

Chapter 1

Introduction

1.1 General

Water is the most precious gift of nature to India. Its most beneficial use is a sine qua non, not only for the economic development but also for meeting the growing food requirements of the country. The rainfall in the country is confined to 90 to 100 days of monsoon season and is unevenly distributed both in space and time even during monsoon season. More and more storage reservoirs are, therefore, essential to achieve high degree of utilisation for various purposes. Agricultural production needs to be more than doubled in the coming two decades or so and most of it has to come by more efficient land and water management in existing irrigated areas, and by extending irrigation to new areas. There is hardly any scope to increase the cultivated areas. Conservation and most efficient utilisation of the water resources for beneficial use such as irrigation, hydropower, flood control, water supply, navigation and other purposes through storage reservoirs and water transfer systems will also provide large scale additional employment opportunities to several millions living in the rural areas. While planning the various projects, it is essential to ensure that environmental values are preserved and enhanced. With economic development, the possibilities of pollution of our water resources increase and we should be continuously on the alert to ameliorate existing pollution and ensure that no new sources of pollution are created.

By the turn of the century, water will be a critical resource to mankind and therefore should be harnessed in a most scientific and efficient manner, In India, the availability of water is highly uneven, both in space and time. The prime source of water is precipitation which is confined to only about 3-4 months in the year and varies from 10 cm in the western parts of Rajasthan to over 1000 cm at Cherapunji in Meghalaya. As a result, the country is afflicted by drought-flood-drought syndrome. Nearly a third of the country is drought prone while an eighth of the country is flood prone. Flood plains in fact occupy some of the most populous regions in our country. Several man made activities often aggravate the flood situation because of the large scale encroachment of flood plains by habitation and by temporary and permanent construction, as a part of the process of population increase as well as of developmental activities.

It has been assessed that at the most the plans evolved by State Governments can utilise not more than 690 BCM of surface water. This includes the use from a large number of inter-State Schemes benefiting more than one State on which understanding would have to be reached on planning and implementation. However, if we take a national view and

harness major inter-State and international rivers in the largest interest of the country as well as neighbouring countries, the benefit would increase considerably. This will be possible by providing storages at appropriate locations and inter-linking of the various river systems. If we look beyond the boundaries of the States and even beyond the boundaries of the national frontiers and conceive of the optimum development of the rivers of the sub-continent, each state in our country and our neighboring countries stands to gain by way of additional irrigation, hydro-power, generation, navigation and flood control.

1.2 Progress and Programmes of Irrigation Development.

Water is a master input to agriculture. The rate of increase in food production has just managed to equal the rate of population growth. We must increase the rate of agricultural growth to four percent at least. Agriculture continues to be the dominant factor in the Indian economy as it contributes about 50 percent of the value of the total national production. Even a single year's drought, therefore causes a severe stress on the overall economy of the country.

In order to keep pace with the increasing population, it is necessary to increase the tempo of irrigation development and this will need tremendous efforts both in physical terms as also in terms of financial outlays. Even after achieving this target about 45 percent of the total cropped area of the country will still have to depend on the vagaries of the monsoon. However, by optimum storage of our water resources and interlinking of our rivers, it is possible to extend significantly the total irrigated area.

1.3 National Perspective Plan (NPP) for water Resources Development - Broad Approach and Principles

Realizing the need for achieving a uniform development of water resources and reducing regional imbalances, the erstwhile Union Ministry of Irrigation (now the Ministry of Jal Shakti) and the Central Water Commission (CWC) formulated, in the year 1980, a National Perspective Plan (NPP) for water resources development which comprises two components viz., the Himalayan rivers development and the Peninsular rivers development. These are described below.

a) Himalayan Rivers Development Component

Himalayan Rivers Development envisages construction of storage reservoirs on the main Ganga and the Brahmaputra rivers and their principal tributaries in India, Nepal and Bhutan along with inter-linking canal system 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 Mahanadi.

b) Peninsular Rivers Development Component

(i) Interlinking of Mahanadi-Godavari-Krishna-Cauvery rivers:

The Peninsular Rivers Development Component, as its first part, envisages the diversion of surplus flows of the Mahanadi to the Godavari and further transfer of the surplus water from the Godavari to the water deficit Krishna, Pennar and Cauvery basins. This would benefit the drought prone areas of Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu.

(ii) Interlinking of west flowing rivers, north of Bombay and south of Tapi:

The second part is to construct storages and to inter-link the small rivers flowing along the west coast, north of Mumbai and south of the Tapi for transfer of surplus waters to the needy areas of Saurashtra and Kutch regions. Another scheme provides water supply to the metropolitan areas of Mumbai.

(iii) Interlinking of Ken-Chambal:

The third part envisages inter-linking of Ken with Chambal. This involves ken –Betwa link as part of the inter linking of the southern tributaries of the Yamuna and a dam on the Yamuna at Panchnad besides construction of small storages in the system to benefit the Ujjain and Indore areas of Madhya Pradesh and the Bundelkhand region of Uttar Pradesh.

(iv) Diversion of other west flowing rivers:

The fourth part of the proposal is to divert a part of the surplus waters of the west flowing rivers of Karnataka and Kerala to the east for benefiting the drought areas apart from bringing new areas on the east of the western side under irrigation.

Overall Benefits from the National Perspective Plan (NPP)

The National Perspective Plan would provide additional irrigation benefits of 25 Mha from surface waters, and 10 Mha by increased use of ground water raising the ultimate irrigation potential of the country from 140 Mha to 175 Mha and generation of about 34 Mkw of power, apart from the benefits of flood control, mitigation of droughts, navigation, domestic & industrial water supply, fisheries, recreational facilities, control of salinity, pollution control,

infrastructural & Socio-economic development, ecological & environmental improvement etc. Besides economic development, large scale additional employment potential would be created in the rural areas.

1.4 Mahanadi (Manibhadra) – Godavari (Dowlaiswaram) Link Project (Earlier proposal)

The Project comprises of the following components:

i) The Govt. of Odisha proposed Manibhadra project across Mahanadi river near Denkarasahi village in Gania Block of Nayagarh District in Odisha with FRL 86.00 m, MWL 91.5 m, MDDL 73.15 m with gross storage capacity of 6000 Mm³, live storage capacity of 4290 Mm³ and a dam toe power house with an installed capacity of 960 MW.

For the purpose of link canal the FRL and MDDL of Manibhadra reservoir will be raised to 91.0 m and 74.15 m respectively and then the gross storage will be 8520 Mm³ and the live storage will be 6608 Mm³. The installed capacity at dam toe power house will be 375 MW.

ii) A head regulator on the right flank of the Manibhadra dam and canal power house of installed capacity of 70 MW with one 30 MW standby unit for the link canal and generate 197 million units (MU) of energy every year.

iii) The Salia reservoir is located across Salia river near village Balugaon in Banpur tahsil of Khurda district in Odisha with FRL 58.52 m, gross storage capacity of 59.87 Mm³, live storage capacity of 51.97 Mm³ and MDDL of 48.82 m. The link canal is proposed to out fall into Salia reservoir and to off take from it at RD 144.0 km. It is proposed to raise the FRL of the reservoir to 63.30 m.

iv) The proposed 827.700 km long link canal taking off from the Manibhadra reservoir.

v) The existing Dowlaiswaram barrage across the river Godavari near Dowlaiswaram village in East Godavari district of Andhra Pradesh with a pond level of 13.64 m.

It is proposed to divert a quantity of 12165 Mm³ from Manibhadra through the proposed link canal. Out of 12165 Mm³ of water proposed for diversion from the Manibhadra reservoir, 3790 Mm³ would be used for enroute irrigation in Odisha and Andhra Pradesh States. The enroute irrigation use includes the requirement for the command area proposed under Manibhadra Right Bank Canal by the Government of Odisha. A quantum of 802 Mm³ will be used for meeting domestic and industrial requirements enroute. The

remaining waters of 6500 Mm³ will be delivered upstream of the existing Dowlaiswaram barrage on the Godavari river after losing 1073 Mm³ in transmission.

It is envisaged to provide irrigation to a culturable command area of 256770 ha and 107189 ha utilizing 3184 Mm³ and 606 Mm³ respectively in Odisha and Andhra Pradesh States.

1.5 Need for the study of Alternate Proposal

The Mahanadi (Manibhadra)- Godavari (Dowlaiswaram) link canal as proposed earlier by NWDA will off-take from the right bank of Manibhadra dam on river Mahanadi. Manibhadra dam project was part of the Irrigation Master Plan proposed by Government of Odisha in 1980.

The proposal consists of an earthen dam across river Mahanadi for a length of 2570 m along with 1000 m long spillway and maximum water level of RL 91.50 m. As per the information provided by Govt. of Odisha, on construction of this project 219 villages fully and 114 villages partially along with 65000 ha of land are likely to be get submerged. The number of families likely to be affected by the reservoir has been estimated to 15,120 as per 1981 census. Due to such large scale submergence and corresponding R&R issues, the project proposal did not make any head way since then and instead, Govt. of Odisha proposed to construct the barrage/dam at Barmul which is about 17 km upstream of Manibhadra dam site. Now, NWDA proposes to utilize Barmul dam for diversion of Mahanadi Waters instead of Manibhadra reservoir as contemplated in circulated FR earlier.

In view of the above, the Ministry of Jal Shakti Department of Water Resources, River Development and Ganga Rejuvenation, Govt. of India directed the NWDA to examine an alternate proposal for Mahanadi (Manibhadra)-Godavari (Dowlaiswaram) link project without Manibhadra dam.

1.6 The Present Alternate Proposal:

Mahanadi (Barmul) – Godavari (Dowlaiswaram) link project

Govt. of Odisha has proposed Mahanadi (Barmul) - Rushikulya intra-state link by constructing a barrage at Barmul (17 km upstream of Manibhadra) with a pond level of 70 m to divert about 1663 MCM of water to irrigate about 1.0 lakh ha enroute in Odisha. This proposal of Odisha Govt. has been slightly modified and it is proposed to have a dam at Barmul 17 km upstream of Manibhadra on River Mahanadi in Nayagarh district of Odisha

connecting Goldei hill on the right and Faigeni hill on the left at the latitude 20°30'44" N and longitude 84°52'34" E (Topo-sheet No. 73D/14) which is about 13 km downstream of Tikrapara and 17 km upstream of Manibhadra dam site proposed by Govt. of Odisha. Barmul dam with FRL 80 m, height 25 m will have a gross storage of 1835 MCM and live storage of 965 MCM.

The Mahanadi (Barmul) – Godavari (Dowlaiswaram) link will off take from Barmul dam at FSL 75.06 m with all the design features of conveyance system as proposed in the FR of Mahanadi-Godavari link and additional length of 16.9 km. Thus the total length of the link canal will be 844.595 km. Six dam projects at Salki and Ong in Ong sub-basin and Uttei Roul Integrated Project, Khadago, Udanti and Tel Integrated Project in Tel sub-basin in Mahanadi basin will be integrated with Mahanadi (Barmul)-Godavari(Dowlaiswaram) link Project. The total submergence from Barmul dam including these six projects of these components will be about 31360 ha.

The hydrological study of Mahanadi river at Barmul site has been carried out by NWDA through National Institute of Hydrology (NIH), Roorkee and assessed the yield availability at Barmul dam site by using latest scientific methods for planning further diversion through Mahanadi (Barmul)-Godavari (Dowlaiswaram) Link. The study by NIH reveals that the net water balance at 75% dependability is 6794 MCM at Barmul site (NIH revised Report-April 2018). As per the simulation study conducted by the NIH, the estimated annual demand of link canal is 10105 MCM and average annual spills are 28486 MCM. The annual average link diversion is 9434 MCM. In their report, water balance at Barmul site has been worked out considering only one year data ie, 75% dependable year. However, the simulation has been done by NIH, Roorkee considering data of 40 years from 1973 to 2012. Government of Odisha submitted their observations on the NIH revised report (April 2018) and expressed that after considering all the latest demands of Odisha and Chhattisgarh States, there is a deficit of 18718 MCM of water at Barmul site on Mahanadi river at 75% dependability. NWDA considered their enhanced demands for irrigation and considering the guidelines of TAC for assessment of water requirements for various purposes and regeneration, modified the surface water balance at 75% dependability and assessed a surplus of 3417 MCM at Barmul on Mahanadi river. The total diversion into link canal has been assessed to 10105 MCM taking all the demands of link canal with 77.5% of success rate, failing in 9 years and success in 31 years out of 40 years. Results provided by National Institute of Hydrology have been considered in the present Feasibility report of Mahanadi (Barmul) – Godavari (Dowlaiswaram) link project.

The irrigation water requirement under the link canal is estimated to be 3790 MCM. Apart from irrigation, the link project will also provide for future

domestic and industrial water requirements in the command area. Domestic and Industrial requirements projected to 2050 AD are estimated to be 700 MCM. Transmission loss in the link canal are estimated to be 569 MCM. It is envisaged that after meeting the above requirements, out of a total diversion of 10105 MCM, a quantum of 5046 MCM would be finally transferred to the Godavari river through the link canal.

As per the original planning of Mahanadi – Godavari link off taking from proposed Manibhadra dam, about 6500 MCM water is reaching to Godavari River up-stream of existing Dowlaiswaram Barrage for further transfer along with surplus Godavari water for utilization in drought affected Krishna, Pennar and Godavari basins. With a view to keep the planning of link projects to further south beyond Godavari, an attempt has been made that even with alternative proposal Mahanadi (Barmul) – Godavari link off taking from proposed Barmul dam 6500 MCM water reaches Godavari at existing Dowlaiswaram barrage. The shortage of 1454 MCM will be augmented from the contribution of MSTG link reaching Mahanadi through Ganga – Damodar – Subarnarekha link and Subarnarekha – Mahanadi link.

Projected Benefits:

It is proposed to provide annual irrigation benefits in Odisha to CCA of 256770 ha (Annual Irrigation 351784 ha) and in Andhra Pradesh CCA 107189 ha (Annual irrigation of 91110 ha). The total CCA is 363959 ha and annual irrigation will be 442894 ha. The details are in Table – 1.1

Table 1.1
Districts wise command area and utilization under link canal

Sl. No.	State	District	Command area in ha	Utilization in M cum
1.	Odisha	Nayagarh	28057	348
		Khurda	106317	1318
		Cuttack	20448	254
		Puri Ganjam	9714	120
		Gajapati	92091	1142
			143	2
	Sub-total		256770	3184
2.	Andhra Pradesh	Srikakulam	73499	416
		Vizianagaram	15079	85
		Visakhapatnam	18611	105
	Sub-total		107189	606
	Grand total		363959	3790

The salient features of the link canal are given at **Annexure 1.1**. The salient features of Hirakud Project and Salia Project are given at **Annexure 1.2 and 1.3** respectively. The salient features of Dowlaiswaram barrage project are given at **Annexure 1.4**. The salient features of Barmul dam are given at Annexure **1.5.1**.

Six dam projects at Salki and Ong in Ong sub-basin and Uttei Roul Integrated Project, Khadago, Udanti and Tel Integrated Project in Tel sub-basin in Mahanadi basin will be integrated to Mahanadi(Barmul)-Godavari(Dowlaiswaram) link Project. It is proposed to provide irrigation to an area of 1.82 lakh ha in Odisha state through these six dams in addition to Power generation of the order of 240MW (Refer **para 13.1.1.3**) and domestic water supply of 125 MCM. The Salient features of these projects are given at **Annexure 1.5.2 to 1.5.7**.

1.7 Climate

The climate of the Mahanadi river basin upto Barmul dam site is tropical monsoon type with three distinct seasons viz., the monsoon season from June to September, winter from October to February and summer from March to May. The hottest and coldest months of the year are May and December respectively.

The climate of coastal regions of Odisha and Andhra Pradesh States, in which the Mahanadi(Barmul)- Godavari(Dowlaiswaram) link traverses is mostly Tropical Rainy.

The mean maximum temperature in the command area proposed en route the link canal ranges from 23.60⁰ C to 40.10⁰ C. Mean minimum temperature varies widely from 13.90⁰ C to 32.00⁰ C.

The mean annual rainfall in the command area varies from 1032 mm to 1166 mm.

1.8 Topography, physiography and geology of the area

The details on the topography, physiography and geology of the Barmul dam site, are presented below in brief.

The river Mahanadi emerging from 23 km long Satkosia Gorge near Barmul is flanked by isolated hills on both the sides. Goldei hill on the right and Faigeni hill on the left.

The area predominantly consists of Archaean rocks represented by folded Khondalites, Granitic gneisses and Charnockite. They are interlarded and appear to grade into one another.

The link canal mostly runs along the Eastern Ghats upto about 530 km of its initial reach in Odisha and Andhra Pradesh States and the further portion mostly in coastal plains which slope gently towards the Bay of Bengal. Major soil types encountered along the alignment are alluvial soils, laterite soils, red soils and black soils.

Geologically, the region along the canal alignment comprises of consolidated gneiss rock formation, semi consolidated tertiary sedimentaries, Khondalite and Charnockite group of rock formations.

1.9 Population

Due to the submergence of Barmul reservoir, about 93 villages comprising of 58000 persons (2011 census) would be affected. The people in the Mahanadi deltaic region are Chronically suffering from flood ravages. After construction of the reservoir and link canal the people living in the deltaic region will get some relief from floods.

About 44 families comprising of 300 people would be affected by the additional submergence that would take place due to the proposed raise in the FRL of the existing Salia reservoir.

People living in the enroute command area are mostly dependant on agriculture and extending irrigation facilities to an extent of 3.64 lakh ha will increase agricultural production and also lead to continuous, steady and all-round prosperity.

Out of the total work force in the districts lying en route the link canal, 39% are cultivators, and 29% are agricultural labour. Similarly, the people living in the districts situated further south, which will be benefited by the diverted water, are mainly dependent upon agriculture.

1.10 Natural resources

The major minerals available in Nayagarh, Khurda, Ganjam and Gajapati, districts of Odisha, through which the link canal is aligned, are Limestone, Manganese, Fireclay and Monazite. Bamboo, Cashew, Kendu leaves and timber are the minor forest produce.

The major minerals available in Srikakulam, Vizianagaram, Visakhapatnam and East Godavari Districts of Andhra Pradesh, in which the link canal is

aligned, are Quartz, Manganese, Lime kankar, Lime shell, Graphite and Mica. Bamboo, Teak, Beedi leaves, Cashew, Casuarina, and Eucalyptus are the forest produce in the region.

1.11 Land use and socio- economic aspects

The land use pattern in the districts through which the link canal passes, is furnished in **Annexure 1.6**. The land use pattern in the proposed command area enroute the link canal is furnished in **Annexure 1.7**.

More than 70% of the population in the command area are dependent on agriculture. The literacy rate is less than 50%. More than 85% of the agricultural land holdings are small.

1.12 Choice of the project

The water balance studies of the Mahanadi basin upto the Barmul dam site (Assessed by NIH) and Godavari basin upto Dowlaiswaram carried out by NWDA, reveal that even after full development there will be surface water surplus in these basins, whereas, the river basins located further south including Krishna, Pennar, Cauvery and Vaigai, are established to be deficient in water resources. Hence, the only option available to meet the deficits of Krishna and other southern basins is by diverting surplus Mahanadi and Godavari waters to Krishna and from there to Pennar, and further south. The Mahanadi (Barmul) – Godavari (Dowlaiswaram) link, which connects Mahanadi and Godavari rivers, is the first link in the series of links proposed under Peninsular rivers development component. As such, the success of water diversion proposals from Godavari basin to Krishna basin and beyond mainly dependent on the water diversions from Mahanadi basin through this link.

1.13 Stages of development of the project

As mentioned above, the Mahanadi (Barmul) - Godavari (Dowlaiswaram) link off-takes from the proposed Barmul reservoir on Mahanadi river. The construction of the link canal shall be synchronized with the construction of dam and appurtenant works of Barmul project. The construction work of the link project is proposed to be completed in eight years. It is proposed to complete all the preliminary works such as additional surveys, design studies, laboratory tests, construction of approach roads etc. in the first three years. The process of land acquisition and thereafter rehabilitation and resettlement, procurement of machinery and T&P are proposed to be taken-up from the first year itself and can be completed by the end of third year. Construction of colonies and approach roads for the same and laying of electric lines shall also be commenced from first year onwards. The

construction of power block, power house, head regulator and tunnels are to start with excavation from the fourth year and would be completed by the end of seventh year. The excavation of canal is to commence from third year and construction of the cross drainage and cross masonry (CD and CM) works is proposed to be completed by the end of eighth year. The lining work of the entire length of canal will be started in fourth year and the same will be completed by the end of eighth year. The distributary system as well as drainage including command area development are programmed to be taken-up simultaneously in the third year and can be completed by eighth year. The proposed diversion to Godavari river will be started by the end of eighth year.

1.14 Fitment of the scheme in overall development of the region

The Mahanadi - Godavari - Krishna - Pennar - Cauvery - Vaigai - Gundar link proposal will be a boon to the entire peninsular region covering the States of Odisha, Andhra Pradesh, Telangana, Karnataka, Maharashtra, Tamil Nadu and Pondicherry. The main aim of the project is to divert the waters from surplus basins to the deficit basins, for the overall development of the region. As its part, the Mahanadi (Barmul) - Godavari (Dowlaiswaram) link is proposed to serve as carrier from Mahanadi to Godavari to divert the surplus waters of Mahanadi to Godavari besides irrigating new areas enroute the link. Thus, the Mahanadi (Barmul) - Godavari (Dowlaiswaram) link project forms an essential integral part of the Peninsular Rivers Development component. And the enroute irrigation component of the link would enhance the overall development of the regions.

1.15 Integrating the scheme with neighbouring basin schemes

The Mahanadi (Barmul) - Godavari (Dowlaiswaram) link envisages diversion of surplus Mahanadi waters to Godavari basin. Enroute, the link canal passes through various minor river basins lying between Mahanadi and Godavari viz., (i) Basin area covered by the Streams between Mahanadi and Rushikulya, (ii) Rushikulya (iii) Basin area covered by Streams between Rushikulya and Vamsadhara (iv) Vamsadhara (v) Nagavali (vi) Basin area covered by the Streams between Nagavali and Godavari and meets the irrigation and drinking water needs of the areas which were not covered by any of the schemes in these basins.

1.16 Inter-State/International aspects

The Mahanadi(Barmul)- Godavari(Dowlaiswaram) link Project lies in Odisha and Andhra Pradesh states. However, this link is an integral part of the Mahanadi-Godavari-Krishna-Pennar-Cauvery-Vaigai-Gundar link system, which envisages transfer of surplus Mahanadi and Godavari waters to the

Krishna, Pennar, Palar, Cauvery, Vaigai basins etc. Hence, a broad consensus among the states of Odisha, Maharashtra, Madhya Pradesh, Chhattisgarh, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu and Pondicherry has to be reached before taking up the project. More details about inter-State aspects are given in **Chapter 3: Inter-State Aspects**. There are no international implications in this scheme.

1.17 Cost and benefits of the scheme

The total estimated cost of link project is Rs. 54019 crore. The total cost of head works is estimated to be Rs. 4888 crore, while the total cost of link canal system and the canal power component works out to Rs. 48082 crore and Rs. 1049 crore respectively. The cost estimates are based on the 2018-19 schedule of rates.

The Mahanadi (Barmul)- Godavari(Dowlaiswaram) link is an integral part of the Peninsular rivers development component under the National Perspective Plan proposals. The surplus flows of the Mahanadi, to be received through the Mahanadi-Godavari link are proposed to be utilized in Godavari delta and thus available additional Godavari waters and the surplus waters of Godavari river will be further transferred to water short Krishna, Pennar, Cauvery, Vaigai and Gundar basins. As such, it will be more appropriate to assess the costs and benefits of Mahanadi – Godavari link only after the overall economics of the entire inter-linking proposal under peninsular rivers development i.e., Mahanadi - Godavari - Krishna - Pennar - Cauvery - Vaigai - Gundar link is finalised. However, to reflect a broad general idea of the economic viability of the scheme, the B.C. ratio of this link has been estimated on the basis of benefits that accrue due to irrigation, power generation and water supply for domestic and industrial uses contemplated under this particular link only.

While working out the total cost, cost of head works, link canal, power component and cost of command area development are considered. The total cost of the project is estimated to be Rs.54019 crore based on the 2018-19 rates. The capital cost for enroute water utilisation component has been worked out on the proportionate water utilisation basis in the enroute command area under the link canal and it works to Rs 25659 crore.

The net annual benefits from enroute irrigation for a CCA of 545959 ha (363959+182000) have been worked out to be Rs. 3326 crore The net annual benefit from water supply for domestic and industrial uses to be Rs. 1730 crore and that of power generation is Rs 1002 crore. The net annual benefits from the project has been worked out to be Rs 6058 crore.

Thus, the B.C. ratio works out to be 2.08. Details of benefit-cost analysis are given in **Chapter 13: Benefit – Cost Ratio**.

1.18 Public co-operation and participation

The scheme is intended to provide irrigation, domestic and industrial water supplies to enroute areas lying in the Odisha and Andhra Pradesh States where the existing irrigation facilities are not adequate. It will also enable diversion of more Godavari waters to water short Krishna and Pennar basins etc, as a major portion of the total irrigation requirement of Godavari delta is proposed to be met with diverted Mahanadi water in place of Godavari waters. Therefore, the co-operation and participation from the public is a must for the scheme as it is vital for the overall development of the Peninsular India.

1.19 Public views on benefits and proposed levies

As the areas proposed to be benefited by the scheme are frequently drought-stricken, the local public, by and large, are found to be welcoming the schemes of inter-linking the Peninsular rivers in general and the Mahanadi(Barmul)- Godavari(Dowlaiswaram) link in particular. The schemes are also seen as a means for mitigating the flood damages, especially in the delta regions further down along the Peninsular river basins.

The project after coming into reality will boost all-round development of the region and reduce the socio-economic imbalance by enhancing employment opportunities and agricultural production. As such, acceptance of any new levies to be imposed, after implementation of the project, which will be for the betterment of the regions, may not be a serious problem.