

Inter-Basin Water Transfer Enhancement of Damanganga Pinjal Link for Thane

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ABSTRACT: The interlinking of rivers is a major boon to create additional storage facilities and transfer water from water surplus regions to more deficit areas through inter basin transfers. Interlinking of major rivers in India aims at modifying most of the areas which face water problems and drought prone areas. A major approach becomes necessary when dealing with resources such as water, which extend state boundaries and form disequilibrium in water supplies that may necessitate the transfer of water from surplus to deficit areas. The concept of inter basin water transfer on large scale has been under consideration for some time. The idea was raised in as early as 1962, by Sir C.P. Ramaswamy then by K.L. Rao in 1970, respectively some of the benefits due to interlinking of rivers are in area of irrigation, flood prevention, hydro power generation, drinking water supply, navigation etc. Whereas the area of concern are ecological issues, deforestation, aqua life, submergence of habitable or reserved land, displacement of people, etc. This paper highlights the concept of inter basin transfer of water, related issues and diverging surplus water for domestic supply for Thane district.

KEYWORDS: Surplus water, Drinking water supply, Thane district, Ecological issues, Water demand, Population.

I. INTRODUCTION

India is a vast country and is highly diversified in terms of natural resource and socioeconomic setup. Moreover, its water resources are unevenly distributed in space and time with increasing population and increasing aspiration for improved standard of living, there is an acute pressure on the demand and availability of water. Though the idea of interlinking of rivers is not a new concept in India, it had rather persisted long back as much as in other countries of ancient civilization. National Water Development Agency (NWDA) has given the real shape to the proposal of the interlinking of rivers of the country. In India the river-linking project in a sensible and scientific manner will not only allow the prevention of the colossal wastage of a vitally important natural resource, by detaining flowing surface water of rainy seasons, but also ensure availability of water to drier areas; combating both flood and drought simultaneously. Moreover, this project will generate 34,000 MW of hydropower and irrigation of an additional 35 million hectares (135,135 square miles). Though linking of rivers may initially appear to be closely proposition in ecological, geological, hydrological and economical terms is in the long run the net far out weight these costs or losses. But the outcome of the project is going to result in various advantages and betterment of the people staying around the source and also the thane region.

On the other hand, large areas in the States of Rajasthan, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu face recurring droughts. As much as 85 percentage of drought prone area falls in these States. One of the most effective ways to increase the irrigation potential for increasing the food grain production, mitigate floods and droughts and reduce regional imbalance in the availability of water is the Inter Basin Water Transfer (IBWT) from the surplus rivers to deficit areas. This paper aims at looking at this long-term plan, the project proposal, its involvement and impact not only on the states of India, India as a whole, but also on its neighboring nations which are linked with India through the waterways, and share the common climatic conditions and economic status.

II. LITERATURE REVIEW

We need a basic knowledge about the past researches and advancements in this field, before starting the work in it. A Literature Review is a text written on the study of the past work and our understandings from them. In other words, it is

a form of work acquired to get the knowledge about the past works and inventions in that field, and to get a clear idea about the methods and ways for going ahead with our work. Literature review isn't any form of new works, it is only the content taken from secondary sources for reference.

- The idea of interlinking of rivers in the Indian subcontinent is at least 150 years old. During the British Raj in India, Sir Arthur Cotton, a British general and irrigation engineer, first suggested linking the Ganga and the Cauvery for navigational purposes.

- **Dr. K.L. Rao et al. (1972)**, which had 2640 km. long Ganga - Cauvery link as its main component involved large scale pumping over a head of 550 m. The power requirement for lifting the water was huge, estimated to be 5000 to 7000 MW, for irrigating an additional area of 4 million hectares only. The scheme was also not having any flood control benefit. Dr. Rao had estimated this proposal to cost about Rs. 12,500 crores, which at 2002 price level comes to about Rs. 1,50,000 crores. The Central Water Commission, which examined the proposal, found it to be grossly under estimated and economically prohibitive.

- **Capt. Dastur et al. (1977)**, envisaged construction of two canals – the first 4200 km. Himalayan Canal at the foot of Himalayan slopes running from the Ravi in the West to the Brahmaputra and beyond in the east; and the second 9300 km Garland Canal covering the central and southern parts, with both the canals integrated with numerous lakes and interconnected with pipelines at two points, Delhi and Patna. The cost estimated by Capt. Dastur was Rs. 24,095 crores. The cost estimated by the experts in 1979 was about Rs. 12 million crores. The realistic cost at 2002 price level comes to about Rs. 70 million crores.

- **Shukla and Dey et al. (2009)**, Thirsty Himalayan and peninsular rivers have been identified by the national water development agency for such transfers. Fourteen links between the Ganges –Brahmaputra-Meghna river basins have been proposed in the Himalayan zone similarly in the peninsular zone, 16 rivers including Mahanadi, Krishna, Godavari, Pennar and Cauvery river basins have been chosen for transfers.

- **Amarsingh et al. (2005)**, The global trend of increase in demand for the freshwater and the dearth of this water has given rise to the various inter basin transfer projects. The per capita availability of water per person has decreased from 5400 cubic meters per person in 1950 to 1900 cubic meters per person in 2000. Due to the Spatial variation in the flow of various rivers the Government of India has proposed several inter basin transfer projects with an objective of transferring surplus water from the Himalayan Rivers in the north and east to the deficient zones in the peninsular and western India. Floods are a recurring feature, particularly in Brahmaputra and Ganga rivers, in which almost 60 per cent of the river flows of our country occur. Flood damages, which were Rs. 52 crores in 1953, have gone up to Rs. 5,846 crores in 1998 with annual average being Rs. 1,343 crores affecting the States of Assam, Bihar, West Bengal and Uttar Pradesh along with untold human sufferings. On the other hand, large areas in the States of Rajasthan, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu face recurring droughts. As much as 85 percentage of drought prone area falls in these States.

III. METHODOLOGY

This section discusses the methodology of the research. The process involved in conducting the study is shown in a flow chart. The preliminary insight of the subject data has been collected through a literature review followed by the use of data from the TMC. The population details of the district and the area to be studied, water balance studies, water supply systems for the minor region of the district as in an area that is selected

The flow chart goes accordingly,

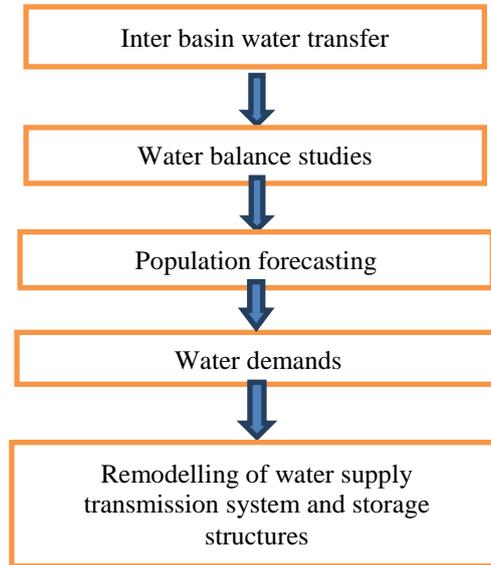


Figure 1 Flow chart

Table 1 Population and Water demand

The following table includes the required factors:

No	Years	Population	Demand (Mld)
1	2016		
2	2031		
3	2046		

After the water demand is calculated, remodelling of the water supply system and storage structures in the area to be done using the WaterNet software or a consultancy.

Analysis methods

To obtain the data required for the study, a population forecasting method was used. Different methods which were found from earlier works in book and journals were listed and appropriate method most likely suitable was used (Table 1). To analyse the data obtained by survey, Arithmetical increase method was used.

Relative importance index (RII) method –

This method is suitable for large and old city with considerable development. If it is used for small, average or comparatively new cities, it will give lower population estimate than actual value. In this method the average increase in population per decade is calculated from the past census reports. This increase is added to the present population to find out the population of the next decade. Thus, it is assumed that the population is increasing at constant rate. Hence, dP/dt . Therefore, Population after nth decade will be $P_n = P + n.C$

Where, P_n is the population after ‘n’ decades and ‘P’ is present population.

The numerical values obtained from the above formula indicates the population of each year in the Table. After this total water requirement is to be calculated as per domestic need per person per day, which we get by multiplying the population with water required by per person per day.



IV. RESULTS

Data collected from various sites

Collection of accurate data is one of the important phase in order to achieve main objective of study. Data collection is a procedure of collecting crucial data record for a certain sample or population of observation.

The following table shows the population result and water demand

No	Years	Population	Demand (Mld)
1	2016	36331	6.41
2	2031	43900	7.45
3	2046	48834	8.62

So as per the current scenario upto 5mld of water is being supplied to the ward by the ozone valley Esr and AtkoneshwarEsr. So to meet this demand of more water remodelling of system done through waternet resulted as follows

Particulars	Existing	Proposed
ESR Storage capacity	2.75	2.50
Ground level (M)	3.72	3.72
Staging height	20.00	20.00
Lowest supply level (M)	23.72	23.72
Full supply level (M)	29.72	29.72

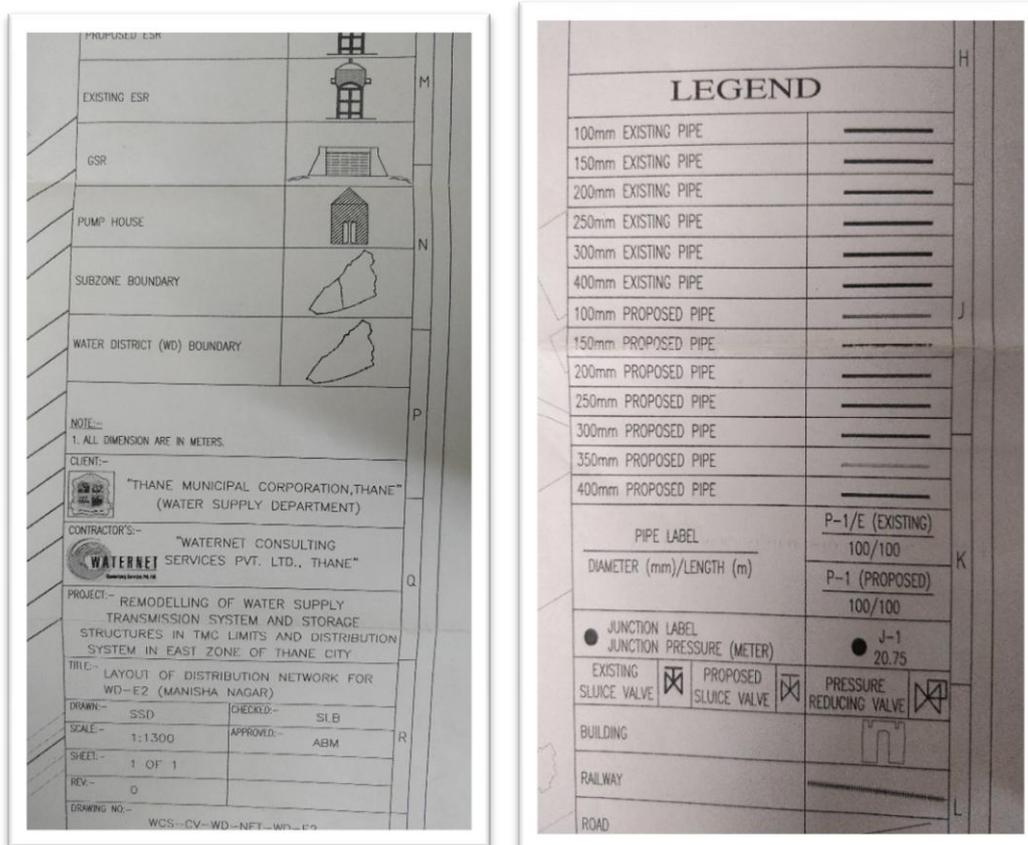


Figure 2 Remodeling of Water Supply of Thane area and showing Existing and Proposed pipelines of Water Supply

V. CONCLUSION

At present state as water crisis are major problems to society, also it is important that every part of country or state should get adequate supply of water as per their water demand. Some rivers which has plenty of water supply which would either go waste or flow into sea or ocean could be diverted to river which is in water deficit, hence water from surplus source (Donor basin) can be diverted to recipient basin by process of interlinking of rivers. So government is initializing sewer into basin water through transfer project, out of several project DamangangaPinjal link is on state of being implemented as per the former notice.

After studying DamangangaPinjal interlinking project we did case study on Thane district .we calculated population of area and also considered increasing population as well as water needs with help of existing water supply .Estimation of future water demand by area was done and to overcome this need how we can lay new network next to existing network to meet water demand and supply water to area.

Thus with such IWT projects water crisis and Scarcity of water can be resolved and each and every region or area will get their water supply as per their demands.

REFERENCES

- [1] Amarasinghe Upali., Tushar Shah and Malik., R.P.S. (2009). "Strategic Analysis of the National River Linking Project", IWMI publishers, ISBN:978-92-9090-691.
- [2] AnithaSampath, BalakrishnanKedarnath, Chandrika Ramanujam, HozefaHaideri, Rajesh Rao,RavishankarArunachalam, Sandhya Govindaraju, VennilaThirumalavan, VishvJeet,{2004]"Water Privatization and Implications is India"accessed on 28thjuly at.studentorgs.utexas.edu/.../water/water_privatization.pdf
- [3] Boddu M; Gaayam T and Annamdas V G M (2011) "A Review on Inter Basin Transfer of Water" IPWE 2011, Proceedings of 4th International Perspective on Water Resources & the Environment, January 4-6, 2011, National University of Singapore (NUS), Singapore. [January 4, Time: 13.30-13.50] Session on: Interbasin Transfer of Water.
- [4] E. Mapedza et al 2010, " Benefit Sharing as a mechanism for improving Transboundary Water Governance: the case of the Eastern NileSub-basin"
- [5] Gujja, Biksham and Shaik Hajara (2005) "A Decade for action: water for life, when India will cover the uncovered?" Economic and political weekly, March 19, 2005. PP 1086-1089.
- [6] H. Mahabaleshwara , H.M. Nagabhushan "Inter Basin Water Transfers In India – A Solution To Hydrological Extremities " IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | PISSN: 2321-7308 Volume: 03 Special Issue: 03 | May-2014 | NCRIET-2014.
- [7] Kashid, Sukhdeo (2003) "Water" Municipal Engineers Association, Mumbai and Brihan Mumbai Licensed Plumbers Association ,OM Sai Printers, Vile-Parle (E) ,Mumbai-57
- [8] MCGM (1995) "Mumbai City Development Plan 2005-2025" Mumbai.
- [9] New National Water Policy- Press Information Bureau, Government of India, Ministry of Water Resources 17-December-2012 14:07 IST.
- [10] NIUB (2008a) "Appraisal of city development plan Kalyan-Dombivali" June 2008, New Delhi.
- [11] NIUB (2008b) "Appraisal of city development plan Mira- Bhayandar" July 2008, New Delhi.
- [12] NNMC (2006) "New Mumbai Municipal Corporation City Development Plan", April 2006, New Mumbai, Maharashtra.
- [13] National Water Development Agency, "Annual Report"2011-2012.
- [14] Rode, Sanjay (2009) "Equitable distribution of drinking water supply in municipal corporations of Thane district" Management research and practice, Vol.1 Issue 1, December 2009, PP14-25.
- [15] Thatte C. D. Inter -basin water transfer for augmentation of waterresources in India- A review of needs,plans,status and prospects1-15.
- [16] TMC (2006) "Thane Municipal Corporation City Development Plan", April 2006, Thane.
- [17] Sadoff, C., and Grey, D. (2002). "Beyond the river: the benefits of cooperation on international rivers." Water Policy 4(5):389-403.
- [18] "Interlinking of Rivers:Himalayan Rivers Development Component". Damanganga- Pinjal Link Canal. national Institute of Hydrology. Retrieved 2 September2015.
- [19] "Interlinking of Rivers:Himalayan Rivers Development Component Damanganga -Pinjal Link Canal". National Institute of Hydrology.
- [20] Water supply and waste water engineering B.S.N.Raju Tata McGraw Hill publishing Co Ltd, NewDelhi. Sewage treatment & disposal and wastewater engineering, vol II DrP.N.Modi Standard book house,NaiSarak,Delhi.