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Feasibility Studies of Par-Tapi-Narmada Link Project

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ABSTRACT

This report contains revised feasibility studies of Par-Tapi-Narmada Link project. This Link in the western part of India is planned to transfer water from the water surplus regions of Western Ghats to the water deficit regions of Saurashtra and Kutch. The link project includes seven reservoirs proposed in north Maharashtra and south Gujarat. The water from the seven proposed reservoirs would be taken through a 395 km long canal including the 33km length of the feeder canals to take over a part of the command of the on-going Sardar Sarovar Project, while irrigating small enroute areas. This would save Sardar Sarovar water which will be used to extend irrigation in Saurashtra and Kutch region.

The main aim of Par-Tapi-Narmada link is to transfer the surplus waters of Par, Auranga, Ambica and Purna river basins to take over part of Narmada Canal command (Miyagam branch) after providing enroute irrigation. Water thus saved in Sardar Sarovar Project, as a result of this transfer, could be taken further northwards to benefit water scarce areas of Saurashtra and Kutch regions in Gujarat. This link mainly envisages construction of seven dams, three diversion weirs, two tunnels (5.0 km & 0.5 km of length), 395 km long canal (205 km in Par-Tapi portion including the length of feeder canals and 190 km in Tapi-Narmada portion), 6 power houses and a number of cross-drainage works. Besides providing irrigation benefits to the enroute command and Narmada command, the link will generate hydropower of the order of 93.00 Mkwh through the power houses installed at four dam sites viz. Jheri, Paikhed, Chasmandva and Chikkar and in two feeder canals taking off from Dabdar and Kelwan dams. The reservoirs will also provide flood relief to the people residing in downstream areas.

Location of project area

The project of Par-Tapi-Narmada link generally falls in the state of Gujarat except Jheri reservoir which falls in Maharashtra state. Jheri dam is located in Nasik district of Maharashtra, while remaining dams viz. Mohankavchali, Paikhed, Chasmandva, Chikkar, Dabdar and Kelwan dams are located in Valsad and Dang districts of Gujarat. Par-Tapi reach of canal passes through Valsad, Navsari, Dang and Surat districts of South Gujarat whereas Tapi-Narmada reach of canal passes through Surat, Bharuch and Vadodara districts of Gujarat. Thus, the project area is mainly spread in the districts of South Gujarat except for Jheri dam and reservoir. However, the irrigation benefits of this scheme would ultimately reach Saurashtra and Kutch regions of Gujarat after providing enroute irrigation in the specified commands in Par-Tapi and Tapi-Narmada reaches of the link.

Present report

As envisaged in the National perspective Plan, the water balance studies have been carried out for the west flowing river basins covered between north of Mumbai and south of the Tapi. From the studies it is revealed that considerable surplus water is available in the four basins namely Par, Auranga, Ambica and Purna, which can be transferred towards north to Narmada canal system to meet the demands of the deficit areas. Seven diversion points have been identified across the rivers in the above basins to facilitate transfer of water besides providing for enrooted irrigation. The topo sheet and pre-feasibility studies were carried out for the Par-Tapi and Par-Tapi-Narmada link project respectively. These reports were discussed and accepted by the TAC of NWDA. Thereafter, feasibility studies were carried out & report prepared and circulated on 14.8.1995. As per this FR, in addition to the divertible quantity of 1350 Mm3 from the proposed 7 reservoirs', it was also proposed to transfer 1554 Mm3 of water assumed to be surplus at Ukai reservoir. However, as per the detailed water balance study of Tapi basin upto Ukai carried out as per TAC guidelines, by NWDA in the year 2002 it was revealed that Tapi basin is not water surplus at Ukai dam. Hence, the transfer of 1554 Mm3 of water of Tapi basin from Ukai reservoir will not be available for diversion through Par-Tapi-Narmada link. Govt. of Gujarat vide their letter dated 01.02.1996 had also indicated that there is no likelihood of surplus water in Tapi basin at Ukai and suggested to carry out feasibility study of Par – Tapi – Narmada link without considering augmentation of water from Tapi.In view of the above, the FR of Par-Tapi-Narmada link (circulated in the year 1995) has now been revised considering only the surplus water of 1350 Mm3 available from the proposed 7 reservoirs. As per this revised study, it is found that Par-Tapi portion of the link canal will remain unchanged and in the Tapi-Narmada portion of the link canal, the length of the canal will be reduced to 190 km from earlier 225 km and the link canal will now terminate at Miyagam Branch Canal instead of Vadodara Branch Canal of Narmada Main Canal.

Climate

The project area falls mostly in Gujarat State which is situated on the west coast of India, is surrounded by the Arabian Sea on the west, and the states of Rajasthan, M.P. and Maharashtra on north, east and southern sides respectively. The eastern side of project area is flanked by Western Ghats and Satpura range of hills. Thus, the climate of the area is influenced by Arabian Sea and the hill range in South Gujarat. The coastal area along the sea has humid climate whereas area away from the coast has dry climate. Most of the project area falls in the average temperature zone of 25.o- 27.5 o c. The rainfall in the project area including Narmada command varies from a low of 400 mm or even less in Kutch region to a high of 3100 mm in hilly reaches of Valsad district in southern part. Dharampur, Valsad, Pardi, Gandevi and Chikhali talukas in the project area receive average annual rainfall of more than 2000 mm, whereas Navsari, Vansda, Umargaon, Vyara, Songadh, Valod, Bardoli, Surat, Mandvi, Olpad, Kamraj, Rajpipla, Dediapada, Sagbara, Mangrol and Palsana talukas receive average annual rainfall between 1000 and 2000 mm. Hence project area under these talukas falls under humid climate zone.

General description of area

Out of the total area of 196 lakh hectares in Gujarat, the net area sown is 97 lakh hectares and irrigated area is 22 lakh

hectares. As such percentage of irrigated area with respect to sown area is 22.3%. Further as per 2001 census, the density of population in Gujarat was 258 per sqkm which is more or less equal to average density of population of the country as a whole. However, there is wide variation in the density of population within the state ranging from almost nil in certain places like Rann of Kutch area to the maximum in places like Surat and Vadodara in south Gujarat which are industrially developed. The population of districts of north Gujarat and Kutch which are thinly populated will increase if assured irrigation is provided and areas under cultivation are extended. The topography of Southern part of project area is steep along hills of the western ghats and satpura ranges and the ground level reduces as we go westwards towards Arabian Sea.

Physiography
The project area falls under the 'West Coast Plain' region. The West coast plains are wider in northern Gujarat comprising Kutch, Kathiawar peninsula and Gujarat plains. Some part of the project area also falls in Peninsular plateaus and Central highlands. Peninsular plateau region is triangular in shape and bounded by eastern ghats in the east and Sahyadri (Western ghats) in the west. Central highlands are a wide belt of hilly country bordered on the west by Aravalli range and Vindhyan range and Narmada valley on the south.

Water resources
Surface water
As per Surface water balance studies , surface water balance at all 7 diversion points after considering the future requirements upto 2025 AD works out to be 1170 Mm3 and 1765 Mm3 at 75% and 50% dependabilities respectively .

For deciding the capacity of the reservoirs and the corresponding availability of water from reservoir at the specific reliability, simulation studies were carried out to derive yield-capacity relationship of each of the reservoirs. The divertable yields likely to be available from the reservoirs is 1350 Mm3.

Ground water
The utilizable Ground water Resources for irrigation in Gujarat is 1.9169 M ha m/year whereas net draft is only 0.6411 M ha m/year. Thus leaving 1.2758 M ha m/year as available potential for future development. Similarly utilizable Ground Water resources in Maharashtra is 3.4810 M ha m where as net draft is only 0.6854 M ha m/year, thus leaving 2.7956 M ha m/year as available potential for future development. In this way, it is seen that only 33.44% and 19.69% of Utilizable resources have been exploited in Gujarat and Maharashtra respectively and abundant ground water potential is still available for development in these two states.

Land use and socio-economic aspects
The particulars of land used in the command area of the link canal are given below:
a) Gross command area 2, 69,163 ha
b) Culturable command area 1,88,414 ha
c) Annual irrigation 1,69,339 ha
Agriculture is the main occupation of the people in the command area.

Agriculture
Like other part of India, the economy of the project area is dominated by agriculture which accounts for more than one-third of the income. More than 60% of the working population depend on agriculture. Agro industries account for more than 50% compared to other industries. Agricultural production largely depends upon climatic conditions which vary from one region to the other. Variation in rainfall in different areas and limited irrigation facilities has made the area susceptible to drought and famine. Severe food shortages due to drought have been experienced at least 25 times since 1900 AD. In view of scanty and erratic rains in the area, irrigation project is a dire necessity for increasing agricultural productivity and economic betterment.

Conclusion
The rainfall in the country is mostly confined to monsoon season and is unevenly distributed with respect to both space and time. As a result, some parts of the country are affected by frequent droughts, whereas other parts are affected by floods. Nearly one third of the country is drought prone. Water will become scarce resource in the near future, due to increasing thrust of population and increasing demands of water for various uses. Therefore, it needs no emphasis that water needs to be harnessed in a scientific and efficient manner for its optimum utilization. The monsoon flood waters need to be conserved and utilized during the period of its scarcity for drinking & industrial use, irrigation, power generation etc. The water availability and requirements in the various river basins should be assessed realistically and the requirements be met appropriately. The surplus water, if any, should be transferred to the needy areas. The National Water Policy evolved by Govt. of India in 1987 and revised in April 2002 lays emphasis on inter-basin transfer of water.

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