

# Forests and Water-Conservation and Sustainable Development

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**T**he earth's ecosystems with the services they provide, such as food, water, climate regulation, spiritual fulfillment and the aesthetic environment sustain human life on planet earth (Millennium Ecosystem Assessment, 2005). Streams, rivers and floodplains are among the most dynamic ecosystems on Earth. However, most of these ecosystems have significantly been impaired during the past few decades due to unequal distribution and a sharp rise in global freshwater demand driven by industry. Most of the world's large river-floodplain ecosystems have been altered by human activities.

Water is essential for all life forms. Water connects every aspect of life. Water is the driving force for nature. Freshwater is one of the most important and crucial resources for humanity. Though nearly 70 per cent of the world is covered by water, only about 2.5 per cent of it is freshwater and less than 1 per cent of the freshwater is actually accessible in lakes and rivers. Freshwater has been vital renewable natural resources in the form of rivers, streams, lakes, ponds, groundwater, cave water, springs, floodplains and wetlands (bogs, marshes, and swamps) for sustaining life and establishing civilisations throughout history. Nearly 70 per cent

of the freshwater used by humans goes to agriculture. Technically, today, there is sufficient amount of freshwater on a global scale.

## Water Crisis

Water scarcity is the most critical issue of our lifetime and future generations. The increasing world population, improving living standards, changing consumption patterns and expansion of irrigated agriculture are the main driving forces for the rising global demand for water. Climate change, deforestation, pollution, greenhouse gases and wasteful use may result in insufficient supply. Extensive degradation because of



*Figure 1: Forests-Water Connectivity*



Figure 2: Mullaperiyar Water Dam

urbanisation has threatened the forests that nurture the water regime in the ground. Similarly, expansion of road network in higher reaches or upstream areas has caused extensive landslides and erosion and has caused irreparable damage to the perennial water streams. These factors have influenced the ecological functioning of the world's major water bodies and in turn destroyed the various freshwater systems. Consequently, about two billion of world's population is going through water stress which is expected to increase with time. In fact, extent of availability of clean water could prove to be the stepping-stone to development. Issues pertaining to water accessibility, quantity and quality are major global concerns. India is no exception as it is home to one-sixth of the world's total population but has only 4 per cent of the water resources sustaining the economy in terms of agriculture, power and biological productivity. Values of per capita surface water availability have continuously declined and in the near future the country is expected to become 'water stressed'. Water crisis will also lead to health crisis, and women unduly while taking away their considerable time from

work, family care and causes loss of economic opportunities.

### **Forests, Water and People - Interconnections**

Forests, water and people are closely interconnected. The availability and quality of water are increasingly threatened by overuse, misuse and ever-increasing pollution levels. It is scientifically recognised that both quantity and quality of water are strongly influenced by forests. The health of forests and its composition has direct impact on water availability as well as quality which shows the importance of the relationship between forests and water. Forested tracts not only constitute catchment of rivers and their tributaries but often they harbour their headwaters. Water, wetlands and forests are constantly interacting to produce healthy and productive ecosystems. Forests absorb rainfall and snow melt and also slow runoff, reduce soil erosion, improve water infiltration rates, recharge aquifers, thus exhibiting 'sponge effect'. At the same time forests growing along the streams filter pollutants from entering the water. Forests therefore undoubtedly play a critical role in the well-being and proper functioning of

the hydrological cycle. Since, forests are storehouses of biodiversity, these play an equally important role in global cycling of carbon, oxygen and other gases influencing the earth's atmosphere.

Forest cover is one of the many factors which affect climate at the global as well as regional and also local levels. Forests play a significant role in climate mitigation. Climate change is altering forest's role in regulating water flows and influencing the availability of water resources. Therefore, the relationship between forests and water is a critical issue that requires highest priority attention at all levels.

### **Forests—Conservation Values**

Since time immemorial, importance of forests to humanity has been well recognized. Forests are seen as source of timber, edible products, fuel wood, medicinal plants and habitat to wildlife. As catchment for rivers, they predominantly affect the volume, quality and timing of water flow as well as rates of soil formation or erosion. Forests have been a source of inspiration and are increasingly used for tourism and recreation. Forests not only provide multiple services but they

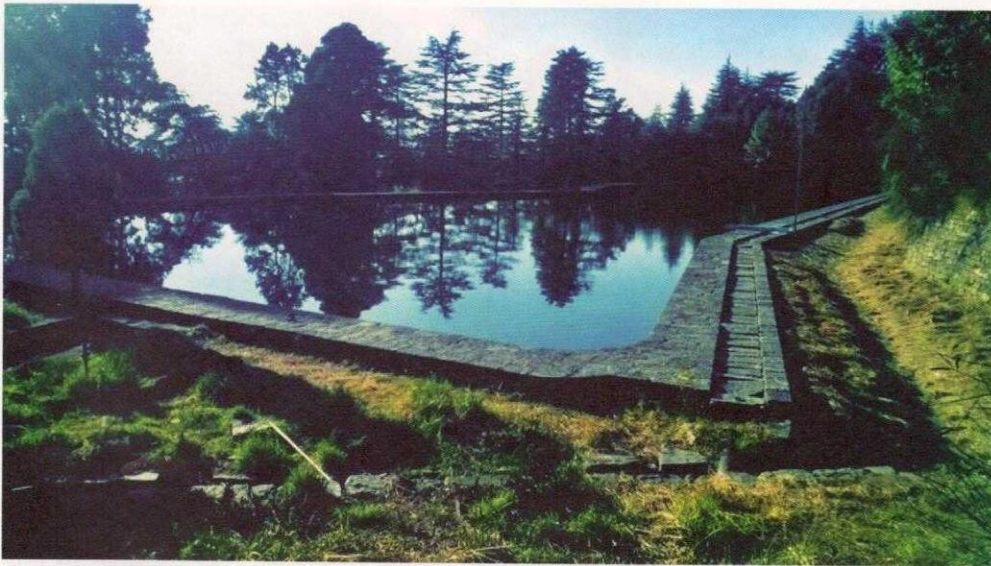


Figure 3: Shimla Catchment Forest, Reservoir

are perceived to have multiple values which are being recognized by different stakeholders. Forested catchments supply a high proportion of water for domestic, agricultural, industrial and ecological needs in both upstream and downstream areas. The health of our waters is the principal measure of how we live on the land. Water management will not be sustainable unless key ecosystem services that influence availability of water are explicitly considered from the landscape sustainability perspective.

**Tapping Forest Catchment Potential:** A few of the country's pioneer efforts to tap forest catchment potential to augment water supplies to major cities and drier regions are highlighted as below:

- Construction of Mullaperiyar dam on Periyar River in Kerala so as to divert water eastwards to the arid rain shadow region of Madurai under the then Madras Presidency and creating a large lake (26 km<sup>2</sup>). Forests surrounding the lake and the entire lake area now constitute the Periyar Tiger Reserve (PTR). Diverted water augmented the small flow of Vaigai River and brought notable changes in the thirsty area and ensured sustainable livelihoods by way of agriculture production (Figure 2).

- Protection to high altitude oligotrophic lake, Marsar and diverse forests (500 km<sup>2</sup>) in the mid slopes constituting the catchment of Dagwan River so as to ensure clean water supply for the city of Srinagar and J&K.

- Similar initiative was taken to provide ensured water supply to Shimla town during the colonial time.

A small forest patch (10.15 km<sup>2</sup>) located 8 km east of Shimla constituted an important forested catchment with dense Deodar forests and Oak forests was leased to Shimla Municipal Committee in 1878. Ever since, the water supply to Shimla town is from the catchment forests.

The forest was declared a Protected Forest and finally notified as Shimla Water Catchment Wildlife Sanctuary (Figure 3).

- Likewise, the water distribution system in Mumbai metropolis is more than 150 years old. Water is brought into the metropolis from various reservoirs. Tansa dam on Tansa River in Thane district was opened in 1892. Before Independence, Tansa was the major source and major water pipelines were laid to supply water

to Mumbai. Tansa dam is located within Tansa Sanctuary and forested catchment serves as sponge and continues to provide water recharge even after the withdrawal of monsoon.

## Forests Management and Water Conservation

**Forests and varied natural water resources** (surface water and ground water) are complex and dynamic in nature. In India, there has been a long history of management of forests

as well as adequately documented traditional systems of water harvesting and water use, practiced in drylands.

### Policy and Legal Framework:

Management of Indian forests commenced way back in 1860s with the establishment of forest reserves, law enforcement and initiation of silviculture-based forest working. State Forest Department(s) and trained manpower were created. SFDs are the custodian of forests and wildlife. The Constitution of India-Article 48A provides a clear mandate of the State to protect the environment. Forests and the protection of wildlife fall within the Concurrent List. The Environment (Protection) Act, 1986 is the umbrella legislation for the protection of all aspects of the environment. The issue of pollution and water quality falls primarily under the Water (Prevention and Control of Pollution) Act, 1974. The Indian Forest Act, 1927, and the Forest (Conservation) Act, 1980 are the primary legislations governing forests; while the Wild Life (Protection) Act, 1972 and the Biological Diversity Act, 2002 are significant from the perspective of biodiversity, intellectual property right, and access and benefit sharing.

**Paradigm Shift:** Newer approaches focus on the ecosystem management,



*Figure 4: Tansa Sanctuary and forested catchment*

biodiversity, participatory management, sustainable livelihoods, maintenance of ecosystem services and banning green felling ultimately aiming to achieve target of 33 per cent forest cover in the country and also to fulfil the global commitments alongside addressing national priorities and local needs. Presently, about 25 per cent of country's geographical area is covered under diverse forests including 'Trees Outside Forests'. India has established an impressive network of protected areas and presently PAs (Protected Areas) represent nearly 5 per cent area of the country. Prominent country-wide activities carried out under various programmes/ have contributed immensely. Several national level institutions dealing with forestry/wildlife research, education and training, have been established for capacity building.

**Conservation of Water Resources:** In the federal scheme of the Indian Constitution, regulation and development of inter-state rivers falls within the legislative competence of the Union Government. States have the legislative competence over water supplies, irrigation and canals, drainage and water storage. States also have the power over issues relating to land and land use. Post-

independence the country has realised the priority need for developing water resources, particularly in drier zones for expansion of agriculture and realization of national goals of self sufficiency in food production. A large number of irrigation projects were implemented. As a result, numerous multipurpose dams, reservoirs, canals and ponds came into existence. Water supply was also enhanced tapping ground water resources. There has been a notable growth in number of water sources. India has nearly 2/3rd area under rainfed agriculture and considering limitations on expanding irrigation potential, the country decided to adopt and implement watershed management approach to augment water supply in rainfed areas. Over past decades, country has gained considerable experience in execution of integrated watershed management programmes (IWMP).

### **Contribution to the Sustainable Development**

Past experiences have amply illustrated that forests provide the cleanest and most stable flows of surface water and groundwater recharge among all land uses. Flow amount, quality and timing can be

altered by forest management; flows can increase or decrease depending upon post disturbance successional patterns. These findings appropriately indicate linkages between forests and freshwater ecosystems. Both ecosystems significantly contribute towards UN Agenda on Sustainable Development Goals which reflect complex and interrelated nature of social, economic and ecological well-being parameters. In recent past, India has directed its development pathway to meet its priorities of food, water and energy security; economic growth; disaster resilience and poverty alleviation while maintaining the natural capital and adopt transparent and robust governance along democratic lines. SDGs related to water (SDG 6) and land (SDG15) explicitly acknowledge the linkages between forests and water. Further, SDG 6 and SDG 15 have strong interconnections with targets of other SDGs and thus, approaches adopted towards ecosystem management, sustainable forest management, biodiversity conservation, effective and efficient use of water resources would not only contribute to other SDGs but would ensure sustainable overall development and fulfilment of global commitments. □

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