The Concept of Inter-Basin Transfer of Water in India

Dr. Amartya Kumar Bhattacharya
BCE (Hons.) (Jadavpur), MTech (Civil) (IIT Kharagpur), PhD (Civil) (IIT Kharagpur), Cert.MTERM (AIT Bangkok), CEng(I), FIE, FACCE(I), FISH, FIWRS, FIPHE, FIAH, FAE, MIGS, MIGS – Kolkata Chapter, MIGS – Chennai Chapter, MISTE, MAHI, MISCA, MIAHS, MISTAM, MNSFMFP, MIIBE, MICI, MIEES, MCITP, MISRS, MISRMTT, MAGGS, MCSI, MIAENG, MMBSI, MBMSM
Chairman and Managing Director,
MultiSpectra Consultants,
23, Biplabi Ambika Chakraborty Sarani,
Kolkata – 700029, West Bengal, INDIA.
E-mail: dramartyakumar@gmail.com
Website: https://multispectraconsultants.com

Abstract

A basin or a watershed is that area from which all precipitation flows into a single stream. The boundaries of a basin are known as drainage divides; precipitation falling on opposite sides of drainage divides falls on different basins or watersheds. But a stream may have its tributaries, which bring in the run-off from their smaller basins to the main river. In fact, in case of large basins, the smallest stream within the basin joins the next higher stream in a rising hierarchy and the process continues till the largest or the trunk-river is reached. Evidently, the largest basin comprises the smaller ones, which are identified as sub-basins.

Keywords

Basin, inter-linking, precipitation, topographic sheet, pipeline transfer.

Introduction

Quite a long time back, the subject of linking of rivers came to the limelight consequent to an interim direction on the Indian Ministry of Water Resources in a Public Litigation case in the Supreme Court. Earlier, the Ministry had filed an affidavit stating that this project, which it claimed would control flood and drought conditions, would be completed by 2043. The Supreme Court reacted on October 31, 2002, directing the Indian Government to explore ways to achieve the target by 2012 and to constitute a task force in this regard. Accordingly, the Ministry constituted a task force with R. Prabhu, former Energy Minister as Chairman and C.C. Patel and C.D. Thatte, former Secretaries, Ministry of Water Resources, as members. In this context, the recommendation of the National Water Policy, April, 2002, is relevant. In Paragraph 3.5, it 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."

This serious concern about the subject, particularly in view of the long drawn tussle regarding allocation of water resources in case of Krishna and Cauvery rivers, a large section of the society demands an analysis of the problem of utilisation of water, identifying the issues involved and discussing possible solutions with respect to transfer of water resources. An ordinary citizen is also anxious to know whether linking of rivers can offer a solution to the age-old paradox of flood and drought.

Inter-Basin Transfer Concept

The Natural Water Policy, April 2002, Paragraph 3.3 stipulates "Water resources planning, development and management will have to be done for a hydrological unit such as drainage basin as a whole or for a sub-basin. But this may not lead to optimal utilisation of the water resources of the country as a whole. It is considered that some basins would remain surplus in water resources even in the ultimate stage of development, while some other basins are already facing the curse of water shortage. To resolve this paradox and to achieve equitable distribution and optimal utilisation of water resources of the country in the national perspective, long-distance inter-basin transfer has been considered as a possible solution."

Inter-Basin Transfer in the Past

Long-distance inter-basin transfer of water resources is not a new concept in India or abroad. The Western Yamuna Canal and the Agra Canal built in Mughal times are good examples of inter-basin transfer. The Kurnool Cudappa Canal (1860-70) and Periyar Vaigai (1896) are also important examples of this concept. The Rajasthan Canal, the Prambikulam - Aliyar, the Telugu Ganga and the Sardar Sarovar projects have either been completed or are nearing completion. In abroad, quite a number of such projects have been implemented in the USA, Canada, Mexico, Sri Lanka, China and Russia.

Indian Situation

The UN report, *Water for people, Water for life,* released on March 5, 2003, ranked India a poor 120th in water quality, which is third worst above Belgium and Morocco. The evaluation also ranked India 133rd in a list of 180 countries for its poor availability. Leaving aside the question of quality, which is nonetheless less important, the question of availability may be discussed in little more detail.

As per the assessment made in 1993, out of the total precipitation, including snowfall, of around 400 Million hectare meter (MHa-m) in the country, the availability from surface water and replenishable groundwater is put at 186.9 MHa-m. Because of topographical and other constraints, about 60 % of this i.e. (112.2 MHa-m), 69.0 MHa-m from surface water and 43.2 MHa-m from ground water can be put to beneficial use. According to international standards, availability of water below 1000 cubic metre per capita annually in a region marks scarcity condition. And applying this standard in India, quite a number of river basins like Cauvery, Pennar, Sabarmati, East flowing rivers between Mahanadi and Pennar and between Pennar and Kanyakumari and West flowing rivers of Kutch and Saurashtra including Luni are already in water-scarce region. More and more basins will come under this dubious umbrella in future

as a consequence of steep rise in population, change in demand pattern and unchecked pollution of water bodies. It is only a matter of time before all other basins including the redoubtable Ganga basin, save and except the Brahmaputra basin, become water scarce.

Water Demand

Recent studies reveal that the demand in all sectors of water use was about 55.2 MHa-m in 1990 and 75.0 MHa-m in 2000 respectively. Further, water needs in 2025 A.D. are estimated to be 105.0 MHa-m. The following table may be examined in this respect. Moreover, if a reasonable forecast can be hazarded, in 2050, when the population is likely to stabilise at a plateau of 1640 million, the total demand in all probability will not be less than the total utilisable quantity, which is 112.2 MHa-m.

Table 1: Present and Future Water Demand

Purpose	Annual water demand in the year (MHa-m)		
	1990	2000	2025
Domestic use	2.5	3.3	5.2
Irrigation	46.0	63.0	77.0
Energy	1.9	2.7	7.1
Industrial use	1.5	3.0	12.0
Others	3.3	3.0	3.7
Total	55.2	75.0	105.0

Uneven availability of water

The problem becomes further accentuated due to the fact that availability of water is highly uneven in both space and time. Precipitation is confined to only about three or four months in a year, during the monsoons, and varies from 100 mm in the western parts of Rajasthan to 11,000 mm at Cherrapunji in Meghalaya. Moreover, on occasions, very intense rainfall occurs when most of the run-off goes to waste sometimes even resulting in devastating flood. Paradoxically enough, even at Cherrapunji, once the monsoon is over, the residents often suffer from acute water shortage. So, it is essential to store water when there is excess flow so that regulated release from the storage can be utilised during the lean period, thus bringing a semblance of balance between demand and supply. But, as already mentioned, there is a limit to the quantity of utilisable water, which is far short of the total available quantity due to topographical and other reasons. So, it has been rightly recommended in National Water Policy, April 2002 that non-conventional methods like inter-basin transfer need to be practised to further increase the utilisable water resources. Although, effective steps to conserve water in all sectors of utilisation can go a long way in releasing additional resource, yet spatial unevenness can be set right only through inter-basin transfer, sometimes through long-distance.

Inter-Basin Transfer of Water - Past Proposals

Suggestions for inter-basin transfer to create a balance between surplus and deficit basins have been made from time to time since long; but two proposals put forward in the seventies viz. (1) Garland Canal by Captain Dinshaw J. Dastur in 1977 and (2) National Water Grid by Dr. K.L. Rao in 1979 gained considerable attention.

Captain Dastur's proposal consisted of two large canals, viz. (1) the Himalayan canal, 300 m wide and 4200 km long, aligned along the southern slopes of the Himalayas from the Ravi in the west to the Brahmaputra and beyond in the east; (2) the Central and Southern Garland canal, 300 m wide and 9300 km long covering almost the whole Deccan shield and part of Rajasthan. The two canals were proposed to be inter-connected at Patna and Delhi by pipelines. The proposal was examined by experts from the Central Water Commission, State Governments, IITs and Roorkee University and found to be technically unsound and economically prohibitive.

Dr. Rao suggested Ganga - Cauvery, Brahmaputra - Ganga and a few other links. The proposal was also examined by the Central Water Commission and found to be grossly under-estimated, heavily pumping-oriented and having no flood-control benefits.

R.N. Malik, Executive Engineer, Technology Mission, suggested only four links viz. (1) Ganga - Yamuna, (2) Yamuna - Ghaggar, (3) Ravi - Beas and (4) Sutlej - Ghaggar. Dr. Subir Kar, IIT, Mumbai, proposed creation of inter-connected lakes of the size of a Chilka Lake in every state at village, pargana, district and state levels. The proposal of Major S. Dhawan, Consulting Engineer and Contractor, Delhi, was somewhat similar to that of Captain Dastur. M/s Himmat Kumar Mair and Associates, Construction Engineers, Mumbai suggested a 5000 km long coastal canal. The next five proposals from (1) Dr. Haridas Shetty of Mumbai, (2) Nirmal Vaswani, President of The Gandhidham Chamber of Commerce and Industry, Kutch, (3) M/s Third Point, Fatehganj, Baroda, (4) G. Madhusudanan, Chennai and (5) M.A. Tirunarayan, Chief Engineer (Retd.), Delhi Water Supply suggested long-distance pipeline transfer. Balai Krishna Kar suggested excavation of new rivers and lakes. All these proposals were at best conceptual and need further study, investigation and planning before they can be considered for implementation.

Continued interest evinced in many quarters compelled the then Ministry of Irrigation to study Inter-Basin Transfer more deeply. The Ministry formulated a National Perspective Plan for Water Development in August, 1980. National Water Development Agency (NWDA) was established in July, 1982, as an autonomous Society under the Societies Registration Act, 1860, under the Ministry of Water Resources.

The main objectives of the Agency are:
To promote scientific development for optimum utilisation of water resources in the country.
To carry out detailed field surveys and investigations of the possible storage reservoir sites and inter-connecting links in order to establish feasibility of the components of Peninsular Rivers Development and Himalayan Rivers Development of National Perspective for Water Resources Development prepared by the Ministry of Water Resources.

To carry out detailed studies about the quantum of water in various Peninsular and Himalayan River Systems, which can be transferred to other basins/states after meeting reasonable needs of basin states in the foreseeable future.
To prepare feasibility reports of various components of the scheme relating to Peninsular Rivers Development and Himalayan Rivers Development.
To take all such other actions, as the Society may consider necessary, incidental, supplementary or conductive to the attainment of above objectives.

The National Water Development Agency has been carrying out studies of the National Perspective Plan for water resources development. The proposal comprises of two components, namely (a) Peninsular Component and (b) Himalayan Component.

Peninsular Component

The Peninsular Rivers Component is divided into the following four parts:
Inter-linking of the Mahanadi - Godavari - Krishna - Pennar - Cauvery.
Inter-linking of the west flowing rivers north of Mumbai and south of Tapi.
Inter-linking of the river Ken with Chambal.
Diversion of the west flowing rivers of Kerala and Karnataka to the east.

The work under this component comprises of water balance studies of 137 basins/sub-basins and at 49 identified diversion points, studies of 58 identified storages, topographic sheet studies of 18 links including identifications of command area en route, preparation of pre-feasibility reports of 17 links and survey and investigations of 16 water transfer links for preparing feasibility reports.

The Agency has completed the collection of data for all the basins/sub-basins; water balance studies of 137 basins/sub-basins and 52 identified diversion points, 58 studies of identified storages, topographic sheet studies of 18 links and have prepared pre-feasibility reports of all the 17 water transfer links. The feasibility reports of 5 links have been completed. Survey and investigations of 8 more links, namely, (i) Mahanadi (Manibhadra) - Godavari (Dowlaiswarm) link, (ii) Krishna (Almatti) - Pennar link, (iii) Krishna (Nagarjunasagar) - Pennar (Somasila) link, (iv) Damanganga - Pinjal link, (v) Parbati - Kalisindh - Chambal link, (vi) Inchampalli Low Dam - Nagarjunasagar Tail Pond link, (vii) Pennar (Somasila) - Cauvery (Grand Anicut) link and (viii) Cauvery (Kattalai) - Vaigai - Gundar link for preparation of feasibility reports were continued during 1999 - 2000.

Himalayan Component

Himalayan Rivers Development component of National Perspective for Water Resources Development envisages construction of storage reservoirs on the principal tributaries of Ganga and the Brahmaputra in India and Nepal, along with inter-linking canal systems to transfer surplus flows of the eastern tributaries of the Ganga to the West, apart from linking of the main Brahmaputra and its tributaries with the Ganga and Ganga to Mahanadi. It would also provide the necessary augmentation of flow at Farakka, to inter alia flush the Calcutta Port, and boost inland navigation facilities across the country.

The work under this component comprises of water balance studies at 19 diversion points, topographic sheet studies of 16 reservoirs, topographic sheet studies of 19 water transfer links, preparation of pre-feasibility report of 14 water transfer links and survey and investigations of 14 water transfer links for preparation of feasibility reports.

Upto the end of March, 1999, water balance studies at 19 diversion points, topographic sheet studies of 16 storages, topographic sheet studies of 19 water transfer links and pre-feasibility report of 14 links have been completed. The survey and investigations of 7 links, namely (i) Manas - Sankosh - Tista - Ganga link, (ii) Sarda - Yamuna link, (iii) Ghagra - Yamuna link, (iv) Ganga - Damodar - Subarnarekha, (v) Yamuna - Rajasthan link, (vi) Chunar - Sone barrage link and (vii) Sone Dam - Southern Tributaries of Ganga link for preparation of feasibility reports were continued during the year 1999-2000.

General Response

The general response to the hurried programme of action of the Indian Government as a reaction to the direction of the Supreme Court was mixed. R. R. Iyer, a former Secretary, Ministry of Water Resources, and a noted columnist on water-related issues, criticised the concept "An almost abandoned idea has been given fresh currency; a dubious idea has been given legitimacy; and a wild goose chase has not merely been sanctioned but also mandated ..... The Supreme Court direction is not at all a defensible instance of judicial activism. That apart, turning to the merits of the direction, one wishes that the learned judges had undertaken a more careful study of the subject before deciding to issue directions." B.G. Verghese, another noted columnist, has rather welcomed the idea but has cautioned "Inter-linking rivers is a highly complex process with huge backward and forward and inter-sectoral linkages that may be accomplished incrementally over the next 50-100 years. There is work in progress and more inter-basin transfers must and will follow." Medha Patkar, the eminent Social Activist, asked, "Who has seen the plan? Has it been discussed or debated in any public forum? This plan won't carry water but (will carry) silt and floods. Disputes such as Cauvery will multiply and the displacement and environment problems will be huge." An Editorial in The Hindusthan Times has dismissed the idea as "little more than a fancy in its infancy". A. Vaidyanathan, Emeritus Professor, Madras Institute of Development Studies says that the idea may have some merit if seasonal patterns of rainfall and stream flow in different parts of the country differed significantly. In India, practically all rivers have their peak flows in roughly the same period - July to October. Colossal amounts of water will then have to be stored. Geographical constraints would, in any case, make it impossible to design a distribution network that will carry the required amount of water to all segments of the recipient basins.

Implementation Prospects of Inter-Basin Transfer Proposals

From the general responses given above, it appears that implementation of the proposals in their entirety within a short time frame is perhaps not feasible. Apart from the physiographic and technological problems, which can be overcome, albeit at a cost, the socio-economic,

including political, problems will pose almost unsurmountable obstacles to the process of mass transfer of water resources. At the same time, as the water resources are getting more and more scarce due to various reasons, the most important of which has been identified as the steep rise in population, the economics of water resources development will undergo a radical change and inter-basin transfer may be welcomed as a workable solution in the future. However, at the present moment, the prospect of implementing these proposals do not appear to be bright. As indicated by B.G. Verghese above, it "is a highly complex process with huge backward and forward and inter-sectoral linkages that may be accomplished incrementally over the next 50-100 years" and it will be quite reasonable to start the implementation in convenient phases.

Issues

Quite a few contentious issues are involved. These issues are to be debated widely and consensus reached before any work can be started. Some of the issues tentatively identified are as follows:
Water resource development and management can be planned on administrative/political units.
Are inter-basin transfers within the basin states to be allowed or encouraged?
Should water be made available to non-basin states through inter-basin transfers?
What is to be the role of the Indian Government with regard to inter-basin transfers?
Is it practicable to decide on long-distance transfers through an accord of concerned states?
Should the tribunals decide on the ultimate requirements of the basin and estimate the surplus? Long-distance transfer vis-à-vis lifting en route.
Should normal criteria of economic analysis be applicable in inter-basin transfer?
Is better water management a substitute for water transfers?
Inter-basin transfer as an effective tool for socio-economic development and poverty alleviation programmes.
Need for constitutional amendment.
Area of national responsibility in providing water to people.
Whether self-sufficiency in food should be national goal?
Possibility of funding from private or international agencies.

Conclusion

Evidently all these issues have numerous stakeholders. They belong to various rungs of socio-economic milieu, political compulsions, beliefs, hopes and aspirations, pressure groups, language and religion and so on. Under the circumstances, it is rather difficult, if not impossible to orchestrate a symphony of consensus among the cacophonous voices. However the rate at which our population is growing and the demand for water resources rising, the criterion for viability is bound to change. With wider and deeper awareness among the general public and development of better management practices of social and environmental problems, in future, at least some of these proposals would be implemented under popular will. Finally, the concept of total water management plan for a basin and then for the entire

country may receive genuine support as a holistic solution for all water related problems of the country.

References

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