaturalness and the unpredictability of flow regimes adopted by the dam authorities. Several villages have a history of people, especially children, being washed away in unexpected releases. The notices put up by the dam authorities and local government bodies advising people not to go into the river only serve to protect the authorities as the villagers have no option other than to visit the river for their various needs.
- A large proportion of the villagers living along the banks of the river are dependent directly or indirectly for their livelihood on the cultural importance ascribed to the river. These livelihoods are those of priests, ashrams, or catering to the needs of tourists.
- Like with most major religions, it seems that ritual has taken precedence over concepts. While river worship might have begun as a means of protecting rivers, it seems that worship of idols

of the Ganga has edged out worship of the river itself. Pollution and diminished flows also contribute to a decrease in the number of people bathing in the river.

**Further steps:** Quantifiable variables that are directly linked to the flows in the Ganga will be selected and monitored and a flow regime for the Ganga will be established considering cultural needs. While this study confines its scope to the upper reaches of the Ganga, it needs to be explored if a generic set of parameters can be established that will be applicable to a wide range of rivers. Considering that cultures and traditions are defined by geography, it will not be possible to have a modular set of variables that are applicable to all rivers. However, broad data sets can and should be identified.

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JM King, RE Tharme and MS De Villiers (2000), "Environmental Flow Assessments for Rivers: Manual for the Building Block Methodology", Water Research Commission report No. TT 131/00, Pretoria, South Africa

V. Smakhtin and M. Anthupas (2006), "An Assessment of Environmental Flow Requirements for Indian Rivers", Research Report 107, IWMI, Colombo, Sri Lanka.

Vladimir Smakhtin, Muthukumarasamy Arunachalam, Sandeep Behera, Archana Chatterjee, Srabani Das, Parikshit Gautam, Gaurav D. Joshi, Kumbakonam G.Sivaramakrishnan and K. Sankaran Unni (2007), "Developing Procedures for Assessment of Ecological Status of Indian River Basins in the Context of Environmental Water Requirements", Research Report 114, IWMI, Colombo, Sri Lanka