**Inter-Linking of Rivers in India : A Way Forward**

**Towards Irrigation Efficiency and Water Security**

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*"We can not solve the problems of 21st Century with mind set of 19th Century and attitude of 18th Century"*

**Introduction**

 Water is the precondition for human life. As a shared resource it is at the core of human interdependence, both within and between countries. Thus ensuring access to clean and sufficient water for all, including through comprehensive laws and policies regulating the use and management of water, must be a priority of any government authority involved in the development of implementation of water management systems. Fresh water is indispensable to human survival and most forms of economic production. In fact, it is essential for nearly every sector of human activity, such as agriculture, industrial production, power generation and transportation including environment, conflict and governance. We can understand the importance of water by these words, *"The yellow of the sun combined with blue of water creates the green of our living world. Remove or mismanage either the blue or the green from the Earth and the heat of the sun will change everything".* According to water experts, India has been identified as a country where water scarcity is expected to grow considerably in the near future due to rapid growth in demand of fresh water driven by growth in population, irrigation consumption, and to achieve food security. To meet out the increasing demand of freshwater, it is necessary to properly and wisely manage our water resources. We can properly and wisely manage our surface water through Inter Basin Water Transfer. Our civil / Irrigation Engineers are most competent to transfer water from water rich eastern and north eastern regions of India to southern and western regions of India by way of a mega project known as Inter-Linking of Rivers Project. In favour of this project we can understand that if water transferred from water abundant rivers or water rich regions to water deficit areas, there would be adequate supply for everyone in every area of India. Completion of Inter-Linking of rivers project would also appears to promote national integration and a fair and equitable sharing of natures' bounty as water wealth. Rivers-linking project would guarantees a great concern for water conservation and optimum use of available water resources. Government authorities must committed to complete the inter-linking of rivers in 8-10 years in public interest and for sufficient economic growth of the country.

**Historical Background**

 Linking of running surface water resources in not a new concept, it has been evident since time immemorial. Various phenomena of infiltration, interception, stream-flow, geomorphology, artesian wells were well understood. Water management and conservation were well known in 400 B.C. Construction methods and materials of dams, bank protection, spillways and other considerations mentioned in the ancient books reflect the high stage of development of water resources and hydrology in ancient India. In Medieval period human beings started diversion of water from local resources for irrigation purposes, by construction of earthen 'anicuts' across local streams. The "grand anicut" of 2nd century over the river Cauvery is true example of water diversion experience. It was recorded to be functioning till mid 19th century providing irrigation to 25000 hectares land resisting the impact of floods for 1600 long years. Long time back irrigation canals were developed by Cholas, Pandyas, the rulers of Vizianagarm and Kakatiyas for diverting the waters from Cauvery, Tungbhadra and Vaigai. The western Yamuna Canal and Agra Canal were built during the Mughal reign. Under British rule, the dominant ideology for water resources management in India was that *of hydraulic manipulation* of rivers through large scale perennial engineering solutions like dams and diversions for economic growth, water transport, irrigation and flood control. In 1834, Sir Arthur Cotton, who had constructed the Godavari and Krishna dams, suggested a plan called the "Arthur Cotton Scheme" to link the Ganga and Cauvery rivers. In the 1860s, two private companies planned irrigation development in India on a grandiose scale. The aim was to establish links by rivers and man-made canals starting all the way from Karachi to Kolkata via Kanpur and from Cuttack to Bhatkal, Mangalore and Chennai and so on. But all that they could eventually do was to construct some disconnected navigational canals, like the Midnapore Canal, the Orissa High-level Canal, and the Karnool-Cuddapah Canal. The venture ended up in a great failure and finally the Government of India (British) had to intervene. In 1930 Sir C.P. Ramaswami Aiyyar also suggested and support such a scheme.

**Inter Basin Water Transfer SchemeS**

 In 1972, 1974 likewise, there were two such big schemes, one was the "Ganga-Cauvery link", joining up the Brahmaputra river with the Ganga in Bihar with a view to lifting up millions and millions of cubic metres of Ganga water up the peninsular plateau and delivering the same across successive basins on the peninsula till the Cauvery would have been reached. The other one was named as "garland canal scheme" with a view to constructing enormous canal encircling the whole of India. There would have been a several thousand kilometres long mega-canal running parallel to the Himalaya on the north and round the coast of India on the south. Obviously and luckily, both the schemes fell through, as they could not prove to be feasible. Suggestion for a national water grid for transferring surplus water available in some regions to water-deficit areas have been made from time to time.

 A detailed note on the National Water Grid was prepared by the then Central Water and Power Commission and three possible alignments for the Ganga-Cauvery link along with other links were brought out. Further studies were made by the then Union Minister for Irrigation, and eminent civil engineer Dr. K.L. Rao who advocated one of the alignments for the Ganga-Cauvery link along with a few other links including the Brahmaputra and Ganga link. The 2640-km long the Ganga-Cauvery link essentially envisaged withdrawal of 1680 cubic metres of water per second from the flood flows of the Ganga near Patna for about 150 days in a year and pumping about 1400 cubic metres of water per second of this water over a head of 549 metres for transfer to the Peninsular region and utilizing the remaining 280 cubic metres per second in the Ganga basin itself. The proposal envisaged utilization of 2.59 million hectare metres of Ganga water to bring under irrigation an additional area of 4 million hectare-metres. Dr. K.L. Rao had also proposed a few additional links to be constructed like : (i) the Brahmaputra-Ganga link to transfer 1800 to 3000 cubic metres per second with a lift of 12 m to 15 m, (ii) link canal transferring 300 cubic metres per second of the Mahanadi water southwards, (iii) a canal from the Narmada to Gujarat and Western Rajasthan with a lift of 275 m, and (iv) a number of links from rivers of the Western Ghats to transfer water towards the east. Dr. Rao's proposals were eventually examined by the Central Water Commission and were found to be grossly impractical.

 Caption Dastur, put forward his proposal in 1974 for a Garland Canal which would, consist of two major canal systems : (i) There would be a 4200-km long, 300m wide Himalayan Canal at a bed level ranging between 335 m and 475m above the mean sea level aligned along the southern slopes of Himalaya, running from the Ravi on the west to the Brahmputra on the east and further beyond. The proposal envisaged a storage capacity of 24.7 million hectare metres to control and distribute 61.7 million hectar-meters of water (ii) The second part of the scheme would have consisted of a 9300 km long 300 m wide central and southern Garland Canal at a bed level ranging between 244 m and 305 m above the mean sea level. The Himalayan and Garland canals were proposed to be inter-connected at two points (Delhi and Patna) by five of 3.7 metre diameter pipelines for transfer of water. It was estimated that all the surplus waters in the country would have to be utilized to irrigate 219 million hectare metres of land. After examination by experts, the proposal was declared technically unsound and economically prohitive and was rejected. Thereafter, various political leaders of the country have supported the cause but no such schemes have been implemented.

 The Ministry of water Resources (then known as Ministry of Irrigation) in the year 1980 formulated a National perspective plan for water resources development by transferring water from water surplus basins to water deficit basins by inter-linking of rivers. The National Perspective Plan has two main components i.e, the Himalayan Rivers Development and Peninsular Rivers Development. The National Water Development Agency (NWDA) was set up as a Society under the Societies Registration Act, 1860 in 1982 to carry out the detailed studies and detailed surveys and instigations and to prepare feasibility reports of the links under the National Perspective Plant.

 In November, 2002 the then Prime Minister Atal Bihari Bajpai announced, in view of the Supreme Court Directive, that the centre would take up a new scheme for inter-linking of rivers of India on a "war footing" and as a long term or permanent solution to the recurring problem of water scarcity and drought in the country. The then President of India APJ Abdul Kalam had also shown keen interest to this mega Project.

 NWDA has, after carrying out detailed studies, identified 30 links for preparation of feasibility reports and has prepared feasibility reports for 6 such links. The various basin States have expressed divergent views about the studies and feasibility reports prepared by NWDA. Due to reluctance of water-rich states, the NWDA has not been allowed to undertake detailed survey and it is argued that only by nationalization of the rivers, by Government of India, this problem can be resolved to some extent. With a view to bringing about a consensus among the states and providing guidance on the norms of appraisal of individual projects and modalities for project funding etc. the central Government has since set up a Task Force.

 **success story of Inter-Basin Transfer of water in India**

 According to water management expert, Shri Suresh Prabhu, long-distance Inter-basin Transfer of Water has been in practice in India for over five centuries. The Periyar Project, Parambikulam-Aliyar Project, Kurnool-Cudappah Canal and the Telugu-Ganga Project are some of the example of Inter-basins Water Transfers executed in south India in the 19th and 20the centuries. The Periyar Project is the most notable endeavour of the last century in trans-basin diversion. The project was commissioned in 1895 and provided irrigation to 58 thousand hectares initially. This has since been extended to 81 thousand hectares. There is also a power station of 140 MW capacity. The Parambikulam-Aliyar Project is a complex multi-basin multipurpose project. Seven streams - five flowing westward and two towards the east-have been demanded and their reservoirs interlinked by tunnels. The water is ultimately delivered to the drought-prone areas in the Coimbatore district of Tamil Nadu and the Chittur area of Kerala. The project has a command area of 1.62 lakh hectares with 185 MW of power generation capacity. The Kurnool-Cuddappah canal is 304 km long with a capacity of 84.9 cubic metres extending from the krishna to the Pennar basin for irrigating an area of 53 thousand hectares of land. The Telugu-Ganga Project brings the Krishna waters from the Srisailam reservoir through an open canal to Somasila reservoir in the Pennar valley. From Somasila the water is taken through a 45 km long canal. By agreement among the riparian states 12 thousand metric cubic metres (TMC) of water will be delivered to Tamil Nadu to increase the water supply to Chennai and similarly in Himachal Pradesh, inter sub-basin transfers in the Indus basin and the Rajasthan Canal are some of the projects executed in the 19th and 20th centuries. A diversion dam, Pandoh, 140 km upstream of Pong on the Beas river enables the diversion of its water to the Bhakra reservoir and generates 165 MW of power on the way. The Beas-sutlej link is 37.25 km long. Of this, 25.45 km passes in tunnel through difficult rock formations. The Rajasthan Canal project diverts water from the Himalayas to the deserts of Rajasthan. The project comprises of a huge multipurpose project constructed across the Beas river at Pong, a barrage at Harike and a grand canal system. Executed both in the southern and northern parts of our country these projects have been highly beneficial

 There are so many examples of Inter-basin Water Transfer around the globe like U.S.A. Canada, China, South Africa. The USA, Which is water-rich and scarcely populated is transferring 45 billion cubic metres of water through inter-basin transfer and plans to add 376 billion cubic metre. China has steadfastly stayed course on its own scheme of transferring 48 billion cubic metres of water from Yangtze to the yellow to improve water availability in dry plains of North China.

 In India from 2005 to April 2014 the project of inter-linking was not taken care of by UPA Government. In February 2012 Supreme Court of India delivered strict direction to complete the inter linking project in public interest and also for economic growth of India by way of its verdict through *Re- Networking of Rivers*, case, with these words, "we do not only express a pious hope of speedy implementation but also do hereby issue a *mandamus* to the Central and the State Government concerned to comply with the directions contained in this Judgment effectively and expeditiously and without default. This is a matter of national benefit and progress. We see no reason why any state should lag behind in contributing its bit to bring the Inter-linking River Program to a success, thus saving the people living in drought-prone zones from hunger and living in flood-prone areas from the destruction caused by floods." Item 3.5 of National water policy 2012 also advocated Inter-basin Water Transfer in the interest of food security. Newly formed central Government under the Prime Ministership of Shri Narendra Modi ji is very strongly committed to complete the inter-linking of rivers project in India within 8-10 years time frame.

**Justification of Inter-basin water Transfer/Inter-linking of Rivers**

 After completion of inter-linking of rivers project, it would provide additional irrigation benefits of 25 million hectare from surface water and about 10 million hectare by higher use of ground water. The additional capacity to generate hydropower will be resulted to 34000 MW. Besides, India, would also get large benefits from domestic water supply, floods control, drought mitigation, navigation, control of pollution, fisheries, improvement of environment and development of infra structure. Apart from this there are some apprehensions regarding environmental challenges and rehabilitation challenges of displaced people and challenges of survival of wild life due to deforestation in the process to complete the project. Disturbance in water ecology in linked river is also apprehended by experts, it will resulted in a threat to life-cycle of equatic habitat of river.

**Solutions**

 The Union Government must draft a comprehensive resolution mechanism by way of effective and strong legislation to meet out state's apprehension about water shortage to meet their future demands and to resolve the social and political issues like displacement and rehabilitation, disturbance in River ecology, submergence of cultivated and forest land and problems arising out before installing inter-linking of rivers project and after completion of proposed inter-linking projects. Regarding human displacement, the main act that applies is still the land acquisition Act (1894), enacted with the interests of the colonial government rather than the interests of the displaced in mind. It gives the government significant control over the process of eviction and the displaced very few rights. There is no obligation to provide land-for-land compensation. After nearly 2 decades of debates, a Draft National Policy on Resettlement and Rehabilitation for Project Affected Families (2004) was proposed, followed by the more progressive Draft National Development, Displacement and rehabilitation policy (2005) that provides, for instance, for land-for-land compensation. This was superseded by the National Rehabilitation and Resettlement Policy of 2007. There is only one case-the Sardar Sarovar dam-where the Tribunal set up under the Inter-State Water Disputes Act decided that the displaced should be given land-for-land compensation (Narmada Water Disputes Tribunal 1979). This proved controversial and Madhya Pradesh, for instance, proposes cash compensation instead of land-for-land compensation. We have success story of rehabilitation of displaced person due to construction of Tehri dam. To mitigate the Environment challenges there must be a broad study by way of environment impact assessment and through it we can prepare a crystal clear road map against environment challenges. To secure wild habitat we can start plantation in adequate quantum against deforestation, that would resulted during construction of infra-structure to complete inter-linking of rivers project. It is further submitted that plantation must be done on the flood plain of each and every river to protect our wild life and it will also protect flood plain of rivers from private/public encroachment and it will also help to mitigate the impact of climate change and global warming as well. To fight with the threat to life cycle of equatic habitat. NWDA/CWC and concern authorities must construct ponds adjacent to each and every inter-link and pour waters of these linked rivers and drop equatic habitat of these rivers into the ponds. As a result of that process the equatic habitat of the rivers to be linked will prepare themselves for new and changed equatic environment. After completion of a inter-linking project these equatic habitat developed in mix water will be droped in liked rivers to grow and for reproduction to complete their life-cycle in the linked river.

*"Water, like religion and ideology, has the power to move million of people.*

*People move when there is too little of it.*

*People move when there is too much of it.*

*People journey down it.*

*People write, sings, and dance about it.*

*People fight over it.*

*And all people, every where and every day need it."*

 *(Mikhail Gorbachev)*