

Interlinking of rivers in India: Proposed Sharda-Yamuna Link

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Abstract: Currently, about a billion people around the world are facing major water problems drought and flood. The rainfall in the country is irregularly distributed in space and time causes drought and flood. An approach for effective management of droughts and floods at the national level; the Central Water Commission formulated National Perspective Plan (NPP) in the year, 1980 and developed a plan called "Interlinking of Rivers in India". The special feature of the National Perspective Plan is to provide proper distribution of water by transferring water from surplus basin to deficit basin. About 30 interlinking of rivers are proposed on 37 Indian rivers under NPP plan. Sharda to Yamuna Link is one of the proposed river inter links. The main concern of the paper is to study the proposed inter-basin water transfer Sharda – Yamuna Link including its size, area and location of the project. The enroute and command areas of the link canal covers in the States of Uttarakhand and Uttar Pradesh in India. The purpose of S-Y link canal is to transfer the water from surplus Sharda River to deficit Yamuna River for use of water in drought prone western areas like Uttar Pradesh, Haryana, Rajasthan and Gujarat of the country. It could be one of the effective plans of flood and drought management and other water based activities for future.

Key words: Drought, Flood, River Interlinking, Sharda – Yamuna Link, Water Management

I. Introduction

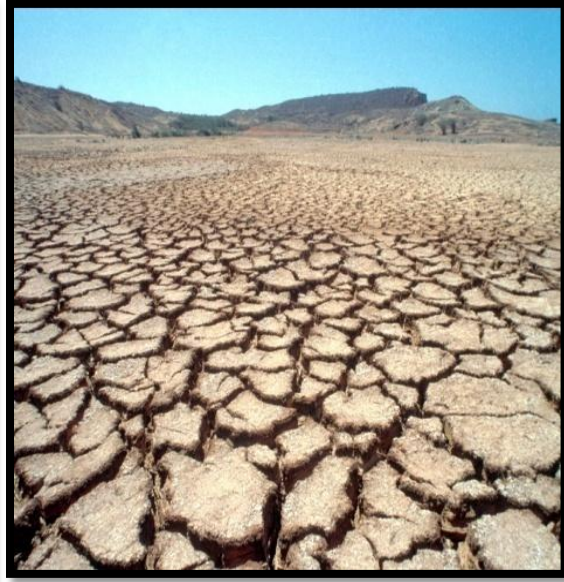
Water is an important element and one of the most essential natural resources [1]. Some researchers have estimated that by 2025 more than half of the world population will be facing water-based crisis and suggested that by 2030, in some developing regions of the world, water demand will exceed supply by 50%. Water resources are however limited due to developmental activities, industrialization, pollution, population, dropped rainfall levels, droughts, floods and other factors. Problem of water scarcity in Indian scenario discussed by [2]. In future, even more water will be needed to produce food because the Earth's population is forecast to rise to 9 billion by 2050. More than one-third of all countries face higher risks of water shortages by mid-century as a result of climate change in the developed countries which causes due to increasing pollution, population, industrialization, deforestation, urbanization and depleting natural resources. Climate change is affected by many things from natural processes or by human activities. Drought and Flood are natural disasters caused by climate change which are the major water concerns in the country happens due to heavy and low rainfall. The recent mega and complex disaster due to flash flood [3]. [4] Change in water supply and demand across river basins of India. Considering the future demands, conservation and management of water resources are very essential.

1.1 Flood and Drought

Floods are one of the most common natural hazards, occurs mostly due to heavy rainfall (Fig. 1.). Drought is a period when a region receives a deficiency in its water supply. It is a disaster when an area gets less amount of rain water (Fig. 2.). Some regions of the country are facing drought and some are flooded. Floods cause billions in damages every year. The study on causes of floods done by [5]. Flood prone areas in India are Punjab, Uttar Pradesh, Haryana, West Bengal, Odisha, Andhra, Kerala, Assam, Bihar and Gujarat. Drought regions in India are Rajasthan, Gujarat, Madhya Pradesh, Karnataka, Tamil Nadu, Haryana, Maharashtra and Andhra Pradesh.



(Fig. 1.)



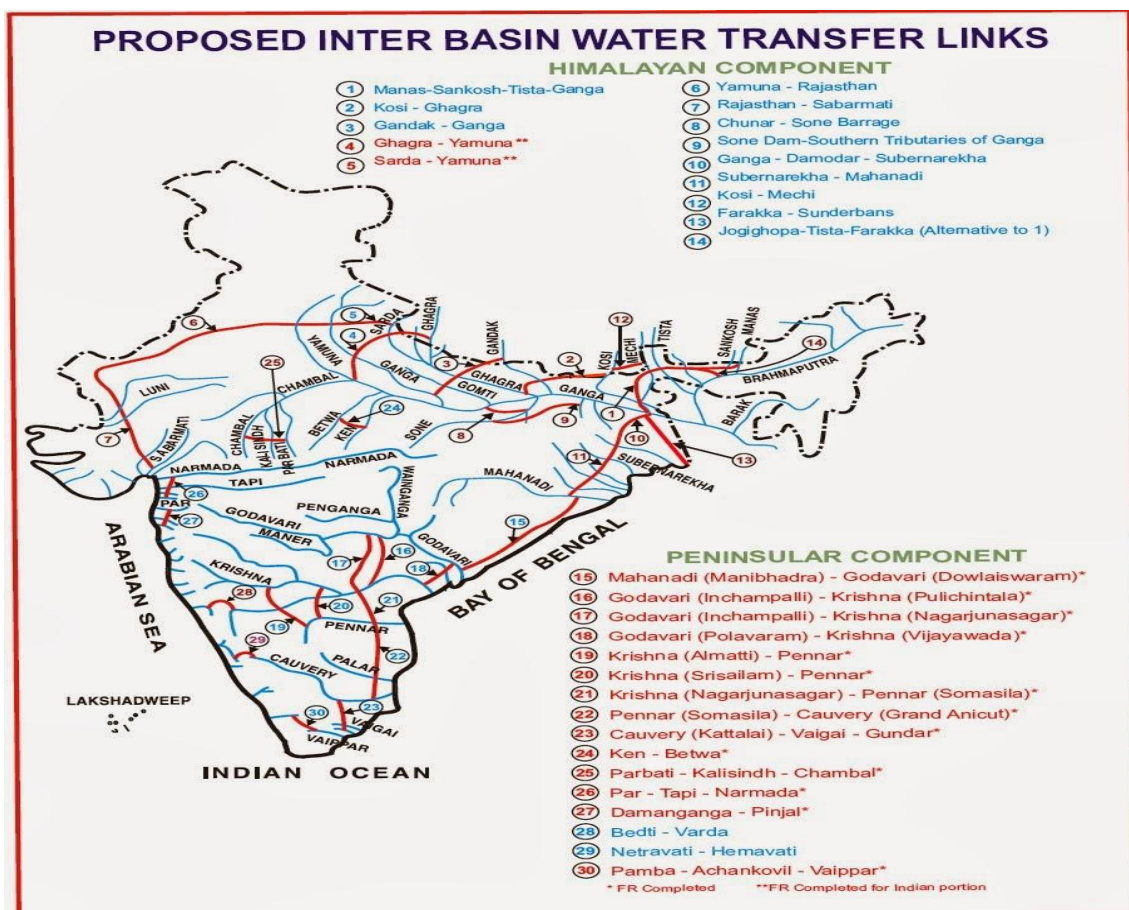
(Fig. 2.)

(Google)

Fig 1 and Fig 2 showing the regions affected by Floods and Drought.

1.2 National Perspective Plan (NPP) for Water Resources Development: “Inter-Linking of River's” (ILR)

A National Perspective Plan (NPP) was formulated in the year 1980, by Ministry of Water Resources and the Central Water Commission identified a number of large scale Inter- Basin Water Transfer Links “Inter-Linking of River's” (ILR) to increase the availability of water by transferring from surplus water basins to deficit basins in India and also to manage the problems of flood and drought disasters. Inter-Linking of River (ILR) is a water conservation method to reduce the irregular distribution of water and for providing solution to minimize floods and droughts in India. Practices should be needed for water resource management [6]. Various practices have been made by the Indian Govt. for water management and conservation. To overcome the problems of flood and drought, National Water Development Agency (NWDA) has taken up massive project ILR which includes 30 major river link canals over 37 rivers throughout the country. National Perspective Plan (NPP) consists of two components Himalayan component and Peninsular component. The Himalayan component carries of 14 canal links and 16 links are proposed in the peninsular component (Fig. 3.). Interlinking system of Sharda-Yamuna is a part of the Himalayan Rivers Development Component of the National perspective plan. Planning of Interlinking of rivers for the mitigation of droughts and floods under national water policy by the Government of India [7]. Study on proposed river link canal project has done by several researchers [8], [9], [10], [11], [12], [13]. Environmental impacts, issues and challenges of Inter- Linking of Rivers in India are discussed by [14].



(Fig.3.) Proposed Inter-Link of Rivers in India

(NWDA)

1.3 Need of the Project

Water should be made available to water deficit river basins based on a national perspective, after fulfilling the water requirements of the enroute and command areas. The surplus water should be transferred to the water needy areas. Need for proposed ILR to tackle the problem of droughts and floods to providing both water and security explained by [15] and [16]. The large scale project will helps in increase in water availability in different river basins. Study on proposed linking of rivers has done by several researchers including [17], [18], [19], [20], [21], [22], [23], [24], [25] and Central Water Commission [26]. Transfer of water from surplus basins to deficit basins to control floods and droughts studied by [27]. [28] Indian Government has approved the country's first river interlinking project on Ken–Betwa Rivers among the states of Uttar Pradesh and Madhya Pradesh. The key objective was to study about the description of proposed Sharda -Yamuna link project including its size, area, location.

II. Methodology

The research work has been done to carry out the studies on the descriptions and impacts of proposed Sharda-Yamuna Link Project. The related information has been collected from various state and central govt. water departments. Extensive review of literature was done to collect information and get a fair understanding of the kind of research.

III. Discussion

3.1 Proposed Sharda-Yamuna Link Canal

Sharda-Yamuna Link is an interdependent link for the diversion and utilizations of water to overcome the problems of drought and flood in Uttar Pradesh and Uttarakhand states in India. This plan is aimed to transfer of about 11,680 Mm³ of surplus water from river Sharda to deficit river Yamuna and further towards west parts of India. Before falling into Yamuna River the water of Sharda river will be utilize to fulfill all the water requirements of its command areas and transfer of water towards the drought prone western areas of India such as Haryana, Rajasthan and Gujarat. Sharda-Yamuna link project will locate in the States of Uttarakhand and Uttar Pradesh (Fig.4). The proposed link canal will cross through enroute areas Champawat, Nainital, Udham Singh Nagar and Haridwar districts of Uttarakhand and Bijnor and Muzaffarnagar districts of Uttar Pradesh

(Table.2) in India. The command areas of the link canal would be Bareilly, Rampur, Moradabad, Badaun and Bijnor districts of Uttar Pradesh and Udham Singh Nagar district of Uttarakhand (Table.3). There will be development of Pancheshwar dam and Poornagiri dam for the generation of power during the construction work of link canal and also to provide domestic, irrigation facilities to drought prone western parts of the country. During the journey it will cross the major rivers viz. Sharda, Kosi, Ramganga and Ganga. Barrages on these crossings are also proposed for flood control and to be constructed at the time of level crossing which would be named as Sharda barrage, Kosi barrage, Ramganga barrage and Ganga barrage. The Sharda-Yamuna link canal and its proposed four barrages will locate in the Ganga basin. The total length of this link canal will be 384 Kms and full supply depth is 7.8 m. The proposed link canal will transfer water from Sharda river near Tanakpur town of Champawat district of Uttarakhand between proposed Poorangiri dam and Tanakpur barrage into the Yamuna River about 2.5 Km near Kairana village of Muzaffarnagar district of Uttar Pradesh. First the available water in the catchment of Sharda River will be stored in the reservoir of Pancheshwar dam, then the release of water from this reservoir after generating the power will again stored at proposed Poornagiri dam which is located of about 58 Km distance of Pancheshwar dam. The construction of Pancheshwar and Poornagiri dams would be across the Sharda river known as Mahakali in Nepal with having gross storage capacities of 11,355 Mm³ and 3,680 Mm³. (Table.1) 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 would be of 541 Mm³. Annual electrical energy benefit may be of approx. 8378 Mkw, Irrigation benefit 2.94 lakh hac and economic irrigation benefit shall be 1306.63 crore. Overall this proposed link – canal will pass through 2 states, 6 districts, 15 Tehsils and 170 villages. The Sharda to Yamuna Link would provide an additional irrigation benefits, generation of power, fisheries, salinity, economic development and employment potential in the enrouted and command areas. The inter-basin water transfer can be quicker and efficient plan for proper distribution of water in India. This plan is socially needed, technically feasible, economically viable and environmentally sustainable (Thatte). This link canal could be beneficial for fulfilling the water requirements of its command areas and drought prone western areas of India such as Haryana, Rajasthan Gujarat. The inter-basin water transfer can be quicker and efficient plan for proper distribution of water and to overcome the problem of floods and droughts in India.

3.2 Sailable Features of Proposed Sharda-Yamuna Link Canal

1.	River Basin	Sharda (Mahakali)
2.	States Passing	Uttar Pradesh and Uttarakhand
3.	District Traversed	Champawat, Nainital, Udham Singh Nagar, Haridwar, Bijnor and Muzaffarnagar
4.	Basins Traversed	Sharda, Ramganga, Upper Ganga and Yamuna sub-basins of Ganga Basin
5.	En-routed, Command Districts	Moradabad, Jyotiba Phule Nagar, Rampur, Udham Singh Nagar, Badaun, Bareilly, Bijnor
6.	Off-take area	Sharda River, 10 km North East to Tanakpur town of Champawat district in Uttarakhand
7.	Out-fall area	Yamuna River in Kairana village of tehsil Kairana of Muzaffarnagar district in Uttar Pradesh
8.	Water available for transfer from Sharda river	11,680 Mm ³
9.	Transmission Loss	541 Mm ³
10.	Water utilization in the Enrouted of Sharda-Yamuna link	1758 Mm ³
11.	Full supply depth	7.8 m in depth
12.	Bed width	At head of canal 55.00 m and At tail of the canal 44.50 m
13.	Velocity	1.363 m/s to 1.334 m/s.
14.	Flow	By gravity
15.	Length of Canal	384.0 Km
16.	Lining	Lined with Cement concrete all along the stretch (canal)
17.	Barrages	Sarda, Kosi, Ramganga, Ganga Barrage
18.	Dams	Poornagiri, Pancheshwar (For Hydro Power Generation)
19.	Annual electrical Energy	8378 M Kwh
20.	Irrigation Benefit (Enrouted, Command)	2.94 Lakh hac
21.	Estimated Cost	35404.77 Crore
22.	Power	10785.53 Crore
23.	Economic Irrigation Benefit	1306.63 Crore
24.	Economic Power Benefit	1935.60 Crore

(Table.1.)

3.3 Enrouted and Command Areas of Proposed Sharda –Yamuna Link Canal

The location of the proposed Sharda-Yamuna link project covers in the states of Uttarakhand and Uttar Pradesh in India. (Fig.5).

3.3.1 Enrouted Areas

Enrouted areas are those through which proposed S-Y link canal will cross such as Champawat, Nainital, Udham Singh Nagar and Haridwar districts of Uttarakhand and Bijnor and Muzaffarnagar districts of Uttar Pradesh. Sharda-Yamuna Link has planned for transferring surplus water of river Sharda near tanakpur town of champawat district of Uttarakhand into the Yamuna River near kairana village of muzaffarnagar district of Uttar-Pradesh. Table 1:

Enrouted areas of proposed S-Y link canal are following:-

States	Districts	Town
Uttarakhand	Champawat	Poonagiri/Tanakpur
	Nainital	Haldwani
	Udam singh nagar	Bajpur
		Kashipur
		Jaspur
	Haridwar	Haridwar
		Roorkee
Laksar		
Uttar Pradesh	Bijnor	Dhampur
		Nagina
		Najibabad
	Muzaffarnagar	Muzaffarnagar
		Shyamli
		Kairana

Table 2: Source: NWDA (National Water Development Agency)

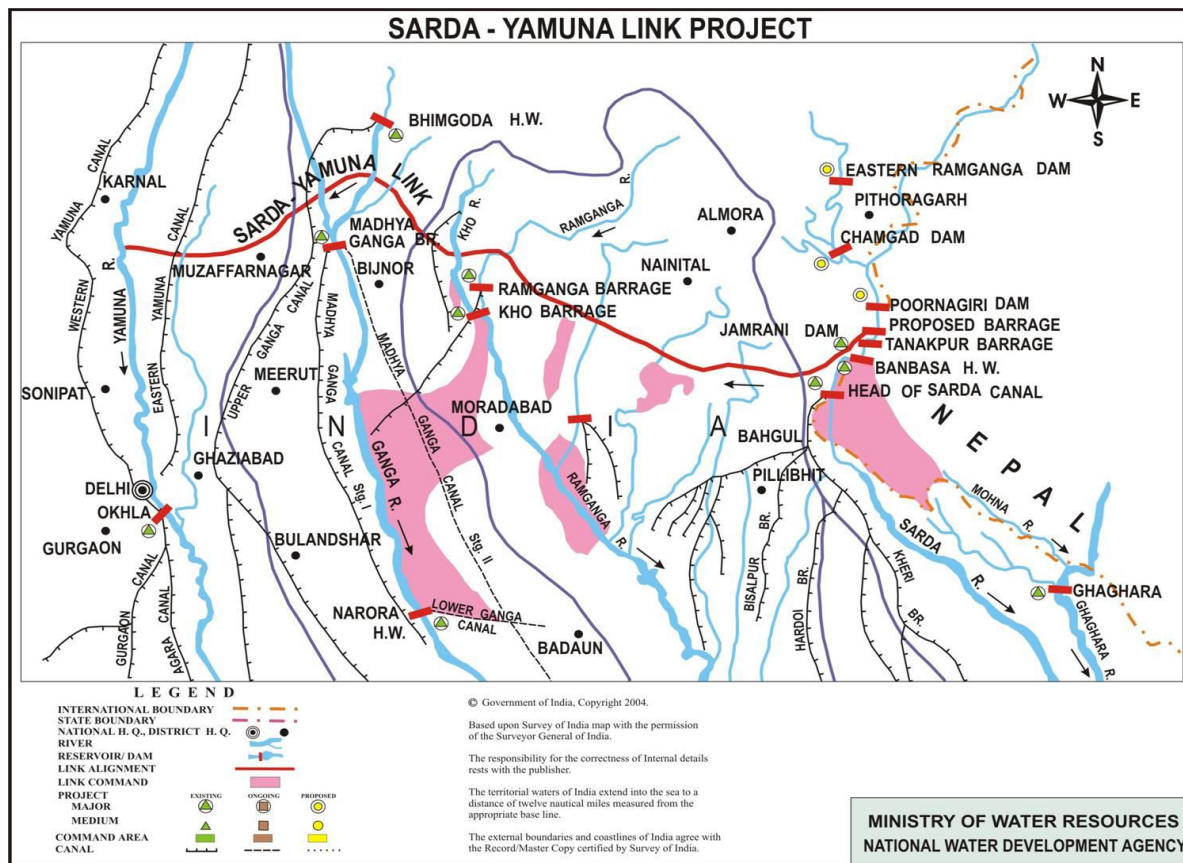
3.3.2 Command Areas

Command areas are the surrounded areas of proposed S-Y link canal. The command areas of the link canal lies in Bareilly, Rampur, Moradabad, Budaun, Bijnor and Jyotiba Phule Nagar districts of Uttar Pradesh and Udham Singh Nagar district of Uttarakhand.

Command areas of proposed S-Y link canal are following:-

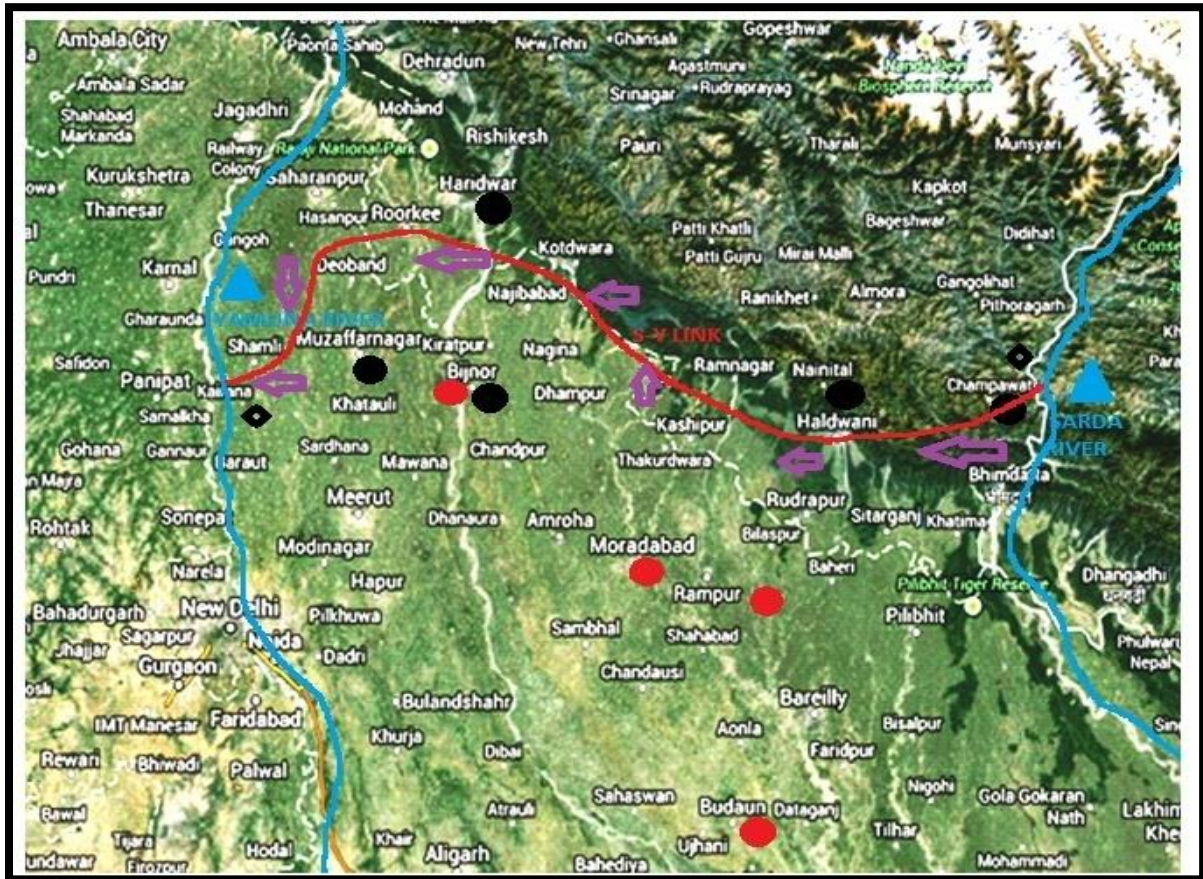
States	Districts	Town
1. Uttarakhand	Udham Singh Nagar	Kichha
		Kashipur
2. Uttar Pradesh	Moradabad	Moradabad
		Kanth
		Amroha
	Jyotiba Phule Nagar	Hasanpur
		Dhanaura
		Chandpur
	Bijnor	Dhampur
		Swar
	Rampur	Rampur
		Sahabad
		Meerganj
	Bareilly	Aonla
		Baheri
		Sahswan
	Badaun	Gunnaur
Bisauli		

(Table.3.) Source: NWDA (National Water Development Agency)

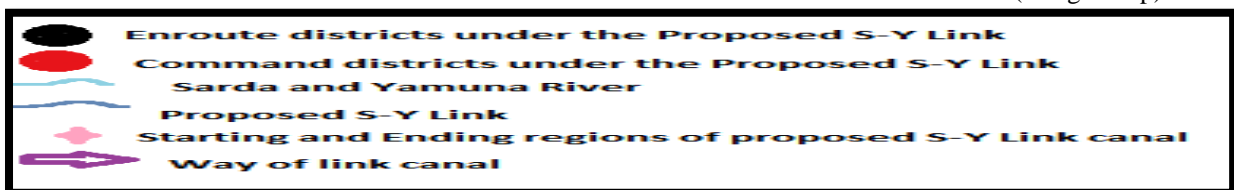


(Fig.4.) Location of Proposed S-Y link canal project.

Source: NWDA



(Fig.5.) Satellite Map of Enroute and Command areas covered under Proposed S-Y link Canal. (Google map)



IV. Conclusion

This paper highlights the description viz. size, area and location of proposed inter basin water transfer Sharda-Yamuna Link, which is a part of Himalayan river development component (Fig. 4.) and one of the proposed links of NPP (National Perspective Plan) to minimize the problem of flood and droughts in India. The Ministry of Water Resources and Central Water Commission formulated a National Perspective Plan (NPP) for Water Resources Development in 1980, considering large scale inter basin water transfer proposals for transfer of water from surplus regions to deficit regions. Sharda-Yamuna Link (S-Y Link) is aimed to make available of water to the acute water short and drought prone west part such as Haryana, Rajasthan, Gujarat of the country.

V. Acknowledgements

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