



Trees give life to life-giving Ganga

The Pioneer

8-10 minutes

Forests are the most significant players in the life of a river and their health, density and composition are vital for maintaining its food web. Hence, in any Ganga restoration plan, the role of trees has to be appreciated and should be an integral component

If the Ganga dies, India dies,” says Vandana Shiva, a prominent scientist, campaigner and an environmental activist. The Ganga basin covers more than a million square kilometers and deposits sediments which are more than a kilometer deep in some places. These are a boon for crops in North India and Bangladesh. Based on historical evidence, until the early 19th century, the bank of the river Ganga teemed with wildlife, including dolphins. The Arthashastra of Kautilya mentions that the banks of the Ganga were covered by forests full of wildlife, including herds of wild elephants. Ganga is the lifeline of India in view of its economic, ecological, historical, cultural and spiritual imperatives, yet, despite the national restoration programmes, the Ganga Action Plan and the Ganga River Basin Management Plan, it is a dying river.

So what has made the Ganga a toxic, extremely polluted, threatened river? Broadly, anyone can count the factors on their fingertips: Inadequate ecological flow; impact of human activities that add to its toxicity; over-extraction of biological and other material; degradation or death of linked water-bodies; disappearance of riparian vegetation; poor health of basin catchment or draining streams; dying springs and the multiplicity of institutions dealing with different dimensions of the river and the riverscape.

The Ganga has three distinct zones, the upper catchment, the middle part and the deep lower reaches. All these zones have their own autecology. But in all these parts the surrounding landscapes are key players that influence the river’s ecosystem and its integrity. To make the ecological cleansing mechanism effective, the tree cover has to be restored in the catchment and riparian regions.

They are the most significant players in the life of a river and their health, density and composition are most important for maintaining the food web of the river. It is the food web of the river that makes it vibrant and living. Hence, in any river restoration plan, the role of trees has to be appreciated and should be an integral component. Out of the 8,51,475 sq km of the Ganga basin, only 5.6 per cent constitutes dense forest, the rest of the landscape comprises open forests, mangroves or shrubs. The function of forests ceases to be effective if density falls below

40 per cent. There is of course some mention of trees in the detailed project report but so far it has remained a non-starter.

For augmenting the ecological flow of the Ganga, catchment reforestation/enrichment of at least 7.40 million sq km should be a high priority. The Ganga basin is diverse in its geology, climate and in its aquatic ecology but in every zone, trees have a key role to play. Various experiments and studies have shown that any water sub-basin which has a forest cover of more than 30 per cent retained 25 per cent more water than basins with lower coverage. In sub-basins where the forest cover is over 70 per cent, water-retention is 50 per cent more than the sub-basin where forest cover is only 10 per cent. The study has also found that different forest types also have an impact on the degree of water retention. For instance, coniferous forests retain more than 10 per cent more than mixed forests.

Though extensive research has been carried out on various aspect of the river, most of these studies have limitations because the Ganga has never been observed for a long period of time. Hence, data are skewed, sparse or point at spatial coverage. This is particularly true regarding its ecology. The Ganga is a living identity and it has its own cleansing mechanism and ecology.

The 1995 records of the Forest Survey of India show that 85 per cent of river basins are devoid of any forest cover. While the headwater tributaries of the Ganga, like the Bhagirathi and Alaknanda still support a few stretches of good riparian forest cover, these forests almost disappear downstream. This can be attributed mainly to agriculture, which has been the dominant land use in the Gangetic plains for centuries and has affected the green cover and polluted the river. The relationship between trees and water is quite intricate and requires sound skill, knowledge and field experience to address forest management under varied conditions of terrain, climate, geology and hydrology.

People have observed that whenever there has been a loss of tree cover, perennial streams have oscillation between dry river beds and floods. Why does this happen? The leaves of trees intercept a proportion of the rain. That which falls on the ground, loses its momentum and its erosive power is considerably reduced. The interstices within the soil created by roots provide ample room for water absorption and storage. Thus, the trees, through their roots allow the rest to enter the soil slowly to increase the groundwater table. It also reduces the run-off to retard its power of soil erosion. The relationship between water and forests is complex and in the absence of research on river ecology and lack of scientific data, the management of Ganga on its ecological principles has not seen the light of day.

Further, regulation of rivers by construction of dams and reservoirs, logging, grazing, mining, water extraction and tourism have all deteriorated riparian forests. According to a study by Pandit and Grumbine, around 300 dams proposed to be constructed and under construction in the high biodiversity regions of the Indian Himalayas will result in the submergence of 54,117 hectares of forests. This will not only submerge many biodiversity hotspots it will seriously alter the habitat by changing the depth and duration of water in the remaining areas along the dams.

The assessment of the impact of urbanisation that results in increased flow variability, extreme channelisation of nutrients, toxic chemical invasion of biota and decreasing stream vegetation cover are also not available for various locations.

But the real challenge facing the country is the managerial knowledge and expertise of field foresters, land managers and those managing the water resources. Also absent on the ground is the integrated symbiotic approach reflecting the absence of effective institution. Water managers and foresters need to maximise the multifaceted forest benefits without adversely impacting the quality and quantity of flow and the function of the ecosystem of the river. Therefore, to address this challenge there is a dire need for deeper understanding and integration of policies for management of water, land and forest resources and also sensitising decision-makers and building community awareness so that a location-specific sound policy can be formulated along with effective application of regulations. .

So far, the rejuvenation of the Ganga is dominated by engineers and bureaucrats. River ecology was relatively a non-focussed, unapplied instrument kept aside. Serious gaps in ecological research, the management of the river to revive its ecology and to restore its ecological integrity, are great stumbling blocks, preventing management of the Ganga on ecological principles. It is seldom appreciated that the Ganga is an ecosystem that has its own cleansing mechanism that allows it to function efficiently. However, for that to happen, its ecological integrity must be maintained, which includes ecological processes such as production, decomposition, nutrient dynamics and movement of biota. Thus, the good health of the river refers to fully-functional unstressed river ecosystems and a healthy river has high resilience to recover from stress induced by disturbances.

(The writer is a retired IFS officer and Advisor, Amity University)