LOK SABHA SECRETARIAT
RESEARCH AND INFORMATION DIVISION

INFORMATION BULLETIN

No. LARRDIS (E&S) 2015/IB-5 DECEMBER 2015

INTER-LINKING OF RIVERS PROJECT

Since ancient times, mankind has been manipulating the movements of water to meet their water needs. Over the past century, the development of water resources has been largely driven by the demands of expanding populations for food, fiber and energy. Since diversion and withdrawal of fresh water is continually increasing globally and since fresh water constitutes only 2.5 per cent of water on earth, an informed approach to manage this precious natural resource is being increasingly recognized and articulated the world over.

Water Resources: India's Position

India is endowed with enormous water reservoir potential. The average annual surface water flow in the country is estimated to be 1,869 billion cubic metres[1] (BCM). But, there are wide variations in availability of fresh water over the geographical space and time period in the country. Though India possesses 2.4 per cent of the land area of the world with 4 per cent of world's renewable water resources, it has to sustain a large population, *i.e.*, 17.5 per cent of the world population. Most of the rains occur during the south west monsoon months while the rest of the year remains relatively dry. Moreover, the uncertainty in rainfall marked by prolonged dry spells and fluctuations in seasonal and annual rainfall is a serious problem. As a result, large parts of Haryana, Maharashtra, Andhra Pradesh, Rajasthan, Gujarat, Madhya Pradesh, Karnataka and Tamil Nadu face rainfall deficit resulting in droughts. On the other hand, excess rainfall in some parts of the country results in floods which are a perennial feature, particularly in the Brahmaputra and Ganga river basins, affecting the States of Assam, Bihar, West Bengal and Uttar Pradesh. According to an estimate by the World Health Organization (WHO)[2], economic losses due to floods and droughts during 1990-2001 in India stood at $ 4,604 million. With an increasing population base, the per capita availability of water in India is rapidly declining. From 5.20 th.cu.m. in 1950, it came down to 1.82 th.cu.m. in 2001 and declined to 1.55 th.cu.m. in 2011. It is expected to slip further to 1.34 th.cu.m. in 2025.

Impact of Drought and Floods in India

According to Murthy et al. (2010)[3], the 1987 drought in India had damaged 58.6 million hectare of cropped area affecting 285 million people. Since 2001, the country has experienced three major droughts, in the years, 2002, 2004 and 2009. The 2002 drought had damaged 12 million hectare of cropped area affecting the livelihoods of about 300 million people. To overcome the drought situation, India's National Disaster Response Fund (NDRF) provided an assistance of Rs. 12,190.95 crore to various States from 2010 to 2015[4].

As per an estimate by the World Resources Institute (2015)[5], India faces more potential loss in GDP due to flood risks than any other country. As per the estimate, India's losses in GDP exposed annually due to floods could increase more than ten fold in 2030. In the Monsoon 2013 floods, 1,537 people lost their lives and economic losses amounted to Rs. 4,748.60 crore. From 2012 onwards, the Government of India released an amount of Rs. 572.85 crore to various States as Central Assistance under the 'Flood Management Programme' during the Twelfth Plan. Out of this, an amount of Rs. 341.92 crore was utilized till 30 June 2014[6]. This is in addition to the Central Assistance provided by the Government under the NDRF for taking immediate measures during flood disasters.

[1] One cubic metre water equals 1000 litres water.
[2] *Economic Impact of Inter-linking of Rivers Programme*, Report of the National Council of Applied Economic Research, April 2008 (pp. 4-5).
[3] Murthy C.S. & Sesha Sai M.V.R., 2010, *Agricultural Drought Monitoring and Assessment*, in Roy P.S., Dwivedi R.S. & Vijayan D. (Eds.), "*Remote Sensing Applications*" (pp. 303-330), National Remote Sensing Centre, Indian Space Research Organization, Department of Space, Government of India.
[4] Inputs received from the Ministry of Agriculture dated 18 May 2015.
[5] The analysis used 2010 GDP data.
[6] Lok Sabha Starred Question No. 321, dated 31 July 2014.

Inter-linking of Rivers: The Purpose

Many areas in western, central and southern India receive minimum rainfall while the northern and eastern regions receive very high rains. As a result, some rivers become dry while some others discharge huge quantities of water to the sea. In view of this, policy makers have been thinking of solving the water problem by harnessing the huge monsoon run-off in the rivers in the eastern and north-east region, primarily with the help of large structural interventions. The inter-linking of rivers and inter-basin transfer through long distances has also been mooted as a viable alternative. The underlying idea is to bring about an equitable distribution and optimum utilization of water from surplus to deficit river basin areas in the country.

Inter-Basin Water Transfers — Examples

(i) India:

- Many schemes of large scale water transfer projects have been planned and some of them implemented. Some of the notable examples include, *the Periyar Project*, *the Parambikulam Aliyar Project*, *the Kurnool Cudappah Canal*, *the Telugu Ganga Project* and *the Ravi-Beas-Sutlej—Indira Gandhi Nahar Project*.
- *The Telugu Ganga Project* was made possible by Maharashtra, Karnataka and Andhra Pradesh voluntarily foregoing 5 thousand million cubic feet of water each from their entitlement. This project is a fine example not only of hydraulic engineering but also of inter-State cooperation. The Beas-Sutlej link in combination with the Indira Gandhi Nahar Project is a standing example of how the large inter-basin transfers brought about all round socio-economic growth with overall enhancement in the ecology and environment of the region.

(ii) Other Countries:

Many large scale water transfer schemes have been planed and implemented in other countries also. Some of the examples are as follow:-

- *California's State Water Project* in United States provides for diversion of water from better-watered northern California to the drier central and southern parts of the State.
- *The Texas Water Plan* envisages redistribution of water in Texas and New Mexico.
- The water of *the Colorado river* (an international river between USA and Mexico) is being supplied outside the basin to the Imperial Valley in California.
- There are a number of existing and under construction *inter-basin transfers in Canada,* including for transfer of water from Canada to USA.
- *Mahaveli-Ganga Project* of Sri Lanka includes several inter-basin transfer links.
- *The Irtysh Karganda* scheme is a notable project executed in the central Kazakhstan. Other proposals include partial redistribution of water resources of northern rivers and lakes of the European part to the Caspian Sea.
- *The Lingua Canal* was completed in China in 214 BC and the Grand Canal was completed in 605 AD. Besides, many projects have been recently completed. *Diversion of Quiantang river water*, *diversion of Yellow river surplus* and *South to North transfer* are the other proposed projects.
- *Pakistan* built a network of river links as a part of Indus Treaty works, which functions as replacement links to irrigate those areas which, after partition, got deprived of irrigation when three eastern rivers of Indus system, *viz*. Sutlej, Ravi and Beas were allocated to India. Pakistan built ten links, six barrages and two dams during the post-Treaty period of 1960-1970. Most of the links built are unlined channels.

Earlier Proposals

Suggestions for a National Water Grid for transferring water from water-rich to water-deficit areas have been made from time to time.

1. In the 19th century, Sir Arthur Cotton, the Royal Engineer working with the then Madras Presidency, who was the pioneer behind harnessing the waters of Godavari, Krishna and Cauvery, proposed such links for promoting inland navigation and better transport. His plans, however, were abandoned in favour of Railways.
2. The 'National Water Grid', proposed by the well known engineer and the then Union Minister for Irrigation and Power, Dr. K. L. Rao, in 1972 envisaged a Ganga-Cauvery link as its main

component, involving large scale pumping of water, but the proposal lacked any flood control benefit.

3. The 'Garland Canal' proposed by an Indian Airlines Pilot, Captain Dinshaw J. Dastur in 1977, envisaged construction of two canals. The first one was the 'Himalayan Canal' at the foot of the Himalayan slopes running from the Ravi in the west to the Brahmaputra and beyond in the east. The second 'Garland Canal' was to cover the central and southern parts of India. Both the Canals were to be integrated with numerous lakes and interconnected with pipelines at two points, Delhi and Patna.

Institutional Mechanisms in place in context of the Inter-linking of Rivers (ILR) Programme

Constitutional Provisions

In the Constitution of India, water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power, is a matter included in Entry 17 of List-II, *i.e.*, State List. States are responsible for the development and apportionment of their water resources and there are State-specific laws for irrigation. This entry, however, is subject to the provision of Entry 56 of List-I, *i.e.*, Union List, which confers the Union Government with powers to regulate and develop inter-State rivers to the extent declared by the Parliament by law to be expedient in the public interest. The Union Government also has the power to make laws for the adjudication of any dispute relating to waters of inter-State river or river valley under Article 262 of the Constitution. Water also finds a place in 'economic and social planning' under List-III, *i.e.*, the Concurrent List (entry 20), and is, hence, subject to the provision of central clearance for inclusion in the national plan.

National Water Policy

The need for a coordinated approach towards the management of drought and floods was recognized and stressed in as early as 1987, when the first National Water Policy was formulated. The premise of river basin development is rooted in the National Water Policy, 2002 which stressed the need for a sub-basin approach to development of inter-State rivers. It also called for the creation of river basin organisations for the planned development and management of a river basin. The National Water Policy, 2012 stresses that water needs to be managed as a common pool community resource held by the State, under public trust doctrine to achieve food security, support livelihood and ensure equitable and sustainable development for all.

River Boards

Under the River Boards Act, 1956, the role of River Boards envisioned is largely advisory. The National Commission for Review of the Working of the Constitution, 2002 recommended the enactment of a new Act to replace it.

Inter-State Water Disputes

Settlement of Inter-State Water Disputes, should they arise, are dealt with in the Constitution under Article 262—*via* formation of tribunals. The Article also bars courts from extending jurisdiction in these matters, underlining the unique position of water. The Inter-State Waters Dispute Act, 1956 was formulated to support Article 262 and lays down legal mechanisms to provide for the adjudication of disputes relating to waters of inter-State rivers and river valleys.

National Perspective Plan and Benefit

The continued interest shown by many gave impetus to the study of inter-basin water transfer proposals. In August 1980, the then Ministry of Irrigation (now the Ministry of Water Resources, River Development & Ganga Rejuvenation) formulated a National Perspective Plan (NPP) for Water Resources Development. The Plan envisaged to provide additional benefits of 35 million hectare of irrigation (25 million hectare of irrigation from surface waters and 10 million hectare by increased use of ground waters), raising the ultimate irrigation potential from 140 million hectare to 175 million hectare and generation of 34000 Megawatt (MW) of power, apart from the benefits in terms of flood control, navigation, water supply, fisheries, salinity and pollution control, etc.

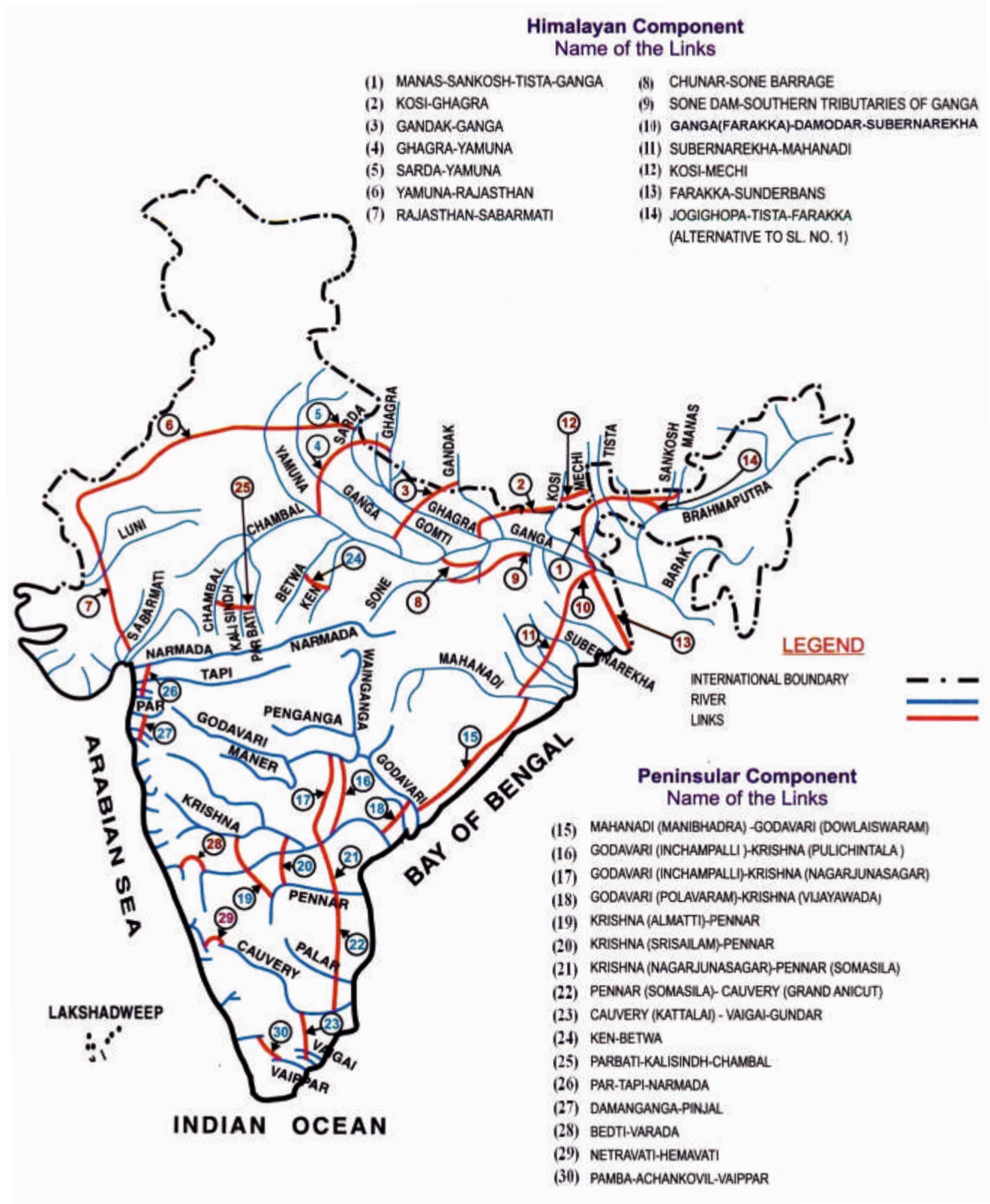
The NPP comprises of two components:—

i. Himalayan Rivers Development, and

ii. Peninsular Rivers Development

The distinctive feature of the NPP is that the transfer of water from surplus basin to deficit basin would essentially be by gravity and only in small reaches, it would be by lifts not exceeding 120 metres.

Proposed Inter Basin Water Transfer Links



Source: National Water Development Agency

Himalayan Rivers Development Component

➢ The Himalayan Rivers Development Component envisages construction of storages on the principal tributaries of Ganga and the Brahmaputra in India, Nepal and Bhutan, 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 with the Mahanadi.

The Component would provide additional irrigation of about 220 lakh hectare and generation of about 30000 MW of hydropower, besides providing flood control in the Ganga-Brahmaputra basin. It would also provide the necessary discharge for augmentation of flows at Farakka, required *inter alia* to flush Kolkata Port and the inland navigation facilities across the country.

Peninsular Rivers Development Component

The Peninsular Component involves major inter-linking of the river systems and is divided into four major parts:-

(i) **Inter-linking of Mahanadi-Godavari-Krishna-Pennar-Cauvery rivers and building storages at potential sites in these basins:** The surpluses are intended to be transferred to the needy areas in the south, through Krishna, Pennar and Cauvery rivers.

(ii) **Inter-linking of west flowing rivers, north of Mumbai and south of Tapi:** This scheme envisages construction of as many optimal storages as possible and provides for taking water supply canal to the metropolitan areas of Mumbai and irrigation in the coastal areas in Maharashtra.

(iii) **Inter-linking of Ken-Chambal:** The scheme provides for a water grid for Madhya Pradesh, Rajasthan and Uttar Pradesh and inter-linking canal backed by as many storages as possible.

(iv) **Diversion of other west flowing rivers:** The high rainfall on the western side of the Western Ghats runs down into numerous streams which discharge into the Arabian Sea. The construction of an inter-linking canal system backed up by adequate storages could be planned to meet requirements of new areas on the western side as also for transfer of some waters towards east to meet the needs of drought affected areas.

The Peninsular Rivers Development Component is expected to provide additional irrigation of about 130 lakh hectare and generate about 4000 MW of hydropower.

The Indian ILR Project: Some Facts

- As per the Working Group Report for Twelfth Plan for water sector, our country receives a total precipitation of about 4000 BCM, of which 1123 BCM is available for use (690 BCM from surface water and 433 BCM from ground water sources). Against this, the present level of utilization is about 634 BCM. However, more than 80 per cent of the annual run-off in rivers occurs during the monsoon months of June-September due to which, most of the water flows go unutilized.
- The Brahmaputra sub-basin alone, with only 6 per cent of the land area and 4 per cent of the population, drains 31 per cent of the total water resources. Due to geographical restrictions, however, only 4 per cent of the Brahmaputra basin's vast water resource is potentially utilizable within the basin.
- The net cultivated area in the country is about 141 million hectare, of which 65 million hectare (46 per cent) is covered under various means of irrigation. Canal irrigation constitutes about 26 per cent, and irrigation from ground water resources is about 63 per cent; the remaining areas are irrigated through various minor surface irrigation sources. A substantial area, *i.e.*, about 76 million hectare is cultivated under rainfed conditions.

National Water Development Agency (NWDA)

The NWDA was set up on 17 July 1982 as an autonomous society to study the feasibility of the Peninsular Component of NPP. Subsequently, in 1990-91, the NWDA Society resolved to take up studies of the Himalayan Component also. In 2006, the functions of NWDA were modified to include preparation of Detailed Project Reports (DPRs) of link projects and Pre-Feasibility/Feasibility Reports (PFR/FR) of intra-basin links as proposed by States. Later, in 2011, the functions of NWDA were further modified to include preparation of DPRs of Intra-State links also as proposed by the State Governments.

Steps Involved

The implementation of Inter-linking of Rivers Project involves various steps such as preparation of Feasibility Reports of links, negotiation and consensus building among States concerned and agreement with neighbouring countries, if link project involves these countries. Besides preparation of DPRs of the projects and structures identified for the link, clearance is required from appraisal agencies which include the Ministry of Environment, Forests and Climate Change, Ministry of Tribal Affairs, techno-economic clearance by the Technical Advisory Committee of the Ministry of Water Resources, River Development & Ganga

Rejuvenation, investment clearance and funding of the project. The procedure as stated above has to be followed independently for each link.

All the reports prepared by the NWDA are circulated to the State Governments concerned. The State Government officers are invariably invited to all the important meetings of the NWDA.

Building Consensus

A Consensus Group headed by the Chairman, Central Water Commission (CWC), and consisting of other officers of CWC and Secretaries of Irrigation/Water Resources Department from States concerned was constituted in June 2002 to discuss with the States issues relating to sharing of surplus waters and the preparation of DPRs of links by NWDA under the National Perspective Plan. A number of meetings have been held by the Consensus Group for preparation of DPRs of links. In addition, the issues on the inter-State links are regularly discussed during the meetings of the Governing Body and Society of the NWDA.

Task Force on Inter-linking of Rivers

A Task Force on Inter-linking of Rivers for devising an action plan was constituted on 13 December 2002. It submitted its Action Plans I and II for implementation of the project and also finalized the terms of reference for the purposes of the DPRs. Action Plan I, submitted in April 2003, envisaged completion of 30 FRs by the authorities by December 2005. Action Plan II, submitted in April 2004, mainly envisaged the appraisal of individual projects, in respect of their economic viability, socio-economic and environmental impacts, preparation of resettlement plans and reaching speedy consensus among States. With the completion of work, the Task Force completed its objective and was wound up with effect from 31 December 2004.

Present Status of Work of NWDA

Under the NPP, the NWDA has completed various water balance studies of basins/sub-basins and catchments up to diversion points, toposheet studies of reservoirs and link alignments, storage capacity studies of reservoirs, pre-feasibility studies and feasibility studies. Field surveys and investigations for the remaining links under the Himalayan Component are under progress, except one link, namely Kosi-Mechi, which lies entirely in Nepal.

Details of the Studies completed are given below:-

Studies/Reports Completed by NWDA under NPP

Sl.No.	Particulars	Himalayan Component	Peninsular Component	Total
1.	Water balance studies of basins/sub-basins	—	137	137
2.	Water balance studies of diversion points	19	52	71
3.	Toposheet and storage capacity studies of reservoir	16	58	74
4.	Toposheet studies of link alignment	19	18	37
5.	Pre-feasibility Reports of Links (PFRs)	14	18	33 (1 not found feasible)
6.	Surveys and Investigations and Preparation of Feasibility Reports (FRs) of specific links	2 (Indian portion) & 7 (Draft FRs)	14	16

Based on the above studies, the NDWA identified 30 links (16 under the Peninsular River Development Component and 14 under the Himalayan River Development Component) for preparation of FRs.

The status of preparation of Feasibility Reports, Pre-Feasibility Reports and Detailed Project Reports in respect of both Peninsular and Himalayan Components is as given below:—

Present status of Inter-Basin Water Transfer Links

Sl. No.	Name	States Concerned	Beneficiary States	Annual Irrigation (lakh hectare)	Domestic and Industrial Supply (MCM)	Hydro-power Megawatt (MW)	Status
Himalayan Component							
1.	Manas-Sankosh-Tista-Ganga (M-S-T-G) link	Assam, West Bengal & Bihar; [also Bhutan]	Assam, West Bengal & Bihar	2.08 + 1.82 + 2.64 = 6.54	—	5287	FR in progress.

Sl. No.	Name	States Concerned	Beneficiary States	Annual Irrigation (lakh hectare)	Domestic and Industrial Supply (MCM)	Hydro-power Megawatt (MW)	Status
2.	Kosi-Ghaghra link	Bihar & Uttar Pradesh; [also Nepal]	Bihar & Uttar Pradesh	8.17+ 0.67 + 1.74 (Nepal) = 10.58	48	—	FR in Indian portion in progress.
3.	Gandak-Ganga link	-do-	Uttar Pradesh	37.99+2.41 (Nepal) = 40.40	700	—	Draft FR completed (for Indian portion) and FR in progress.
4.	Ghaghra-Yamuna link	-do-	Uttar Pradesh	25.30 + 1.35 (Nepal) =26.65	1391	10884	FR completed (for Indian portion).
5.	Sarda-Yamuna link	Bihar, Uttar Pradesh, Haryana, Rajasthan & Uttarakhand; [also Nepal]	Uttar Pradesh & Uttarakhand	3.45 + 0.30 = 3.75	6250	3600	FR completed (for Indian portion).
6.	Yamuna-Rajasthan link	Uttar Pradesh, Gujarat, Haryana & Rajasthan	Haryana & Rajasthan	0.435 + 2.442 = 2.877	57	—	Draft FR completed and FR in progress.
7.	Rajasthan-Sabarmati link	-do-	Rajasthan & Gujarat	5.35 + 2.04 = 7.39	282	—	Draft FR completed and FR in progress.
8.	Chunar-Sone Barrage link	Bihar & Uttar Pradesh	Bihar & Uttar Pradesh	0.30 + 0.37 = 0.67	—	—	Draft FR completed and FR in progress.
9.	Sone Dam - Southern Tributaries of Ganga link	Bihar & Jharkhand	Bihar & Jharkhand	2.99 + 0.08 =3.07	360	95	FR in progress.
10.	Ganga (Farakka)-Damodar-Subernarekha link	West Bengal, Odisha & Jharkhand	West Bengal, Odisha & Jharkhand	7.63 + 0.30 + 0.55 = 8.48	484	—	Draft FR completed and FR in progress.
11.	Subernarekha-Mahanadi link	West Bengal & Odisha	West Bengal & Odisha	0.18 + 0.365 = 0.545	—	9	Draft FR completed and FR in progress.
12.	Kosi-Mechi link	Bihar & West Bengal; [also Nepal]	Bihar	2.99 + 1.75 (Nepal) = 4.74	24	3180	PFR completed. FR to be taken up entirely lies in Nepal.
13.	Farakka-Sunderbans link	West Bengal	West Bengal	1.50	184	—	Draft FR completed.
14.	Jogighopa-Tista-Farakka link (J-T-F) Link[7]	-do-	Assam, West Bengal & Bihar	—	216	1115	Alternative to M-S-T-G Link. Not to be taken up.
Peninsular Component							
15.	Mahanadi (Manibhadra)-Godavari (Dowlaiswaram) link	Odisha, Maharashtra, Andhra Pradesh, Karnataka, & Chhattisgarh	Andhra Pradesh & Odisha	0.91+3.52 = 4.43	802	445	FR completed.
16.	Godavari (Inchampalli)-Krishna (Pulichintala) link	-do-	-do-	6.13[8]	413	—	FR completed.

[7] Alternative to M-S-T-G link (Sl. No. 1 in the Himalayan Component).

[8] Annual Irrigation figures worked out on the basis of FRs. Allocation of share in irrigation to respective States to be decided at DPR stage, when MoU will be signed amongst the respective States.

Sl. No.	Name	States Concerned	Beneficiary States	Annual Irrigation (lakh hectare)	Domestic and Industrial Supply (MCM)	Hydro-power Megawatt (MW)	Status
17.	Godavari (Inchampalli)-Krishna (Nagarjunasagar) link	Odisha, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka & Chhattisgarh	-do-	2.87[9]	237	975	FR completed.
18.	Godavari (Polavaram)-Krishna (Vijayawada) link	Odisha, Maharashtra, Andhra Pradesh, Karnataka & Chhattisgarh	Andhra Pradesh	5.82[10]	162	—	FR completed. The State Government proposes to complete this Project by 2018.[11]
19.	Krishna (Almatti)-Pennar link	-do-	Andhra Pradesh & Karnataka	1.90+0.68 = 2.58	56	—	FR completed.
20.	Krishna (Srisailam)-Pennar link	-do-	—	—	—	17	FR completed.
21.	Krishna (Nagarjunasagar)-Pennar (Somasila) link	Maharashtra, Andhra Pradesh & Karnataka	-do-	5.81[12]	124	90	FR completed.
22.	Pennar (Somasila)-Cauvery (Grand Anicut) link	Andhra Pradesh, Karnataka, Tamil Nadu, Kerala & Puducherry	Andhra Pradesh, Tamil Nadu & Puducherry	0.49+4.36 + 0.06 = 4.91	1105	—	FR completed.
23.	Cauvery (Kattalai)-Vaigai-Gundar link	Karnataka, Tamil Nadu, Kerala & Puducherry	Tamil Nadu	3.38	185	—	FR completed.
24.	Ken-Betwa link (a) Ken-Betwa Link Phase-I	Uttar Pradesh & Madhya Pradesh	Uttar Pradesh & Madhya Pradesh	2.66 + 3.69 =6.35	49	78	DPR Phase-I completed in April 2010.
	(b) Ken-Betwa link Phase-II	-do-	Madhya Pradesh	0.99	6		DPR Phase-II completed in January 2014.
25.	Parbati-Kalisindh-Chambal link	Madhya Pradesh, Rajasthan & Uttar Pradesh (Uttar Pradesh requested to be consulted during consensus building)	Madhya Pradesh & Rajasthan	Alt.I: 2.05+0.25= 2.30 (Alt.II : 1.77 + 0.43 = 2.20)	13.2	—	FR completed. DPR not yet taken up by NWDA for want of consensus amongst the party States.
26.	Par-Tapi-Narmada link	Gujarat & Maharashtra	Gujarat	1.69	—	32.50	DPR completed in August 2015.
27.	Damanganga-Pinjal link	Maharashtra & Gujarat	Maharashtra (only water supply to Mumbai)	—	895	—	DPR completed in March 2014.
28.	Bedti-Varda link	Maharashtra, Andhra Pradesh & Karnataka	Karnataka	0.60	—	4	PFR completed.
29.	Netravati-Hemavati link	Karnataka, Tamil Nadu & Kerala	Karnataka	0.34	—	—	PFR completed.
30.	Pamba-Achankovil-Vaippar link	Kerala & Tamil Nadu	Tamil Nadu	0.91	—	508	FR completed.

FR — Feasibility Report, PFR — Pre-feasibility Report, DPR — Detailed Project Report, MCM — Million Cubic Metres, MW — Megawatt

[9] *Ibid.*
[10] *Ibid.*
[11] Address by the Governor of Andhra Pradesh in the State Legislature, 7 March 2015.
[12] Annual Irrigation figures worked out on the basis of FRs. Allocation of share in irrigation to respective States to be decided at DPR stage, when MoU will be signed amongst the respective States.

Currently, the NWDA is engaged in preparation of Feasibility Reports of Manas-Sankosh-Tista-Ganga which is the new alternative alignment without forest (Sl. No. 1 in the Himalayan Component) and other 8 inter-basin links under NPP in Indian portion (Sl. Nos. 2, 3 and 6-11 in the Himalayan Component).

Concerns and Apprehensions

I. Himalayan Component

- In the Himalayan Component, the proposed storages and the initial reaches of five water transfer links, *i.e.*, Kosi-Mechi, Kosi-Ghagra, Gandak-Ganga, Ghagra-Yamuna and Sarda-Yamuna are falling in Nepal and that of Manas-Sankosh-Tista-Ganga and Jogighopa-Tista-Farakka[13] are falling in Bhutan. To carry out surveys and investigations in Nepal and Bhutan, permission of the respective countries is essential.

- The Ministry of Water Resources, River Development & Ganga Rejuvenation approached the Ministry of External Affairs for seeking permission from the neighbouring countries for carrying out the survey and investigation works in their territories. It was informed that in Bhutan, a multi-purpose project on Sankosh has been under discussion and the Royal Government of Bhutan indicated an interest in reviving this project. Subsequently, the work of updation of DPR of Sankosh project was assigned to the Tehri Hydro Development Corporation (THDC) and the work was started by them. The issue of Manas dam is very crucial, as the transfer of water from the Himalayan Component to Peninsular Component depends upon the Manas-Sankosh-Tista-Ganga (M-S-T-G) link and both Sankosh and Manas dams are essential for M-S-T-G link. However, in a meeting held between the Ministry of External Affairs, Ministry of Environment, Forests and Climate Change, CWC and NWDA on 20 May 2009, it was decided that it would be appropriate to take up the matter of Manas dam separately after the DPR of Sankosh Dam is ready and agreed to by the Government of Bhutan.

- Bilateral technical discussions are going on with Nepal for storage dams located in their territory. After the technical discussions, a high level Ministerial level meeting would be convened in this regard.

- Regarding the concern raised by Bangladesh on ILR programme of India, the Indian side, in a meeting of the Indo-Bangladesh Joint River Commission held in Dhaka from 19 to 21 September 2005, reiterated that India would not take any unilateral decision on the Himalayan Component of the proposed River Inter-linking Project which may affect Bangladesh. None of the links of Himalayan region would be attempted until the concerns of the neighbouring countries were examined and addressed in an open and transparent manner.

II. Peninsular Component

Following are the objections raised by State Governments concerned for taking up FRs/DPRs of the proposed inter-linking of river projects which are currently under consideration:—

Sl.No.	Name of Link Project	States Concerned
1.	**Bedti-Varda link**	Maharashtra, Andhra Pradesh & Karnataka
	Objection raised: The Government of Karnataka had conveyed their concurrence for preparation of FR in August 2005. However, there is local opposition (Uttar Kannada district) against any such project as it may change environment/ecology of the area. The NGO concerned (Bedti Aghana Shinikolla, Samarakshana Samiti) has suggested that the integrated environmental study for entire Uttar Kannada district should be done by the Government of Karnataka. Response of the Government of Karnataka is awaited.	
2.	**Pamba-Achankovil-Vaippar link**	Tamil Nadu & Kerala
	Objection raised: Kerala Assembly has passed a resolution against taking up of the Link Project (2003).	
3.	**Parbati-Kalisindh-Chambal link**	Madhya Pradesh & Rajasthan
	Objection raised: Government of Madhya Pradesh wants to implement Intra-State Links in place of this Link Project.	

[13] Alternative to M-S-T-G link (Sl. No. 1 in the Himalayan Component).

Sl.No.	Name of Link Project	States Concerned
4.	**Mahanadi (Manibhadra)-Godavari link**	Odisha
	Objections raised: The Government of Odisha was not agreeable for the Mahanadi (Manibhadra)-Godavari (Dowlaiswaram) link, a mother link of nine links system due to large submergence involved in Manibhadra dam proposed under the link project. Based on the suggestions of Water Resources Department, Government of Odisha, the NWDA has prepared a preliminary revised proposal of Mahanadi-Godavari Link Project with reduced submergence and has been submitted to the State Government of Odisha. Also, a presentation on the revised proposal of Mahanadi-Godavari Link Project has been made to the Chief Minister of Odisha on 29 May 2015 by the senior officers of the Ministry of Water Resources, River Development & Ganga Rejuvenation. The response of the Government of Odisha is awaited. Based on response from Government of Odisha, the NWDA will take up preparation of Feasibility Report to establish techno-economic feasibility of the revised proposal followed by Detailed Project Report. Meanwhile, National Institute of Hydrology, Roorkee, has been assigned the work of review of water balance study of the Mahanadi basin.	
5.	**Netravati-Hemavati link**	Karnataka, Kerala & Tamil Nadu
	Objections raised: Netravati being an intra-State river, the Government of Karnataka intends to utilize Netravati water as per its own plan.	

Observations of the Ministry of Agriculture (Department of Agriculture & Cooperation)

The Ministry of Agriculture (Department of Agriculture & Cooperation) supports the concept of inter-linking of rivers as it will increase irrigated area thereby increasing production and productivity in the agriculture sector. It will also contribute towards reducing the risks of flood and impact of drought. The Ministry, however, is of view that the cost effectiveness, environmental sustainability and biodiversity issues and adequate rehabilitation measures for displaced population need to be considered thoroughly before taking of 'Inter-linking of Rivers Project'. They have also suggested that besides considering the climate change impacts, basin-wise challenges and their ecological protection also need to be examined while developing such projects.

Priority Links under NPP

After completion of feasibility reports, five Peninsular links have been identified as priority links for preparation of Detailed Project Reports (DPRs) on the basis of Task Force Report. These are:—

i. Ken-Betwa

ii. Parbati-Kalisindh-Chambal

iii. Damanganga-Pinjal

iv. Par-Tapi-Narmada

v. Godavari (Polavaram)-Krishna (Vijayawada)

Status of preparation of DPRs for the above five links is given below:-

Sl.No.	Name of Link/Project	Rivers	States Concerned
1.(A)	**Ken-Betwa (Phase-I)**	Ken & Betwa	Uttar Pradesh and Madhya Pradesh
	Status: DPR of Phase-I project completed and is under appraisal in CWC. Issues related to environment, forests and wildlife, land diversion and techno-economic clearances are being actively resolved with the Ministry of Environment and Forests and Climate Change and the Ministry of Tribal Affairs. Various clearances are in advanced stages.		
1.(B)	**Ken-Betwa (Phase-II)**	Ken & Betwa	Uttar Pradesh and Madhya Pradesh
	Status: DPR completed and submitted to the Governments of Madhya Pradesh and Uttar Pradesh in January 2014. Issues related to forest land diversion are being actively resolved with the Ministry of Environment and Forests and Climate Change.		
2.	**Damanganga-Pinjal**	Damanganga & Pinjal	Gujarat & Maharashtra
	Status: DPR completed in March 2014 and sent to the Governments of Maharashtra and Gujarat in April 2014.		

Sl.No.	Name of Link/Project	Rivers	States Concerned
3.	**Par-Tapi-Narmada**	Par, Tapi & Narmada	Gujarat & Maharashtra
	Status: DPR completed in August 2015 and sent to the Governments of Maharashtra and Gujarat.		
4.	**Parbati-Kalisindh-Chambal**	Parbati, Kalisindh & Chambal	Madhya Pradesh, Rajasthan & Uttar Pradesh (Uttar Pradesh requested to be consulted during consensus building)
	Status: DPR not yet taken up by NWDA. The Government of Madhya Pradesh now is not in favour of the link project. However, the Government of Rajasthan has informed that NWDA may keep the issue of the link project open irrespective of the views of Madhya Pradesh in this regard.		
5.	**Godavari (Polavaram)-Krishna (Vijayawada)**	Godavari & Krishna	Odisha, Maharashtra, Andhra Pradesh, Karnataka & Chhattisgarh
	Status: The link is part of the Polavaram project of the Andhra Pradesh. The then Government of Andhra Pradesh had taken up the above project, including link component, as per their own planning. Now, the Government of India has constituted a Polavaram Project Authority for the execution of the Polavaram irrigation project in accordance with Section 90 of the Andhra Pradesh Reorganization Act, 2014. Polavaram Project is being implemented as a National Project.[14] The State Government proposes to complete this Project by 2018.[15]		

Ken-Betwa link Project

Phase-I

A 77-metre high dam at Daudhan with gross capacity of 2953 million cubic metres is proposed across river Ken, about 2.5 km upstream of existing Gangau Weir, and a link canal for transferring the surplus water from Ken river to Betwa river. The reservoir involves submergence of 9000 hectare area, out of which 5803 hectare comes under the Panna Tiger Reserve. The latter includes 4141 hectare of forest area which is about 7.6 per cent of the total Panna Tiger Reserve area. The total length of the link canal will be 221 km, including 2 km long tunnel. The total cost of the project has been estimated to be Rs. 9,393 crore at 2007-08 price. The Ken-Betwa Project has been included as a National Project and also a part of Prime Minister's Bundelkhand package.

Phase-II

The Project consists of one major dam across Lower Orr river, a tributary of Betwa, and four barrages at Neemkheda, Barari, Kotha and Kesari. The estimated cost of the project is Rs. 2,283 crore.

The Inter-linking of Godavari and Krishna Rivers[16]

The Godavari (Polavaram)-Krishna (Vijayawada) link is part of the Polavaram project of the Andhra Pradesh.The Polavaram Dam, which has been declared as national project, is likely to take another four to five years to be completed and become operational. The inter-linking of Godavari and Krishna rivers project launched in March 2015 was made partially operational on 16 September 2015 by letting water into the Right Main Canal by lifting the surplus flooding water from river Godavari. The linkage of Godavari water with Krishna basin is being made possible by the Pattiseema lift irrigation scheme on Godavari river at Pattiseema village in West Godavari district.

Priority Links under Intra-State Links identified by States

So far, the NWDA has received 46 proposals of Intra-State links from nine States, *viz*. Maharashtra, Gujarat, Jharkhand, Odisha, Bihar, Rajasthan, Tamil Nadu, Karnataka and Chhattisgarh. Out of these, Pre-Feasibility Reports (PFRs) of 35 Intra-State links have been completed by NWDA as on October 2015.

The details/status of preparation of DPRs of the Intra-State links completed/ taken up so far is given below:—

Sl.No.	Name of Link	Rivers	States Concerned
1.	**Burhi Gandak-Noon-Baya-Ganga link**	Burhi Gandak and Ganga	Bihar
	Status: DPR completed and submitted to Government of Bihar *vide* NWDA letter dated 30 December 2013.		

[14] PIB release dated 4 June 2015.
[15] Address by the Governor of Andhra Pradesh in the State Legislature, 7 March 2015.
[16] As per the inputs received from the Government of Andhra Pradesh dated 29 September 2015.

Sl.No.	Name of Link	Rivers	States Concerned
2.	**Kosi-Mechi link**	Kosi and Mechi	Bihar
	Status: DPR completed and sent to Government of Bihar *vide* NWDA letter dated 2 April 2014.		
3.	**Ponnaiyar-Palar link**	Ponnaiyar and Palar	Tamil Nadu
	Status: DPR is in progress and scheduled to be completed by December 2015.		
4.	**Wainganga (Gosikurd)-Nalganga (Purna Tapi) link**	Wainganga and Purna Tapi	Maharashtra
	Status: DPR is in progress and scheduled to be completed by March 2016.		
5.	**Barkar-Damodar-Subernarekha link**	Barkar, Damodar and Subernarekha	Jharkhand
	Status: The preparation of DPR of Barkar-Damodar-Subernarekha link was taken up during 2014-15. During the second meeting of sub-committee-III for consensus building held on 30 October 2015, in view of the reservation expressed by West Bengal State Government, it was decided that first the PFR of Barkar-Subernarekha link will be revised considering the requirements of all States concerned. Further, action on the preparation of DPR will be taken after completion of revised PFR in consultation with States concerned.		

Departmentally Related Standing Committee on Water Resources

The Departmentally Related Standing Committee on Water Resources has been closely monitoring the matters related to the NWDA and ILR Project. The Committee, in its Report (First Report, 14th Lok Sabha), presented on 23 August 2004, *inter alia* noted that the NWDA is conducting water balance and other related studies on a scientific basis. Endorsing the ILR Project, it strongly recommended the Government to take firm steps and fix definitive time frame and lay down guidelines for completion of FRs, preparation of DPRs and completion of projects so that they might be completed and the benefits accrued within reasonable time and costs. The Standing Committee felt that the inter-linking of Himalayan and Southern region rivers, if done within a definite schedule, would save the nation from the devastating ravages of chronic droughts and floods.

Later, the Committee, in its Report (Eleventh Report, 14th Lok Sabha) presented in October 2008, also extensively deliberated on the subject 'Inter-linking of Rivers' and advised the Government on various aspects of the ILR Project.

Some of the notable recommendations of the Committee which were accepted by the Government *vide* its Action Taken Report submitted in April 2010 include:—

- The Government should undertake a study, which would assure the availability of water as indicated in NPP in a period of about two to three decades.
- The subject 'Water' either needs to be brought under the Concurrent List or the Union needs to enact laws under the provisions of Entry 56 of the Union List under the Seventh Schedule.
- All the apprehensions expressed by the Committee of environmentalists, social scientists and other experts on ILR constituted by the Government with a view to making it a consultative process would be addressed to at the time of preparation of DPR of the Ken-Betwa link which should serve as model for preparation of DPRs of all other links.
- While finalizing DPRs of various links, the authorities concerned may have a re-look with an open mind at some of the suggestions/ proposals/schemes put forward as alternatives to the links under ILR programme by the individuals/experts/NGOs who had been called for submission of Memoranda by the Committee, notwithstanding that the said suggestions were not agreed to by the Independent Group of Experts comprising of CWC, NWDA and other organizations.

Special Committee on Inter-linking of Rivers

On 27 February 2012, the Supreme Court of India, disposing two writ petitions filed in the year 2002 [petitions (Civil) Nos. 512 and 668] on 'Networking of Rivers', directed the Union of India to forthwith set up a Special Committee for Inter-linking of Rivers.

In pursuance, a 'Special Committee for Inter-linking of Rivers' has been constituted *vide* Notification dated 23 September 2014. The first meeting of the Special Committee was held on 17 October 2014 at New Delhi. The meeting was attended by State Irrigation/Water Resources Ministers along with the Secretaries of various State Governments. In the meeting, it was decided to constitute sub-committees to expedite the objectives of the inter-linking of rivers as per terms of reference of the Committee. The 2nd, 3rd, 4th, 5th and 6th meetings of the Committee were held on 6 January 2015, 19 March 2015, 14 May 2015, 13 July 2015 and 15 September 2015, respectively. The Committee reviews the progress of these river link proposals in consultation with the stakeholders to expedite these projects.

Task Force

On 14 April 2015, the Ministry of Water Resources, River Development & Ganga Rejuvenation constituted a Task Force on Inter-linking of Rivers comprising experts and senior officials to look into the issues relating to inter-linking of rivers in the country. Chaired by Shri B.N. Navalawala, the Task Force will take up all

issues for expediting the work on inter-linking of rivers. Apart from examining the existing links that are laid out as per the National Perspective Plan under both the Himalayan and Peninsular Components, the Task Force would also consider alternative plans in place of infeasible links in the present plan. It would facilitate inter-linking of intra-State and intra-basin rivers also along with that of inter-State and inter-basin links. It would recommend the time schedule for completion of feasibility studies and DPRs of all the links, implementation schedule of all the links and suggest on various means of funding mechanisms for the inter-linking of rivers. The Task Force would also provide guidance on norms of appraisal of individual projects in respect of economic viability, socio-economic and environmental impacts and preparation of resettlement plans. It would also device suitable mechanisms for bringing about speedy consensus amongst the States and propose suitable organizational structure for implementing the inter-linking of rivers. Two meetings of the Task Force have been held on 23 April 2015 and 5 November 2015.

Financial Aspects

An amount of Rs. 280 crore has been proposed for activities of the NWDA in the Expenditure Finance Committee (EFC) memo for the scheme 'River Basin Management'[17] during the Twelfth Five Year Plan for survey & investigation and preparation of FRs and DPRs of the links under the NPP along with Intra-State links being proposed by the States. The status of estimates/ actual for the Twelfth Plan is given below:—

(Rs. in crores)

Year	Estimates (Budget/Revised/ Actual)	Name of Scheme- River Basin Management Budget Major Head- 2701 & 4701
2012-13	BE	51.30[18]
	RE	43.40[19]
	Actual	43.40[20]
2013-14	BE	63.20
	RE	50.30
	Actual	50.30
2014-15	BE	60.00
	RE	62.00
	Actual	62.00
2015-16	BE	69.00

- Grant approved for Twelfth Plan—Rs. 280.00 crores.
- Rs.100.00 crores allocated each year for preparation of DPR for Inter-linking of Rivers from 2014-2015 onwards (Budget Major Head 2701). Revised estimate for the year 2014-15—Rs. 10. 00 crore.
- Cumulative Expenditure Incurred by NWDA since inception—Rs. 508.35 crore (Up to March 2015).

Cost of the Inter-linking of Rivers (ILR) Programme

The cost of the overall ILR programme has been estimated by the Task Force/NWDA as Rs. 5,60,000 crore at 2002-03 prices. The National Council of Applied Economic Research (NCAER), in its report titled '*Economic Impact of Inter-linking of Rivers Programme*' (2008), has corrected the figure stating that in the estimates drawn, the cost of 30 links has been taken, whereas there are only 29 links. The Jogighopa-Tista-Farakka (J-T-F) link is an alternative link to Manas-Sankosh-Tista-Ganga (M-S-T-G) and only one of these two links will be constructed. Besides, in order to arrive at a better estimate, the fixed escalation rate of 10 per cent per annum was replaced by a more meaningful escalation factor — the Government investment deflator for construction. Moreover, the cost will undergo changes once the detailed project reports (DPRs) of the individual links are prepared. Two alternatives of cost estimates taking into account alternative links (M-S-T-G or J-T-F) have been prepared:

- The new aggregated cost of the entire programme with M-S-T-G link is estimated as Rs. 4,44,331.20 crore at 2003-04 prices.
- The new aggregated cost of the entire programme with J-T-F link is estimated as Rs. 4,34,657.13 crore at 2003-04 prices.

Conclusion

The ILR Programme focuses on reducing irrigation uncertainties and mitigating the adverse impact of floods and droughts. Once the link canals are built, they can also be used as waterways for navigation, reducing stress on road/rail transport. The successful implementation of the programme is, therefore, of utmost importance for the development of the country. The Union Government has already expressed its commitment to the implementation of the Inter-linking of Rivers Project with due consultation process and it is necessary that a supportive climate for the programme be created. Although the major and direct gainers of the ILR programme will be agriculture and agriculture dependent households, the entire economy will benefit because of increased agriculture production. The growth of other sectors will depend on the strength of the backward linkages and forward linkages of the construction sector with the rest of the economy. As the output of sectors supplying inputs to the construction sector increases, it will increase the demand for goods and services in the economy. The full impact of the ILR programme on economy will be realized only when construction is completed, reservoirs filled and water reaches the ultimate users for irrigation, drinking water, industrial purposes and hydropower generation.

[17] The new scheme has been formulated during the financial year 2013-14 by merging two ongoing schemes, namely 'River Basin Authority Organization' and 'Investigation of Water Resources Scheme'.
[18] For Major Head 2701 only.
[19] *Ibid.*
[20] *Ibid.*

Sources Consulted

1. Status Note on Inter-linking of Rivers, Ministry of Water Resources, River Development & Ganga Rejuvenation, dated 6.12.2014.
2. Status of Implementation of Budget Speech 2014-15.
3. PIB—Press Releases.
4. Answers to Lok Sabha and Rajya Sabha Questions.
5. Official websites of the Ministry of Water Resources, River Development & Ganga Rejuvenation (http://wrmin.nic.in); National Water Development Agency (http://nwda.gov.in); Water Resources Information System of India (http://india-wris.nrsc.gov.in); and Central Water Commission (http://cwc.nic.in).
6. Note on Inter-linking of river projects in the country — Details and status as on 21.1.2015 on the website of the Ministry of Water Resources, River Development & Ganga Rejuvenation ((http://nwda.gov.in/writeread data/main link file/File 423.pdf).
7. Outcome Budget of the Ministry of Water Resources, River Development & Ganga Rejuvenation, 2012-13, 2013-14 and 2014-15.
8. Budget provisions for the Ministry of Water Resources, River Development & Ganga Rejuvenation, 2015-16.
9. Constitution of India.
10. *Economic Impact of Inter-linking of Rivers Programme*, Report of the National Council of Applied Economic Research, April 2008.
11. National Water Policy, 2012.
12. S.R. Singh and M.P. Shrivastava (Eds.), *River Inter-linking in India: The Dream and Reality*, Deep and Deep Publications Pvt. Ltd., New Delhi, 2006.
13. V.P. Jauhari, *Sustaining River Linking*, Mittal Publications, New Delhi, 2005.
14. Tushaar Shah, Upali Amarsinghe and Peter McCornick, *India's River Linking Project: The State of the Debate*, Paper in the Strategic Analysis of the National River Linking Project Proceedings of (NRLP) of India, Series – 2, Proceedings of the Workshop on Analysis of Hydrological, Social and Ecological Issues of the NRLP, International Water Management Institute, New Delhi, 2008.
15. Inputs from the Ministry of Agriculture, issued dated 14 May 2015, 31 July 2015 and 31 August 2015.
16. Documents pertaining to the Departmentally Related Parliamentary Standing Committee on Water Resources.
17. Brij Mohan et al., *Drought Conditions and Management Strategies in India,* Country Report prepared for the Regional Workshop for Asia-Pacific as part of the UN-Water Initiative on *"Capacity Development to Support National Drought Management Policies"* organized from 6 to 9 May 2014 in Hanoi, Vietnam.
18. Documents posted on the website of the World Resources Institute (http://wri.org/floods).
19. Disasters in Asia and the Pacific: 2014 in review, Report of the UN ESCAP.
20. Address by the Governor of Andhra Pradesh in the Andhra Pradesh Legislature, 7 March 2015, and the Budget Speech 2015-16 of the Minister of Finance, Government of Andhra Pradesh, 12 March 2015.
21. Inputs from the Government of Andhra Pradesh dated 29 September 2015.

Prepared by Dr. Jayadev Sahu, Additional Director and Smt. Nalinakshi Trikha, Joint Director of Lok Sabha Secretariat under the supervision of Shri Abhijit Kumar, Joint Secretary and Dr. Dilip K. Singh, Director, with inputs from the Ministry of Water Resources, River Development & Ganga Rejuvenation and the Water Resources Department, Government of Andhra Pradesh for the use and information of members of Parliament.