



Inter Basin Water Transfer of Rivers from Sharda to Yamuna using Construction Techniques

KEYWORDS

Inter Basin Water Transfer, Sharda-Yamuna Link Canal and Construction techniques

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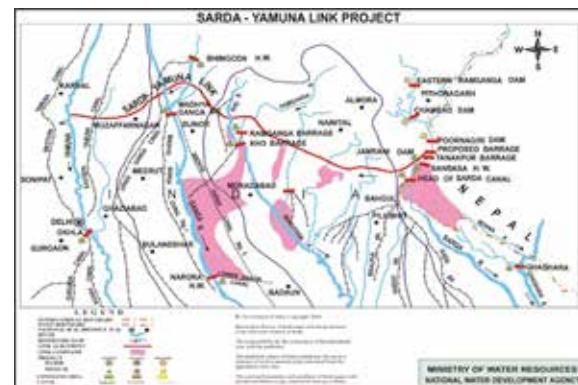
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ABSTRACT This paper focuses on the construction techniques of the proposed Inter basin water transfer Sharda and Yamuna link canal; one of the proposed Inter Basin Water Transfer Links of National Perspective Plan (NPP). The Sharda-Yamuna link canal has been proposed to transfer water from river Sharda to River Yamuna by S-Y link canal of about 11,680 million m³. Surplus water will transfer from river Sharda near Tanakpur town of Champawat district of state Uttarakhand into the Yamuna River near Kairana village of Muzaffarnagar district of Uttar-Pradesh state in India. The construction techniques of the proposed Sharda-Yamuna Link canal include construction of Poornagiri and Pancheshwar dams, construction of barrages for flood management viz. Sharda, Kosi, Ramganga, Ganga, construction of power houses, construction of 384.0 km long main canal, branch canals and distributaries.

Water is vital for all known forms of life; it affects directly or indirectly. About 71% of the Earth's surface is covered by water, out of which 1.7% in form of glaciers of Antarctica and Greenland and about 0.001% of water is present in form of vapour. Less than 0.3% water is present in form of freshwater in rivers, lakes. So far, however, life cannot exist without water. It is being suggested that by 2030 in some developing regions of the world, the water demand will exceed supply by 50%. Water also allows for things like weather which is also responsible for survival of life on Earth. Rainfall is one of the important elements. There are great regional and temporal variations in the distribution of rainfall. Variations in rainfall affects from heavy to scanty on different parts of India. Due to seasonal variability in rainfall drought and flood occurs. Maximum amount of rainfall about 80% of the annual rainfall is received in the four rainy months of June to September. Over 200 cm of heavy rainfall causes flood. Some regions of heavy rainfall are Western Ghats, Sub-Himalayan areas in North East, Meghalaya Hills. Assam, West Bengal, West Coast and Southern slopes of eastern Himalayas. Whereas drought areas are Southern Parts of Gujarat, East Tamil Nadu, North-eastern Peninsular, Western Ghats, eastern Maharashtra, Madhya Pradesh, Orissa, Haryana, Maharashtra, Andhra Pradesh, Rajasthan, Gujarat, Madhya Pradesh, Karnataka and Tamil Nadu. Indian Ministry of Water resources planned Inter basin water transfer of rivers to regulate the major flood and drought water problems by transfer surplus water from surplus places to the deficit areas in India. 30 Inter basin water transfer links are proposed on 37 Indian rivers. These proposed water transfer links could be helpful for proper distribution of water in India.

SARDA -YAMUNA LINK PROJECT

S-Y Link canal is one of the proposed links of the Himalayan part of National Perspective Plan (NPP). This link is proposed to transfer water from surplus river Sharda to deficit river Yamuna and shall be helpful in flood and drought situations in India. The proposed link canal will take water from Sharda river which is near Tanakpur town of Champawat district of Uttarakhand state and transfer into the Yamuna river of about 2.5 km near Kairana village of Muzaffarnagar District of Uttar Pradesh.



Location of proposed S-Y link canal project. Source: NWDA (National Water Development Agency)

ENROUTE AND COMMAND LOCATIONS OF THE PROJECT

Proposed Sharda Yamuna Link will transverse through Uttarakhand and Uttar Pradesh states in India. It will fulfill the water needs of the command areas and enroute areas. The enroute areas are Champawat, Nainital, Udham Singh Nagar and Haridwar districts in Uttarakhand and Muzaffarnagar, Bijnor districts in Uttar Pradesh state in India. The command areas are Udham Singh Nagar district in Uttarakhand and Moradabad, Jyotiba Phule Nagar, Bijnor, Rampur, Bareilly and Badaun districts in Uttar Pradesh State. The transfer of surplus water will be from river Sharda to deficit river Yamuna, further the flow of water will be towards the western parts of India. This link will also fulfill the water demands of other drought prone regions of Haryana, Rajasthan and Gujarat.

BARRAGES

Before falling into river Yamuna, Sharda and Yamuna link canal will cross major important rivers viz. Sharda, Kosi, Ramganga and Ganga during the journey. Hence, four barrages namely Sharda, Kosi, Ramganga, Ganga are also proposed on these rivers to control flood.

PANCHESHWAR DAM AND POORNAGIRI DAM

Pancheshwar dam and Poornagiri dams are proposed for the generation of power during the construction of the link canal. The water available in the catchment of Sharda River will be first stored in the reservoir of Pancheshwar dam followed by water release from this reservoir after generating the water will be stored at proposed Poornagiri dam; about 58 km Pancheshwar dam.

DESCRIPTION OF PROPOSED SARDA -YAMUNA LINK PROJECT VIZ. SIZE, AREA

This project is being considered for the transfer of surplus water of about 11,680 Mm³ from Sharda river to water deficit Yamuna river to manage the flood and drought in India. The river basin of the link canal is Sharda basin, length of this link canal is 384 km and full supply depth is 7.8 m. The discharge of water at starting and ending of the link canal will be 757.32 cumec and 605.77 cumec and the transmission losses of water would be of 541 Mm³. Flow of link canal would be by gravity with a velocity of 1.363 m/s to 1.334 m/s. About 1758 Mm³ of water of S-Y link canal will be utilized to irrigate en-routed areas of Uttar Pradesh and Uttarakand states. Some benefits may be like irrigation benefit of approx 2.94 lakh hac, generation of annual electricity of about 8378M kwh. The estimated cost of the link canal is about 35404.77 Crore.

LITERATURE REVIEW

The purpose of Inter linking of rivers is to provide equal distribution of rainfall and manage drought and flood water problems in India by transferring the surplus water from surplus areas to deficit areas Shah et. al.,2006 .Inter linking of rivers could help to mitigate the Flood and Drought by large scale water transfer Rao et. al., 2010.Feasibility studies is being done by National Water Development Agency about River Linking projects in India (NWDA, 2006).Water balance should be maintained by transferring surplus water towards deficit regions (Bandyopadhyay, 2005).Study on water transfer from water rich parts to deficit done by (Singh and Srivastava , 2006).Study on Inter basin water transfer of rivers has done by several researchers, scientists such as (Mahmood and Kundu, 2006), (Sharma, 2006), Gopalkrishnan et. al .,2006, (Saleth, 2007), (Sinha et. al., 2005),(Hornby,1993), (Iyer ,2007) and (Rijsberman, 2006) etc. Description on NRLP (National River Linking Project given by (Joshi, 2013), which is undertaken by IWMI (The International Water Management Institute) and CPWF (Challenge Programme for Water and Food). Inter-Linking of Rivers in India, its environmental issues and challenges are focused by (Mehta and Mehta, 2013).River link canal project is useful for Economic, Environmental feasible and Irrigation purposes (Bandyopadhyay and Perveen, 2003). From political point of view NRP (National River Linking Project) is technically feasible and justifiable (IWMI-TATA, 2012).

CONSTRUCTION PLANNING

The duration considered for the construction of Sharda-Yamuna link canal is approx 9 years. The construction planning is divided into investigation of pre-construction phase, design preparations, management of organization, tools, machinery, materials arrangements like cement, steel, completing formalities of land acquisition for projects, construction of camps, quarries, land approach roads, branch canal, distributaries and minors etc.

MANPOWER PLANNING

Technical Professionals are required for the construction and maintenance of the Sharda-Yamuna link project like

Technical Directors, Administrative Directors, Finance Directors, Public Relation Officers and Labour welfare Officers. Chief Engineers will design the work of canal and canal structures from RD (Regional Distance) 0.00 km to 100.00 km, 100.0 km to 225.0 km and 225.00 km to 384 km. Superintending Engineers will see the design of Pancheshwar and Poornagiri Dams, Barrages & Power houses. Some other professionals will also involve like Civil, Electrical, Mechanical Draftsmans, Ferro printers, Tracers, Photo copiers, Laboratory assistants for quality control laboratory, medical professional's for dispensary in the project area, Administrative Managers / Officers, Accounts Officers, Accountants, Skilled and semi-skilled labours, Work charged staff, daily wages staff, Contractor's and so many other workers.

TOOLS FOR THE SHARDA-YAMUNA LINK PROJECT

The main tools of construction work for the entire project are classified as Core drilling machine, Vibratory compactors, Sheep foot rollers, Diesel Road roller, Crawler tractor, Concrete Mixer, Concrete Vibrator, Trucks (Dumper), Tipper, Water tanker, Diesel Pump, Stone crusher, Concrete batching plant, diesel Jeep / Van, Mini bus, ambulance, small crane, gravity dams, spill channels, power house, water pools, approach tunnel to power house, branch canals, distributaries and excavation of earth work for four barrages etc.

Table No: 1- Key machineries required for the construction of Sharda-Yamuna link project.

S.No	Name of Tools
1	Core drilling machine
2	Vibratory compactors
3	Sheep foot rollers
4	Diesel Road roller
5	Crawler tractor
6	Concrete Mixer
7	Concrete Vibrator
8	Trucks (Dumper)
9	Tipper
10	Water tanker
11	Diesel Pump
12	Stone crusher
13	Concrete batching plant
14	Diesel Jeep / Van
15	Mini bus
16	Ambulance
17	Small crane

CONCLUSION

Indian Ministry of Water Resources proposed Interlinking of Rivers for water resource management. Sharda Yamuna Link is one of the proposed links. The construction work of the Sharda Yamuna link canal is based on perfect construction and manpower planning. Many key types of machinery will be required for the construction work of Sharda-Yamuna link project along with good technical professionals. The duration considered for the construction work is approx 9 years. This large scale water transfer Sharda Yamuna link project could be one of the efficient ways to mitigate the major water problems Flood and Drought in India.

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