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INTERLINKING OF RIVERS IN INDIA

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Abstract - Watershed of a river is characterized by its unique resources and ecosystem. Watersheds are logical building blocks of water resources planning and management. Control and diversion of a river's flow, as well as land-use practices in a watershed affect not only the quality and quantity of water, but also the quality of ecosystem it supports. In order to solve the twin problem of flood-drought, as well as to increase food grain production through irrigation of additional lands, the Indian government has proposed to transfer 173 billion cubic meters (bcm) of water annually from "water surplus" watersheds of the Ganges Brahmaputra to "water deficit" watersheds in the western and southern parts of India via construction of 14,900 km long canals and 35 reservoirs. This paper analyzes the feasibility of this proposal on geological, ecological, and socio -economic grounds. We argue that the proposed transboundary transfer of water will not solve the flood-drought problem, but will adversely impact geologic, hydrologic, ecological, and socioeconomic functioning of rivers in downstream regions. An integrated watershed-based water resources planning based on sound science and involving all stakeholders is necessary for sustainable development in the Indian subcontinent.

INTRODUCTION

River linking is a project linking two or more rivers by creating a network of manually created canals, and providing land areas that otherwise doesn't have river water access and reducing the flow of water to the sea using this means. It is based on the assumptions that surplus water in some rivers can be diverted to deficit rivers by creating a network of canals to interconnect the rivers. The Indian Rivers Inter-link is a proposed large-scale civil engineering project that aims to effectively manage water resources in India by linking Indian rivers by a network of reservoirs and canals and so reduce persistent floods in some parts and water shortages in other parts of India. The Inter-link project has been split into three parts: a northern Himalayan rivers inter-link component, a southern Peninsular component and starting 2005, an intrastate rivers linking component. The project is being managed by India's National Water Development Agency (NWDA), under its Ministry of Water Resources. NWDA has studied and prepared reports on 14 inter-link projects for Himalayan component, 16 inter-link projects for Peninsular component and 37 intrastate river linking projects. The average rainfall in India is about 4,000 billion cubic meters, but most of India's rainfall comes over a 4-month period – June through September. Furthermore, the rain across the very large nation is not uniform, the east and north gets most of the rain, while the west and south get less. India also sees years of excess monsoons and floods, followed by below average or late monsoons with droughts.

This geographical and time variance in availability of natural water versus the year round demand for irrigation, drinking and industrial water creates a demand-supply gap that has been worsening with India's rising population. Proponents of the rivers inter-linking projects claim the answers to India's water problem is to conserve the abundant monsoon water bounty, store it in reservoirs, and deliver this water – using rivers inter-linking project – to areas and over times when water becomes scarce. Beyond water security, the project is also seen to offer potential benefits to transport infrastructure through navigation, hydro power as well as to broadening income sources in rural areas through fish farming. Opponents are concerned about knowledge gap on environmental, ecological, social displacement impacts as well as unseen and unknown risks associated with tinkering with nature. Others are concerned that some projects create international impact and the rights of nations such as Bangladesh must be respected and negotiated.

1.1 OBJECTIVES

The Inter-linking of Rivers in India proposal has a long history. During the British colonial rule, for example, the 19th century engineer Arthur Cotton proposed the plan to interlink major Indian rivers in order to hasten import and export of goods from its colony in South Asia, as well as to address water shortages and droughts in southeastern India, now Andhra Pradesh and Orissa.

1.2 IMPORTANCE AND NEED OF INTERLINKING

Watershed is the area that drains its surface and subsurface flows to a common stream or river. That is, a river and its watershed are interdependent entities. Watershed is considered a logical building block of water resources planning. Watershed management provides without disturbing the processes that are integral to

normal functioning of a river. Therefore, watershed management should be based on a thorough understanding of the upland, wetland, riparian, and riverine ecosystems a river supports. Further, watershed management requires involvement of stakeholders in assessing and managing the quantity and quality of water in a river from its head to its mouth. Watershed boundaries often do not conform to political boundaries, and this can pose challenges for those trying to formulate a watershed management The major rivers in the Indian subcontinent include the Ganges, Subarnarekha, Brahmaputra, Meghna, Mahanadi, Godavari, Krishna, Kaveri, Pennar, Narmada, and Tapi. Each of these rivers has a watershed that supports unique resources, ecosystems, and cultures. Currently, over one billion people live in the watersheds of these rivers and the population living in these watersheds is projected to reach 1.5 billion by 2050 (Sinha, this volume). The current population in the Ganges-Brahmaputra watershed exceeds 600 million, and is expected to reach 1 billion by 2050. This rapid growth in population will require additional food grains and other resources for sustenance. Additional demands for food grains will stress all aspects of the environment and natural resources in general, and water resources in particular. In view of future resource and water needs, it is imperative that all water resources planning involve all stakeholders and protect the ecosystem.

1.3 INDIAN DRAINAGE SYSTEM:

The Indian drainage system i.e. Indian river system is primarily divided into two major components or parts which are Himalayan rivers system and the second one is Peninsular rivers system. These two major rivers systems are then divided into sub categories. The Himalayan rivers are subdivided into antecedent rivers and nonantecedent rivers. Antecedent rivers are those rivers which are older than Himalaya and the corresponding non-antecedent rivers are those rivers which are younger than the Himalaya. The Peninsular rivers system is subdivided into two categories of rivers. These categories are according to the nature of flow of the rivers. The categories are West flowing rivers and the second one is East flowing rivers.

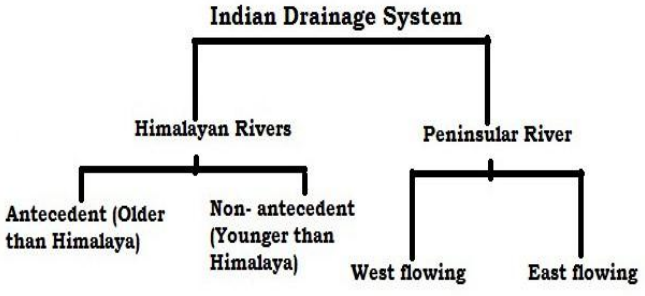


Fig. 2.1 Hierarchy of Indian Drainage System

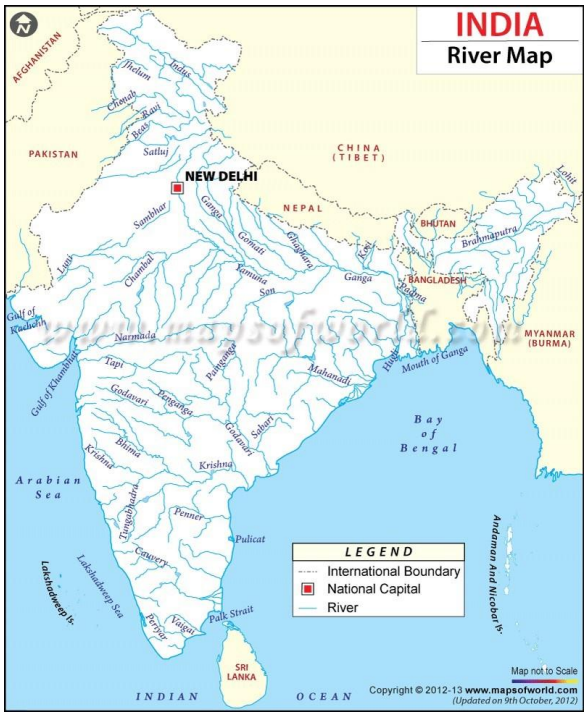
The National Perspective Plan comprised, starting 1980s, of two main components:

1. Himalayan Rivers Development
2. Peninsular Rivers Development

An intrastate component was added in 2005

Characteristics	Himalayan Rivers	Peninsular Rivers
1. Place of Origin	Himalayan mountains (covered with glaciers)	Peninsular plateau and central highland
2. Nature of Flow	Perennial; Receive water from glaciers and rainfall	Seasonal; dependent on monsoon rainfall

1.4 INTER BASIN WATER TRANSFER LINKS



2 MAHANADI-GODAVARI LINK PROJECT

Mahanadi Godavari link is the first and critical link of nine link system of MahanadiGodavari-Krishna-Pennar-Cauvery-Vaigai-Gundar under Peninsular Component of NPP. The Government of Odisha was not agreeable for the Mahanadi (Manibhadra) Godavari (Dowlaiswaram) link due to large submergence involved in Manibhadra dam proposed under the link project. Based on the suggestions of WRD, Govt. of Odisha, NWDA has proposed a revised preliminary proposal of Mahanadi Godavari link project with reduced submergence. A presentation on the revised proposal of Mahanadi Godavari link project has been made to the Hon'ble Chief Minister, Govt.

3 INTERNATIONAL COMPARISONS:

The Indian Rivers Inter-link project is similar in scope and technical challenges as other major global river inter-link projects, such as:

2.3.1 Rhine–Main–Danube Canal:

Completed in 1992, and also called the Europa Canal, it inter-links the Main river to the Danube river, thus connecting North Sea and Atlantic Ocean to the Black Sea. It provides a navigable artery between the Rhine delta at Rotterdam in the Netherlands to the Danube Delta in eastern Romania. It is 171 km long, has the summit altitude (between the Hilpoltstein and Bachhausen locks) is 406 m above sea level, the highest point on Earth reachable by ships from the sea. In 2010, the inter-link provided navigation for 5.2 million tonnes of goods, mostly food, agriculture, ores and fertilizers, reducing the need for 250,000 truck trips per year. The canal is also a source for irrigation, industrial water and power generation plants.

2.3.2 Illinois Waterway:

Illinois Waterway system consists of 541 kilometres of interlink that connects a system of rivers, lakes, and canals to provide a shipping connection from the Great Lakes to the Gulf of Mexico via the Mississippi River. It provides a navigation route; primary cargoes are coal to power plants, chemicals and petroleum upstream, and agriculture produce downstream primarily for export. The Illinois waterway is the principal source of industrial and municipal services water needs along its way; it serves the petroleum refining, pulp and paper processing, metal works, fermentation and distillation, and agricultural products industries.

2.3.3 Tennessee–Tombigbee Waterway:

Tennessee–Tombigbee Waterway is a 377 kilometre man-made waterway that interlinks the Tennessee River to the Black Warrior-Tombigbee River in the United States. The Tennessee–Tombigbee Waterway links major coal producing regions to coal consuming regions, and serves as commercial navigation for coal and timber products. Industries that utilize these natural resources have found the Waterway to be their most cost-efficient mode of transportation. The water from the Tenn-Tom Waterway is a major source of industrial water supply, public drinking water supply, and irrigation along its way.

4 ISSUES AND CHALLENGES

Inter-River Linking Project involves multifaceted issues and challenges related to economic, ecological, and social costs. On this note, Iyer (2003) very sharply states that "We have had great difficulty in completing even a single project successfully and we want to embark on thirty massive projects at the same time."

IRL project has caused much anger and protest in our neighboring nation, Bangladesh. It is grappled with fear that diversion of water from the Brahmaputra and the Ganges, which provide 85% of the country's fresh water flow in the dry season, would result into an ecological disaster.

Indian National Water Development Agency plans to dig hundreds of reservoirs and more than 600 canals. This may trigger an alarm among environmentalists to raise their voice against this plan. Environmentalists are quite concerned about the ecological impact of the project of such huge magnitude. Shiva (2003) very aptly remarked that the water flowing into the sea is not waste; it is a crucial link in the water cycle. With the link broken, the ecological balance of land and oceans, freshwater and sea water, also gets disrupted Shiva considered ILR violence to nature: "Violence is not intrinsic to the use of river waters for human needs. It is a particular characteristic of gigantic river valley projects which work against, and not with, the logic of the river."

As this project is of massive estimated cost, a long term planning and a sound financial simulation are required to meet the standard of due diligence for such proposals. The huge expenditure may likely generate fiscal problems that are difficult to handle. The maintenance cost and physical position of the dams, canals, tunnels, and captive electric power generation will also involve huge financial burdens. This certainly requires financial assistance from the private sector, as well as global capital agencies. Mobilization of global capital may ultimately entail the risk of destroying social welfare measures.

The rehabilitation of project-affected people in water infrastructure projects will also pose a burning question before the concerned authorities. The construction of reservoirs and river linking canals in the peninsular component alone expect to displace more than 583,000

people and submerge large areas of forest, agriculture and non-agriculture land.

5 CONCLUSION

Considering the pragmatic view of all the issues raised it can be concluded that implementation of this ambitious scheme is not possible in foreseeable future. Hence it can be a better option to concentrate on the local resources and think upon the alternatives available.

The proposed inter-linking of rivers project (ILRP) is designed to interfere with natural flow of rivers and ecological settings that have been in place for thousands of years in the Ganges -Brahmaputra watershed. Interbasin and transboundary transfer of waters and sediments will have adverse impacts on growth and sustenance of floodplain and delta plain in the downstream regions of Bangladesh and West Bengal, India. It is argued that the diversion of water during the rainy season will have a very little impact on the floods; however, diversion of waters and sediments in the dry season will have sever environmental impacts on the environment, ecosystems, agriculture, navigation, fisheries, industry, salinity intrusion, and the well being of the Sunderban mangrove forest. Moreover, the unilateral control of surface water and inter-basin transfer of transboundary rivers will be in violation of prevailing water sharing treaties among the riparian countries.

Without regional cooperation between the co-riparian nations, any major inter-basin water resource planning is impossible. The people of Bangladesh, Bhutan, India, and Nepal living in the Ganges-Brahmaputra watershed share common history, heritage, and friendship that go back to the time immemorial. India as the largest country in the

6. REFERENCES

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