

NECESSITY OF TRANSBASIN WATER TRANSFER - INDIAN SCENARIO

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ABSTRACT

Transbasin water transfer is an important activity in the field of water resources development. Although a river basin is the basic hydrologic unit for water resources, the same may not work out to be a proposition for optimum utilisation in the case of surplus water. The assessment may bring out that some basins have surplus water whereas the others may have deficit supplies. The National Water Policy was adopted by the Government of India in the year 1987. The policy emphasises the transbasin transfer of water. The policy states "Water should be made available to water short areas by transfer from other areas including transfers from one river basin to another based on a national perspective, after taking into account the requirements of the areas/basins". For meeting the shortages, transbasin transfers of water may be necessary. The necessity of transbasin transfers will depend upon the future projections for the enhanced demand for irrigation, domestic, industrial requirements etc.

Considering medium variant, the population of India in the year 2050 AD is expected to be 1640 million as per "Sustaining Water - An Update (1994)" by the United Nations. The food requirement has to be worked out on the same basis. At present, the annual food grain production in India is about 200 million tonnes. This annual requirement of food grain would increase to about 500 million tonnes by the year 2050 A.D. Accordingly, it is imperative to have transbasin transfer of water so as to facilitate increased irrigation to meet the food grain production needs and other usages etc. It is considered that the population of the country may stabilise by that time. Transfer of water from surplus basins to the deficit basins will to some extent solve the problem of uneven spatial distribution of water resources in the country. For attaining this, it is envisaged to construct large reservoirs to store monsoon flows for diversion. The main issues are economics, time frame and environmental. The more important issue is the concurrence of States of a basin on its surplus and the extent of such surplus. Finally, the integrated planning at the basin level takes into account all demands, which will indicate the quantum of surplus or deficit.

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GENERAL

In view of scarce water resources, planning and development of water resources is an important activity. Pressure on water resources has increased considerably during the last five decades and will continue to increase. It is a fact that if the water resources are not managed and conserved properly, the whole exercise will be futile. The present scenario calls for a sustainable development to take into account the growth of population vis-à-vis increase in food and fibre requirements. Although our water and land resources are large, their per capita availability is much below the international standards. The main reason is that the distribution of water resources is temporal and spatial leading to various problems of shortages and excesses of water.

The rapid growth in population has put much pressure on water resources to meet food and fibre needs for the country. As population is expected to increase and stabilise by middle of this century, the demand for water will also increase. The sustainability of water resources has gained increased importance as scarcity is being felt in some parts of the country. The water resources in this millennium will pose more challenges in view of growth in demand and deterioration in the quality of utilizable resources.

The river basin may be a basic unit for planning of water resources but this may not in any way make headway for utilisation of surplus water resources in various parts of the country. Many basins in the country may be surplus in water resources even in the ultimate stage of development, while other basins may face shortages in respect of water. To overcome this situation, transbasin transfer of water may be necessary for development of water resources so as to meet requirements of deficit areas leading to equitable distribution and optimum utilisation of water resources. India has started a systematic study of transbasin transfer proposals to maintain self-sufficiency in food which is bound to bring overall prosperity to the region in the future.

The paper describes in brief the scenario of food production and demands in the near future and the extent to which transbasin transfers can help in bridging the gap between demand and supply. Some of the issues with respect to implementation of transbasins transfer proposals are highlighted and discussed.

WATER RESOURCES

India is a vast country comprising extremes of climate. The location map of India is as per Figure 1. There is a variation in rainfall, and rainfall is concentrated in about four months of the year. In most parts of the country, rainfall occurs for a few days with very high concentration. The average annual precipitation including snowfall is about 141,240 Thousand Million Cubic feet (TMC) [4000

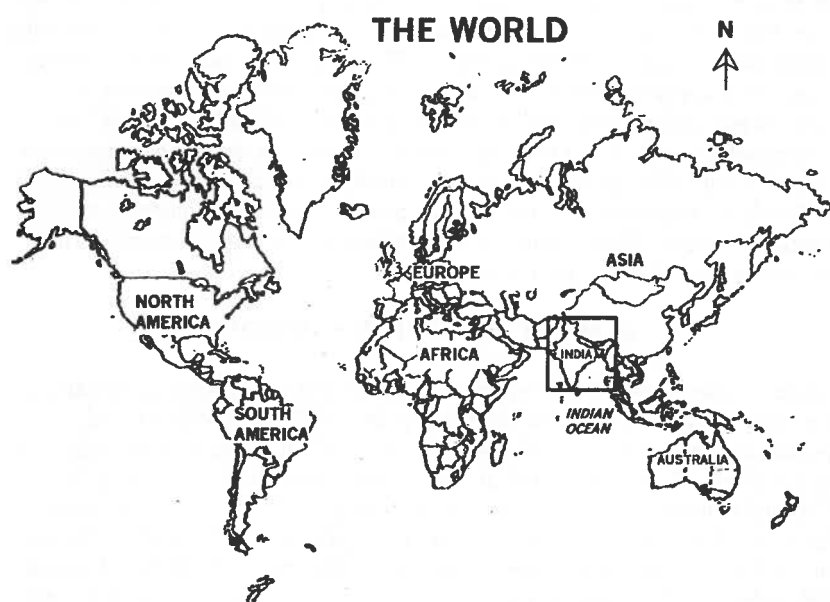


Figure 1. Location Map of India

BCM] and the monsoon rainfall during June to September itself is about 105,930 TMC (3,000 BCM). The annual average runoff in the rivers is estimated as about 67,089 TMC (1,900 BCM). About 80% of the annual runoff in the rivers occurs during four months of monsoon. Unless flood waters are stored in surface reservoirs, the water wastes into the sea because of limitations in availability of sites to store water. There are 12 major river basins and a total of 20 river basins. Rivers like Brahmaputra, Ganga, Mahanadi and Godavari have surplus water after meeting their present and future demands. Rivers like Krishna, Pennar, Cauvery, Vaigai and Vaippar are water short. The annual water resources potential in respect to per capita availability varies from about 635,580 cft (18,000 m³) in Brahmaputra to as low as 13,418 cft (380 m³) in some of the east flowing rivers of Tamil Nadu. The international agencies consider availability below 35,310 cft (1,000 m³) per capita per year as a scarcity condition leading to planning of remedial measures. Thus, scarcity conditions already exist in the country. The river basins of India are as per Figure 2.

DEMAND AND SUPPLY POSITION

Because of uneven distribution of water resources and topographical difficulties, the average annual utilisable surface water is 24,364 TMC (690 BCM) and replenishable ground water is 15,254 TMC (432 BCM). At present, the irrigation requires about 22,245 TMC (630 BCM) of water, domestic 1,165 TMC (33 BCM) and industrial 1,059 TMC (30 BCM), energy 953 TMC (27 BCM) and other uses 1,059 TMC (30 BCM) totalling to 26,483 TMC (750 BCM). By the year 2025, the demand in irrigation would be 27,189 TMC (770 BCM), domestic 1,836 TMC (52 BCM) and industry 4,237 TMC (120 BCM), energy 2,507 TMC (71 BCM) and other uses 1,306 TMC (37 BCM) totalling to 37,075 TMC (1,050 BCM). The requirement will thus match with the availability. The rough projections indicate that by the year 2050, the utilization may increase annually to about 45,903 TMC (1,300 BCM). This may be possible by various means and transbasin water transfer may be one of the leading options.

Present annual food grain production is over 200 million Tonnes (MT) and is based on the average food grain consumption of about 1.22 lbs. (550 gms) per capita per day. This requirement is met by considering the present irrigated area of 148 million acres (60 Mha) and rainfed area of 173 million acres (70 Mha) with yield as 1 Ton per acre (2.5 T/ha) for the irrigated area and 0.28 Ton per acre (0.7 T/ha) for the rainfed area.

This requirement increases to about 380 MT by the year 2025 AD and is based on the projected consumption of 1.66 lbs (750 gms) per capita per day. This requirement shall be met by increasing the gross irrigated area under food grains to about 235 million acres (95 Mha) and reducing the rainfed area to 124 million acres (50 Mha). Also, the improved yield values for the irrigated and rainfed



areas shall be 1.39 Ton per acre (3.5 T/ha) and 0.4 Ton per acre (1.0 T/ha) respectively. For the year 2050 AD, taking the projected consumption of about 1.66 lbs. (750 gms.) per capita per day, the requirement shall be met by increasing the gross irrigated area under food grains to 296.5 million acres (120 Mha) and reducing the rain fed area to 99 million acres (40 Mha) for feeding a population of 1640 million.

To meet irrigation requirements up to the year 2025 AD, it is proposed to utilise the existing water resources i.e. 24,717 TMC (700 BCM) through surface water and 12,358 TMC (350 BCM) through ground water [total 37,075 TMC (1,050 BCM)] by construction of conventional structures. However, to meet irrigation requirements by the year 2050 AD, it is imperative to have transbasin transfer of water so as to facilitate additional utilisation of about 8,828 TMC (250 BCM) when it is expected that the population of the country stabilizes.

TRANSBASIN WATER TRANSFER PROPOSALS

Transbasin water transfers are already being practised in India. The Periyar-Vaigai, the Kurnool-Cuddapah Canal, the Rajasthan Canal, the Telugu Ganga, the Sardar Sarovar etc. are some of the examples pertaining to transbasin transfers in India. The details are shown in Figure 3.

Large scale transbasin transfers were proposed by Dr. K.L. Rao in the year 1972 for the Ganga-Cauvery link and also by Captain Dastur in the year 1977 in the form of Garland Canal. It was found that the proposal of Dr. K.L. Rao i.e. Ganga-Cauvery link alone would amount to about US\$ 15,560 millions (Rs. 7×10^5 millions) (capital cost) at 1995 prices and it would require larger blocks of power (5 to 7 million kw) for lifting of water. It will also have no flood control benefits. The cost of Captain Dastur's proposal would be about US\$ 2,667,000 millions (Rs. 12×10^7 millions) at 1979 prices. The experts who examined the proposal considered that Dastur's concept on holding back surplus water from running down to the sea or causing floods and utilising it for irrigation and power generation is unassailable and also methodology and engineering are not acceptable for various reasons. Both the proposals were, therefore, not pursued.

Further studies in this connection were done for the 'National Water Perspective'. The National Water Development Agency (NWDA) was set up in the year 1982 to carry out the water balance and other studies on a scientific and realistic basis, based on various inputs from the field data for optimum utilisation of water resources and for preparation of feasibility reports so as to give concrete shape to 'National Perspective Plan'. Also, the National Water Policy was adopted by the Government of India in the year 1987. The policy states, "Water should be made available to water short areas by transfer from other areas including transfers from one river basin to another based on National Perspective after taking into account the requirements of the areas/basins".

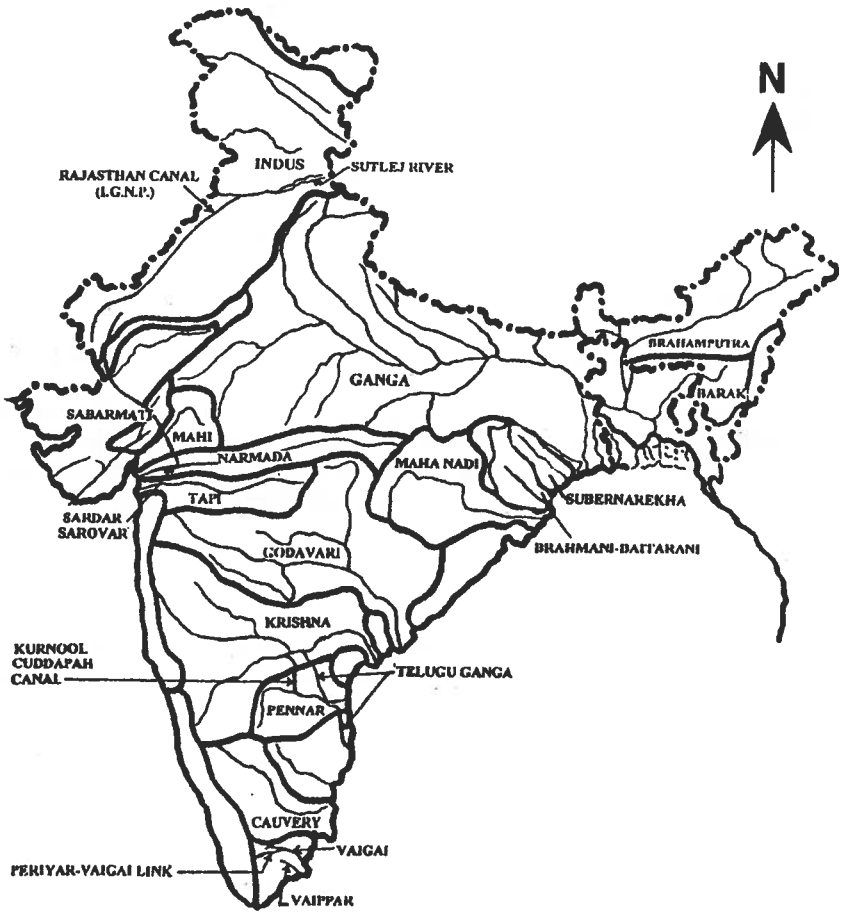


Figure 3. Examples of transbasin water transfer projects

As per present assessment, the total irrigation potential of the country is about 346 million acres (140 Mha) of which only 144.5 million acres (58.5 Mha) would be from major and medium schemes and the balance from minor irrigation surface schemes and ground water. The assessment is based on the possibilities of utilisation of water resources by the States. The scope of irrigation can be significantly increased by utilizing the surplus water available in some rivers and transferring the same to water scarce regions. It is thus seen that by inter-linking of rivers, the ultimate irrigation potential can be increased by about 86 million acres (35 Mha) and also 34,000 MW of hydropower can be generated.

The plan would also provide additional water for augmentation of flows at Farakka required inter alia to flush the Calcutta port and the inland navigation system across the country.

CONSTRAINTS IN TRANSBASIN TRANSFER LINK PROJECTS

The assessment of water resources vis-à-vis surpluses in an inter-state river and its diversion to be utilised in various basins is a complex issue. Some of the important aspects pertaining to technical, environmental, inter-state co-operation, apprehensions of State Governments are discussed below:

i) Technical

Transbasin transfers involve long distance link canals which have no major technical problems. Pumping huge quantities of silt-laden water over high heads during monsoons, tunnelling, high embankments, long river crossings, minimising seepage losses etc. are really difficult problems but with solutions. Modern technology would help overcome them.

ii) Environmental

All activities pertaining to development of water involve changes in the environment. It is a vital concern for one and all. The direct concern is submergence of land under reservoirs which includes forest and cultivated lands and displacement of population. The most sensitive problem is relocating the displaced population to suitable new locations with better civic facilities. The relocating package has to be suitable to match the present quality of life in the existing settlement. Relocating is looked at as socio-economic transformation and measures are devised so that economic conditions of Project Affected Persons (PAPs) improve after their relocation. PAPs would need to be made aware of the packages they are offered and the commitment towards their proper settlement in new locations. They also need to be educated about the benefits which they are likely to get from the new environment.

For environment and ecology, after meeting downstream requirements, a minimum flow of 10% of the inflow at diversion structures should be maintained and with storages, this could be of the order of 10% of average lean season natural flow downstream of the storage.

The canals will be generally aligned through non-forest areas. Only in limited reaches the link canals may pass through reserved/degraded forests. To the extent possible, even the agricultural area needs to be avoided. It is expected that the link canals may not pose serious environmental implications. The service areas of the link canals are also not likely to cause any water logging and salinity problems in view of their topography, soil drainability, conjunctive use of surface and ground water as well as the effective cropping pattern adopted in the proposals.

iii) Inter-state co-operation

Since some of the rivers in India are inter-State in character thereby involving the catchments in different States, no water resources development may be possible until and unless the States cooperate with each other. Any unilateral and isolated action by a State is considered undesirable and invites criticism leading to confrontation with the other basin state. In some cases, though tribunals have been set up to decide about the water allocation among the States, yet the awards could not be implemented as the participating States do not cooperate. In some cases, there has been significant achievement in respect of water resources development after the agreements have been signed. However, in many cases, some of the issues are still unresolved. As such, the developments in the basin could not be achieved.

So far as transbasin transfer links are concerned, once agreements are signed amongst the basin states, the major objection to the implementation of the link proposals may be from the environmentalists. To negate these effects, it may be possible to reduce the dam heights which may lead to increase in the pumping head. However, these aspects may require to be studied in greater detail at a later stage at the time of preparation of the Detailed Project Reports. It may be required to work out packages for Rehabilitation and Resettlement to take positive decision for implementation of the link projects.

iv) Apprehensions of the State Governments

Some states have expressed concern about the reliability and adequacy of the water transfer from distant sources because in-basin irrigation might suffer for want of water. The links are to be operated in an integrated manner to transfer only surplus waters. Before any water is diverted from any basin, it would be ensured that the entire reasonable in-basin needs in the ultimate stage of development are met with first.

In India most of the major rivers flow through one or more states and the lean season flows of the rivers get reduced after the monsoons. In case the State on the upper reaches envisage a dam, the state(s) on the lower reaches immediately raise an objection that the water availability gets reduced considerably. The dispute arises and is so intricate that the technocrats and politicians are unable to resolve their differences and finally the dispute is referred to tribunal which decides the final allocation of water among the basin states. Some states have expressed concern about Tribunal awards fearing that these may get disturbed. They feel that no water can be taken out of the basin due to the Tribunal Awards. It is envisaged that Tribunal awards are sacrosanct in nature and are not disturbed for transbasin transfer of water and Tribunal being the mechanism for inter state allocations for water.

Studies for transbasin transfer are for the optimum utilization of the water. Surpluses are worked out after considering all the in-basin needs. After the studies are over, the states can consider them and enter into a fresh agreement for the sharing of the water. The feasibility studies will form a useful basis for discussions and agreements among the concerned states.

DEVELOPMENT AND MANAGEMENT OF LINK PROJECTS THROUGH RIVER BASIN ORGANISATIONS

For water resources planning, a river basin is generally considered as the basic unit. Even the National Water Policy recognises the drainage basin or sub basin as a unit for planning, management and development adopting a holistic approach by planning and formulation of projects. The development of surface and ground water should be planned together for water and land use.

For water resources to be utilised in an optimum capacity, the projects may be formulated within basin/sub-basin for planning stage. The planning would require coordination among different users of water viz. domestic, irrigation, hydropower, navigation and industrial users etc. Planning will be not only based on present demands but also on future projections.

The River Basin Organisations (RBOs) formulated with multi disciplinary units only can achieve the desired results. RBOs for interstate rivers are encouraging tools as agreements regarding water surplus or deficit in a basin could be mutually discussed by the RBOs of the respective basins to arrive at a consensus at the earliest as the function of RBO shall be to collect data, disseminate them in local languages, formulate integrative master plans and consider the proposals from concerned states on various issues, including project proposals in the basin and implementation of projects. The RBO would also be the forum for mutual discussions among the states concerned and also to resort to conciliation to resolve differences.

The river basin can be a basic unit for planning, it may not lead to optimal utilisation of surplus water resources in various regions of the country. Many basins in the country may be surplus in water whereas the others may be facing a shortage of water. To meet the shortages, long distance transbasin transfer of water may be required for equitable distribution and optimum utilisation. The RBOs with requisite statutory powers for development and management of interstate river basins and for implementation of transbasin transfers, are required to be set up.

CONCLUSIONS

India has planned for self sufficiency in food even in the face of uncertain population growth and likely increase in food demands and dietary changes. Keeping in view the water resources scenario for 2050 AD, it may be imperative to go for transbasin transfers.

The implementation of the proposals may not pose any technical problems in view of the experience and expertise available. Resettlement of project affected people would be required to be done with humane approach. The inter-state issues will be required to be resolved with a give and take policy. This will pave the way for river basin development with transbasin transfers for optimum development of water potential of the rivers leading to overall development of the region.

The paper presents various aspects with a view to exchange the experience and to gain from experience of other countries.

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