

INTERBASIN WATER TRANSFER THROUGH LINK CANALS -SOME PROBLEMS AND SOLUTIONS

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ABSTRACT

National Water Development Agency (NWDA), Govt. of India, proposes to interlink Indian rivers with a view to fight against the recurring floods and droughts occurring periodically in some of the river basins. The paper is intended to discuss some of the merits and some demerits of the proposed National Perspective Plan (NPP) prepared by NWDA. Several problems being faced for implementation of NPP have been discussed. Some possible solutions to overcome the problems have been discussed.

KEYWORDS:

River linking, National Perspective Plan, Merits and de-merits, Problem of implementation, Solutions

1.0 INTRODUCTION

Mangala Rai, former Director General, ICAR and Ex-Secretary, Deptt. of Agricultural Research & Education in a recent article (The Statesman, 2017) has stated:

‘India is heading for an agrarian crisis. With 17.78% of total world population, India possesses only 2.3% of world’s land resources and 4.2% of world’s water resources. Although, country’s food grain target has reached 273Mmt to feed its 1250 million population, farmers are committing suicide as agriculture has become a loss-making business and the young generation in the villages are no more opting for agriculture as a profession. It is a failure of our political, bureaucratic and administrative system. Although there is a lot of talk about increasing water reservoirs and accelerated irrigation by building link canals to transfer water from water surplus to water deficit basins, there seems to be nothing on the ground’.

Concept of national water grid for effective management of flood and drought situations in India was introduced by a number of eminent persons in the past, like Sir Arthur Cotton, Dr. K.L. Rao, Captain M. N. Dastur and many others (IWRS-1996,1999). But the proposals were rejected as they were found to be techno-economically not viable. It was Indira Gandhi who set up the National Water Development Agency (NWDA) in 1982 to study the possibility of water transfer from surplus basins to deficit areas. NWDA, under the Ministry of Water Resources, River Development and Ganga Rejuvenation, Govt. of India, proposed the National Perspective Plan (NPP) consisting of 14 river links under the Himalayan component and 16 river links (Mazumder-2003,2006,2011) under the peninsular component as shown in Fig.1(NWDA,2005). After the Supreme Court order to implement the project in a period of 15 years by 2012, a Task Force (2003) was appointed by the Vajpayi led NDA Govt. under the chairmanship of Sri Suresh Prabhu, now union minister of commerce, in the Modi led NDA Govt. National Commission of Integrated Water Resources Development (NCIWRD,1999) was not in favor of long distance river links and suggested to construct only the short distance river links under NPP scheme. The past UPA Govt. wanted to hear the views of all the stakeholders and experts before taking a final decision. A standing committee under the chairmanship of Sh. Sambashiva Rao, M.P., was formed and the committee invited suggestions /opinions of public and experts in the subject. The committee examined the representations and finally gave its recommendation to the Govt. of India regarding implementation of the proposed NPP scheme.

Some experts and NGOs have proposed other alternatives for solving the water crisis and food problems in India. They claim that decentralized local rainwater harvesting, reviving and improving traditional irrigation techniques [IE(I),2016] can meet essential requirements more effectively and at a far lesser cost. There is much scope for increasing the efficiency of the existing irrigation projects by reducing losses and through better water management.(Bharat Singh-2002, Mazumder-2002). Besides, the optimal use of existing projects, traditional water harvesting projects and recharging groundwater (Mazumder & Kumar,2016) may be useful as alternatives. According to UNICEF and the WWF (2016), if the precipitation within the watersheds or sub-basins is harvested and conserved properly, domestic water needs will not be a problem in most parts of the country.

The NPP scheme should be undertaken with full recognition of the serious ecological damages (Iyer,2003) that may be caused by interlinking rivers and that the benefits should outweigh the costs. India is having water-related

conflicts among several states, e.g. Haryana and Punjab; Karnataka, Kerala and Tamil Nadu; Bihar, Assam, West Bengal and Orissa; Maharashtra, Gujrat and Kerala, Punjab, Madhya Pradesh and Rajasthan. North east states say that their water surplus is due to lack of storage as there is hardly any investment there to build storages. Water surplus states consider water as natural resource and they are reluctant to part with their God given wealth without adequate compensation.

The most important point to be considered is the estimated cost of the NPP project in comparison to other alternative methods to control water and food scarcity and the impact on our economy and the environment. The approximate cost of the NPP Scheme as estimated by the Task Force (2003) was about 5.6 lac crores at 2003 prices (IWRS,1996) which is likely to increase manifold now due to cost and time over run. Before looking for a loan from the World Bank or the Asian Development Bank (ADB,2014), it is necessary to consider whether the country will be in a financial and physical position to repay the loan as the country is already reeling under heavy debt burden. Govt. of India has to look after the needs of other competing sectors like agriculture, industry, communication, health , education etc.-all of which need heavy investments.

The paper is intended to discuss the various pros and cons of NPP scheme, some of the problems in its execution and possible solutions for its implementation.

2. NEED FOR WATER TRANSFER

Areas with water availability less than 1000m³ per capita per year are designated as scarcity areas. Although, the average figure 1545m³/capita/year for India (Iyer,1989), if taken as a whole, indicates that India may not be water deficit right now, but looked from the spatial distribution of available water from basin to basin, there is a great deal of non-uniformity due primarily to extreme non-uniform rainfall over the country. Table-1 gives the list of surplus and scarce basins in India (IWRS,2007). Rapid rise in population growth in India and ever increasing water pollution will soon render many of the surplus basins in India to be water scarce basins. Water transfer from surplus to scarce basins for sustainable development of water resources in India has been found necessary to fight recurring floods and droughts in many parts of the country.

Only way we can address the recurring problems of water shortage in scarce basins is by transfer of surplus flood water to drought prone areas (Table-1). It is estimated (IWRS,2007) that an additional area of 35 mha of land can be brought under irrigation by river linking. NWDA, Govt. of India, has drawn a perspective plan to interlink Indian rivers (Fig.1) by constructing 30 link canals-14 in Himalayan and 16 in Peninsular regions in India (NWDA,2005). Few short distance river links (Fig.1) like Ken-Betwa (link14), Par-Tapi-Narmada (Link 26) , DamnGanga-Pinjal(link27) are in the process of implementation. Besides the above problems, water transfer from Manas, Sankosh, and Kamali rivers need concurrence from Govt. of Bhutan and those from the Brahmaputra and Ganga

Table1: Surplus and Scarce Basins in India

Surplus Basins		Scarce Basins	
Basins	PerCapita Availability in M ³ Per Year	Basins	PerCapita Availability in M ³ Per Year
Brahmaputra Basin	18,417	East flowing Rivers between Mahanadi and Pennar	919
Barak Basin	7,646	Cauvery	666
estflowing Rivers between Tadri and Kanyakumari	3,538	Pennar	648
estflowing Rivers between Tapi and Tadri	3,194	West flowing River Basins of Kutch and Saurashtra including Luni	631
Narmada	2,855		
Brahmani-Baitarni	2,696		
Mahanadi	2,546	East flowing River Basins between Pennar and Kanyakumari	383
Godavari	2,026		
Indus	1,757		
Ganga	1,473		
		between Pennar and Kanyakurnari	

require agreement with Bangladesh. Besides the above links, shown in Fig.1, NWDA has already completed pre-feasibility report of 36 short distance intra-state river links up to March, 2016.

Long distance links by successive transfer of water from one river to another by constructing some 30 small, medium and large reservoirs are under exploration. Typical links (1-10-11 in Fig.1) for transfer of excess water from rivers Manas and Sankosh in Brahmaputra basin to Mahanadi basin with existing and proposed reservoirs (as illustrated schematically in Fig.2) for further diversion to south for utilization in water starved Krishna, Pennar, Cauvery, Vaigai and Gandar river basins. Fig.3 illustrates the proposed Manas-Sankosh-Tista-Ganga link (no.1-13 in Fig.1) for transfer of excess water of Manas and Sankoss rivers to Tista and Ganga river basins to satisfy Bangladesh with which India wants to maintain good relation.

Rao, et al (2012) used deterministic approach for inter-basin water transfer as relevant to monsoon dependent rivers systems in south India. The study provides a preliminary idea of optimal inter-basin water transfers on a bimonthly basis for planning purposes. The network models are solved using linear programming technique. The utility of the study is demonstrated with a trade-off curve to prioritize between operational cost of transfer and the amount of storage reservoirs in space and time.

3.BENEFITS OF THE PROPOSED NATIONAL WATER GRID

Those who strongly advocate implementation of NPP, cite the following benefits which the project is likely to bring about for an all round development of the country

3.1 Food Security

The projected population of India is expected to stabilize at about 1600 million by the year 2050 from the present population of about 1350 million. The food requirement for this increased population will rise from 205 million tons/year at present to 460 million tons/year in 2050. The proposed interlinks are going to increase irrigated area from the present 113 million hectare to 148 million hectare by 2050 ensuring our food security.

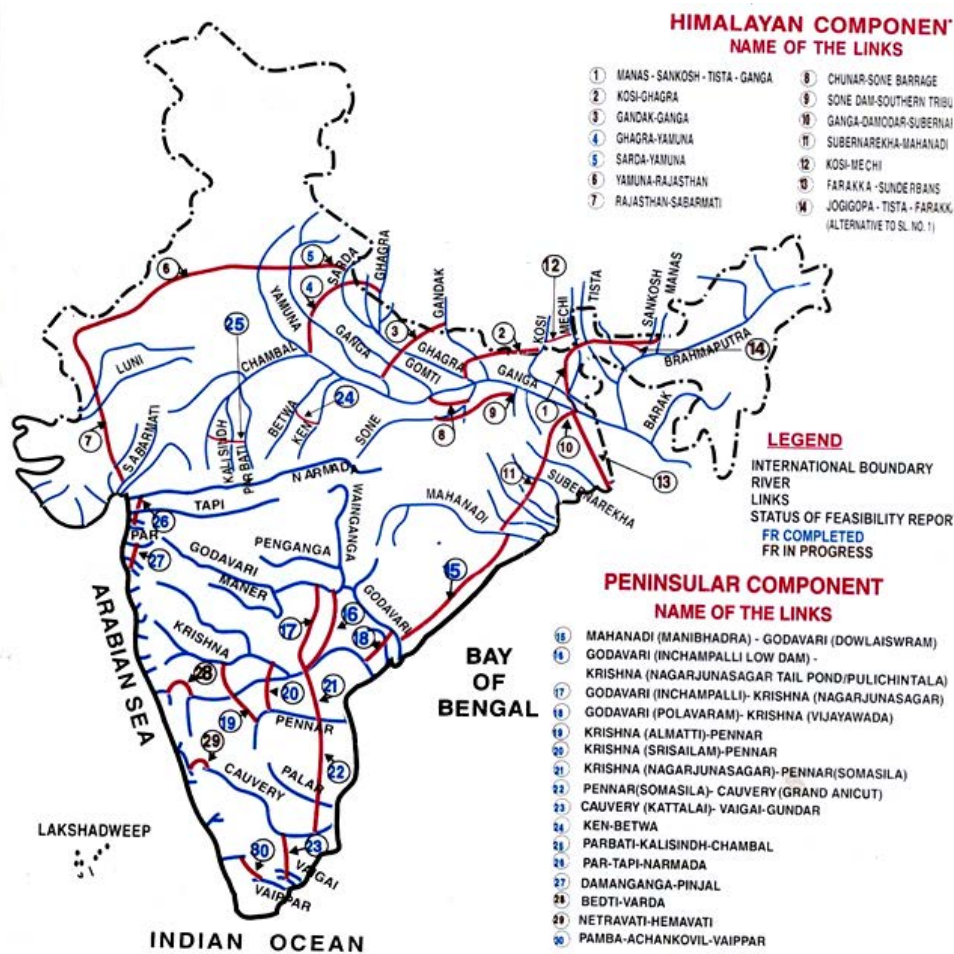


Fig.1 Interlinking Indian Rivers (Rivers in Blue and Link Canals in Red)

3.2 Hydropower Development

At the present, the share of hydropower is only about 25% of the total power generation since our hydro-power development is only about 22,000 MW out of the potential of about 84,000 MW. Only 3-4% of the potential of north-east has been developed so far, although 45% of total hydro-power potential of the country lies there. The proposed links, especially the Himalayan component, is going to provide 34,000 MW of additional hydropower for peaking purpose and for increasing the desired share of hydro to 40%.

3.3 Water Supply for Drinking and Industry

The proposed links envisage supply of clean drinking water and water for industrial use amounting to 90 and 64.8 billion Cum. respectively with a view to meet the demand by 2050. This will remove the current hardship, especially for the women in rural and hilly areas, who has to walk long distances daily to collect water for drinking and other domestic uses. No industrial growth is feasible without guaranteed water supply.

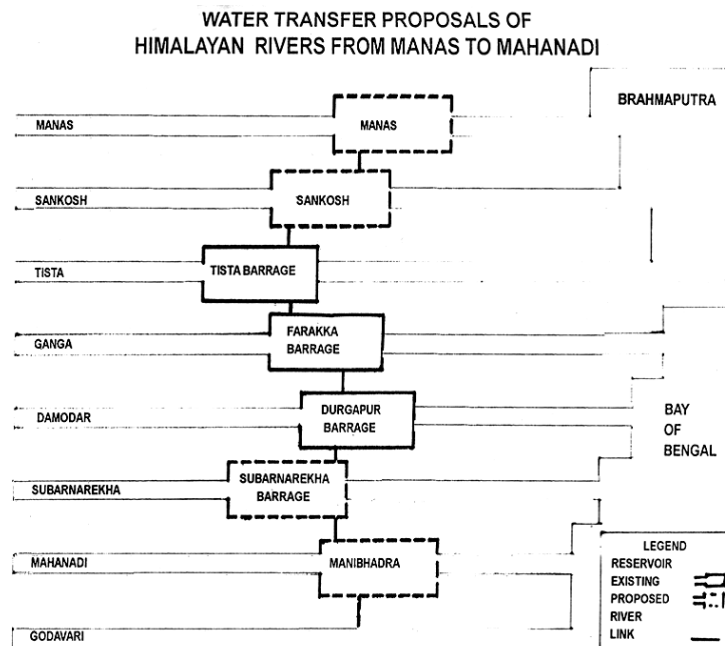


Fig.2 Linking River Brahmaputra With River Mahanadi Through Link 1-10-11 (See Fig.1)

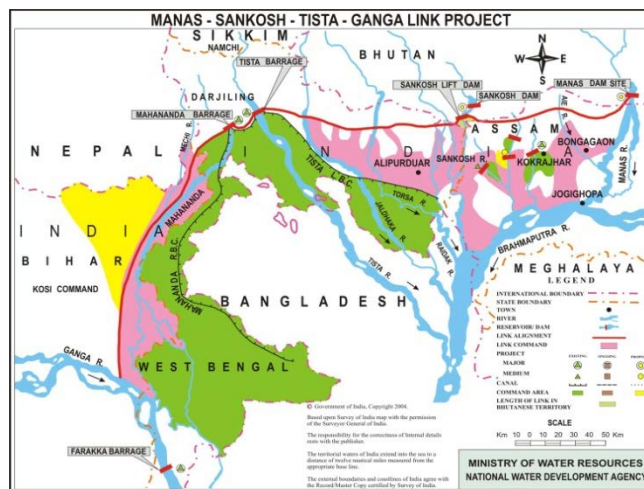


Fig.3 Proposed Manas-Sankosh-Teesta-Ganga Link (Link:1-13 in Fig.1)

3.4 Navigation for inland water transport

Compared to railway and road transport, inland water transport is cheaper, especially for bulk transport of commodities like ores, coal, food grains, forest products, tea etc. Currently, the waterways run only for about 120 days or so in a year due to inadequate draft which is less than the required minimum depth of about 2m. The proposed storages and links (If made navigable) is going to ease pressure on railways and roads by introducing inland navigation by guaranteeing a minimum 2 m depth of water on all the 365 days in a year.

3.5 Flood and Drought Protection

As already pointed out, while one part of the country is devastated by recurring floods, the other part is suffering from drought due to acute shortage of water. The main challenge is how can the surplus flood water causing devastation and running waste into the sea (especially from Brahmaputra, Ganga and Mahanadi Basins) can be diverted for productive use in the drought prone areas in the south and the west, so that the country gets rid of the current flood-drought-flood syndrome.

3.6 Employment Opportunities In Rural Areas

People in the rural areas are now compelled to migrate to cities in search of jobs, causing rapid deterioration of our national economy. Villages are getting poorer and cities are getting congested – resulting in unprecedented pollution of air, water and soil in the cities. Only way to reverse this unhealthy trend is to create more job opportunities in rural areas through agriculture and agro-industry based projects. As the proposed links and the storages are going to be mostly in rural areas, it is going to create large employment opportunities for the rural youths.

3.7 Dry Weather Flow Augmentation

Transfer of surplus water stored in reservoirs during monsoon and releasing it during dry season will ensure a minimum amount of dry weather flow in the rivers which will help in pollution control, navigation, fisheries, growth of forests, protection of wild life, flora and fauna etc. Any water body either in storages or in flowing links will be very attractive and will offer recreational opportunities for people living in both rural and urban areas.

4.0 DIFFICULTIES IN IMPLEMENTING THE PROPOSED SCHEME

There are several issues and challenges involved in the scheme . The several difficulties that the Govt. is likely to face in the implementation of the proposed scheme may be summarized as follows:

4.1 Opposition by NGOs

A group of people, especially the NGOs, the Socio-Economic and the environmental group (Iyer,2003) are strongly against the inter-link. They apprehend that such a massive inter- basin transfer of water will result in environmental degradation (Khitolya et al,2005), loss of aquatic eco-system, loss of land, forests, fisheries and the livelihood of the poor people who thrive on them, massive displacement of people, evaporation losses, water logging and salinity and possible change in the climate (Desai et.al,2005) due to submergence of vast areas of land in reservoirs and the huge network of unlined open canals. The massive investment of Rs.5.6 lakh crores (at 2003 price index) required for the implementation of the project, which is likely to further increase manifold due to cost and time overrun, is going to deprive other important projects for our socio-economic development due to diversion of fund for NPP. The loans from world banks etc. may subject the country to a permanent vicious debt trap where the country is likely to lose its economic sovereignty and dictated by foreign powers granting the loans. They also complain about inadequate information and transparency about the scheme, lack of data regarding cost of other alternatives to inter-link e.g. what will be the cost of transporting surplus foods (by increasing productivity of irrigated land. from the current figure of 2 T/ha to 4 T/ha or more) from water surplus areas to drought prone areas as an alternative to long distance water transfer for irrigation.

As only a small part of flood water (approximately 3 %) will be stored and transferred, there will be hardly any flood relief. Droughts may not occur concurrently with flood and it may not be feasible to remove drought in all the distant areas ,especially those lying in higher altitude due to excessive cost of pumping. Envisaging the interlinking of rivers passing through twenty-five states and involving issues of riparian rights between competing nation states may indeed be all set for a modern ‘Mahabharata’ fought over water.

4.2 Change in Constitution

Water is a state subject under entry 17 of state list- II subject to entry 56 of central list- I at present. Even if the project is found to be techno-economically feasible, implementation of the same will be a herculean task. It needs

constitutional amendment. Most of the donor states, even though surplus, is reluctant to part with its resources free of cost and are trying to project their future demands stating that their surpluses are owing to lack of sufficient storage and due to lack of investment in their states. To provide incentive, water has to be considered as a trading commodity and the beneficiary states will have to be asked for paying the price of water possessed legally by the surplus states. Is it desirable to bring water from state subject to central subject and finally privatize it as is being done in the case of public sector undertakings now-a days ?

4.3 Interstate Dispute

In almost all the river valley projects executed in the country so far, water of a river basin has been shared only by the riparian/basin states. The proposed scheme envisages transfer of water from surplus basins to drought prone basins irrespective of whether they are riparian/co-basin or not . Recently, the country has witnessed bitter quarrel and animosity amongst the states of Karnataka and Tamilnadu over the sharing of water from rivers Kaveri and Krishna, even though both the states are riparian. One can well imagine the degree of complexity and the dispute that will arise over sharing of water for the proposed NPP scheme where a large numbers of states are involved, resulting in tension and rivalry amongst the people of different states. Who is going to control and operate this mega project?

4.4 Resistance of People in the East and North-East

Most of the surplus water lies in the East and North-East states where people are economically backward mainly due to lack of investment. People may resist inter- basin transfer of their water resources free of cost to the beneficiary states unless the Govt. of India bring their economic condition at par with other developed states of the country. Equity in economic development is no less important than equity in water distribution for a healthy and prosperous nation. There is a massive unemployment and unrest amongst the unemployed youths in these states. Unless the Govt. addresses these problems first by taking up those components of the project e.g. in-basin development of hydro-power, irrigation, flood control, inland waterways, communication and development of other infra-structures for these states, it may be almost impossible for the project authorities to implement the proposed river linking scheme , however well planned it may be.

4.5 Poor Performance of Many Existing Projects

It is extremely important to evaluate and improve the performance of the existing river valley projects and address the genuine problems being faced by the people especially those who are affected and who oppose river valley projects for fear not unfounded. Performances of many of the projects are not satisfactory (Mazumder,2002,1984). About 70% of irrigation water is currently being wasted (CWC,2010) due to improper maintenance, lack of proper co-ordination between users and controlling authorities, mismanagement of water at farm level, wrong and unrevised pricing policy (INAE,2008). Almost one third of the irrigated land is subjected to water logging and salt problems. Farmers of Punjab state are not allowing completion of Sutlej-Yamuna river link while half of the project is already completed by the Haryana Govt. long back and the entire investment is lying idle. Punjab farmers are resisting mainly due to their fear of water logging and salinity experienced by them from Bhakra- Nangal scheme. Teesta barrage irrigation project in the northern part of West Bengal is half completed even after 40 years from its start due to lack of funds and problem of land acquisition. One of the DVC main canals which was designed for inland navigation has not carried a single vessel so far in-spite of large investments and wastage of prime agricultural lands which had to be occupied for the construction of the wide navigation canal. The state of Kosi canals and the problems being faced in river training after construction of Kosi barrage (Chitale,1999) and Farakka barrage (Mazumder,1999) are well known. These are only a few examples to illustrate the utter mismanagements in water sector. The maintenance cost and physical position of the dams, canals, tunnels, and captive electric power generation created as capital assets under the plan will involve huge financial burdens. Many such projects which were earlier considered to be national assets are fast becoming national liabilities. Should we build such schemes which can not be maintained ? Unless and until we can correct the situation and improve the performance of these projects, it will be very difficult to earn people's confidence and convince them for implementing a massive program like interlinking of rivers, however justified it may be.

4.6 Poor Economic Return & Faulty Pricing Policy

Unlike other commodities, water for irrigation is currently distributed almost free of cost. The present irrigation water rates are extremely poor and the realization of even those low rates is still poorer. Whereas during the British days, 87% of the rates used to be realized from users, today the revenue receipt has come down to 15% only (Mohile,2000). As a result, there is hardly any maintenance of the irrigation projects after their completion. There is

tremendous wastage of water due to losses in conveyance and operation as well as in the farms since farmers get it almost free of cost. Presently, the overall irrigation efficiency of most of the surface irrigation schemes for agriculture, which consume about 80% of our total water supply, is about 30% only. The savings of water due to even a marginal improvement in irrigation efficiency and use of return flow through scientific management of irrigation water may be sufficient to irrigate the additional areas for increased food production. It will be wise to charge the beneficiary states for the water they will receive and pay a part of the revenue to the donor states as a price of the water they legally possess. The present practice of distributing irrigation water almost free of cost should be abandoned and the water rates so fixed that the revenue realized could pay for at least the annual maintenance and overhead costs, if not the annual depreciation, interest on borrowed capital and the amount to be paid to the donor states.

4.7 Possible Climatic Changes

In an article published in Hindu, 26 th August, 2005, consequences of the proposed interlinking on south-west monsoon were discussed. In the article, the inter-relation between the reduction in fresh run-off to Bay of Bengal and consequent climate change have been examined by the earth scientists in a one day seminar. Currently, Bay of Bengal (BoB), receives 7,700 km³ of water annually comprising of 4,700 km³ from direct rainfall and 3,000 km³ from river run-off. The estimated loss in evaporation is about 3,600 km³ annually. Thus the total fresh water inflow into BoB exceeds evaporation loss. Once fresh water is transferred (estimated as 200 Km³ annually due to water transfer from rivers discharging in BOB), scientists are of the view that it is likely to increase salinity of top layer of BoB resulting in decrease of circulation of water from BoB to the Indian ocean affecting the south-west monsoon.

5. RECOMMENDATION OF NCIWRD

The National Commission on Integrated Water Resources Development (NCIWRD,1999) had projected the improved irrigation efficiencies of the surface and groundwater irrigation system for the future. The Commission also assessed the return flow from the various uses, which would flow into the hydrologic system and thus make it available for reuse. The Commission recognized that inter-basin transfer of water is an outstandingly large complex program of water management. Studies have to be done with the help of computer simulation models and systems analysis. They recommended that with improved management and in-basin development of water, there would be no major water scarcity problem up to the year 2050, except a few isolated pockets for which short links may be provided and there is no need of long distance water transfer at present.

6.0 SOME POSSIBLE SOLUTIONS

Various problems as discussed under section-5 should be addressed first. Some of the possible solutions to the problems are mentioned below.

- A master plan should be drawn after collecting all relevant data; the same should be analyzed and discussed at length with all stake holder states and NGOs with a view to remove their doubts and apprehensions.
- In the first phase of its implementation, only short links and storages needed should be built for in-basin water development with a view to improve the economy of donor states and bring them at par with beneficiary states which are already economically developed.
- To provide incentive and remove disparity, water has to be considered as a trading commodity and the beneficiary states should be asked for paying the price of water possessed legally by the surplus states. Part of revenues earned by the beneficiary states should be shared with the donor states.
- Before implementing this project, all existing ongoing schemes must be completed expeditiously to instill confidence of people.
- Some sort of tax e.g toll tax in highways may be charged from private companies like Coca-Cola for soft drink and Bisleri for bottled water.
- It should be seen that the existing surface irrigation schemes, which run at very poor efficiency at present, are modernized and run with an overall efficiency of 50% at least through proper management of water and proper co-ordination between users and suppliers of irrigation water.
- Demand for fresh water should be reduced by treating waste water and re-cycling of treated waste water and re-use of drainage water

- All alternatives to river linking suggested by NGOs e.g. increasing productivity of land and food transport (Instead of water transport) from surplus to deficit basins etc. should be examined and implemented prior to river linking .
- Benefit-cost study for NPP-scheme should be carried out to study feasibility of all the links and only those which are socio-economically feasible and economically viable may be taken up in the first stage.

It is hartenin to note that NWDA has constituted several sub-committees for

- (i)comprehensive evaluation of various studies/reports from time to time
- (ii) system studies for identification of most appropriate alternative plan in collaboration with other expert organizations like National Institute of Hydrology (NIH) etc.
- (iii)consensus building through negotiation and arriving at agreement between concerned states
- (iv)Restructuring of NWDA task force under the chairmanship of NITI AYOG, Govt. of India

6.0 CONCLUDING REAMARKS

The immediate need is to examine the feasibility of the river links and other alternatives to interlinks with more data and sound economic analysis of cost- benefit of different alternatives to achieve the same objectives. A master plan should be prepared adopting a strategy of implementing the different components of the master plan (including river-linking) in a phased manner so that the immediate problems of the donor states are given the topmost priority for their economic upliftment. The first phase of the execution should be to develop water resources management within the river basin and then to interlink the rivers to facilitate transfer of water from surplus to deficit areas.

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