

Chapter 11

Environmental and Ecological Aspects

11.1 General

Survival of the mankind, with its alarming increase in population growth is linked in the long term, requires a stable eco-system and increase in food production, for which the development of water resources is unavoidable. The development of water resources project is linked with change in the environment of the area due to construction of reservoirs because of submergence of land, displacement of population including the flora and fauna and resettlement in the surrounding catchment, denudation of forest, water logging, salinity and alkalinity of soil, water quality and ground water table change, etc.

The environment and ecology is degraded by both inappropriate and lack of development. In respect of disturbance of environment, there are two schools of thoughts. One school holds that eco-system is fragile and highly unstable. It is implicit, therefore, that eco-system should be left as much as possible in its natural state and that its diversity should be preserved at any cost. Modification for the purpose of development should be minimal and confine to the range of tolerance limits of various elements of eco-system. The second school of thoughts assuring that the eco-system is globally stable and there is large element of built in resilience in eco-system. In any case, it is realized that the water resources projects should be planned to be aimed for the sustainable developments of the inter-connected elements that co-exist in the system.

Water resources development that meets the needs of the present generation without compromising the ability of future generation to meet their own needs will alone be considered as a sustainable development. It is, therefore, realized that the water resources projects should be planned, implemented and managed in such a way that the future demands of the growing population have to be met with minimum disturbance to the existing eco-system along with the incorporation of adequate control measures at appropriate stages to mitigate the adverse effects, if any; to maintain the sustainability of the system, in long run.

11.2 Environmental and Ecological Aspects of Storage Reservoirs

The Pennar (Somasila) – Palar - Cauvery (Grand anicut) Link Project does not involve construction of any new storage reservoirs. Also looking at the region through which the 529.19 km long link canal is traversing, it is not expected to lead to any adverse environmental impact. Hence, detailed environmental impact study is proposed to be carried out at the time of preparation of DPR. A general treatment of the environmental impact of the link project is given here.

11.3 Impact of the Link Canal

Major impact of the link project could be on account of land acquisition for construction of canal, rehabilitation and resettlement of the affected population in the affected villages due to construction of the link canal, environmental impact due to formation of canal water body and introduction of irrigation in the command area enroute of the link canal.

The link canal will utilize the existing Somasila reservoir on river Pennar in Andhra Pradesh at head and existing Grand Anicut on river Cauvery at its tail end as such there will not be any adverse environmental impact due to reservoirs.

11.3.1 Land Acquisition

The land acquisition for the link canal involves 9589 ha for main canal, 33 ha for offices and staff colonies and 3086 ha for borrow areas. Out of the total land to be acquired as above, 10080 ha is patta land, 1025 ha is forest land and 1603 ha is government land other than forest.

The link canal crosses some patches of forest areas enroute. Suitable provision towards the cost of afforestation is made in the estimate for the construction of the link project. In addition to this, spoil banks of the link canal are proposed to be used for social forestry.

11.3.2 Rehabilitation and Resettlement of affected Population

The link canal alignment does not cross any built-up area and hence no rehabilitation and resettlement of displaced population is anticipated.

11.3.3 Environmental Impact

11.3.3.1 Ground Water

The ground water in the command area fluctuated between 20.19 m and 2.00 m in pre-monsoon season and between 17.34 m and 0.52 m in the post monsoon season below ground level as per the data observed during 2002 by the Central Ground Water Board. It is observed that the area is underlain by hard rocks and yielding capacity of open wells and their sustainability in general are poor. The open wells in most of the cases except those that tap alluvial aquifers act as mere collector wells, dry up as summer advances. The fluctuation of levels in some of the observation wells during post monsoon is high due to failure of monsoon in 2002. Quality-wise, the ground water is saline in areas near the seacoast. The ground water is good and potable in other areas of the command. Availability of ground water in the area is moderate. The available ground water potential, draft, etc. based on district-wise CGWB statistics and the fluctuation data at the observation wells in and around the command area are dealt in Chapter on Command Area Development.

The maximum ground water level in pre-monsoon is 20.19 m below ground level as indicated in the Chapter on "Command Area Development". It means, in general ground water is deep. Hence, seepage from canal and irrigated fields may not cause water level to rise to such an extent to create water logging problem generally. However in very limited areas near coastal region, there is a possibility of rising level, which may lead to water logging and salinity conditions. In such areas, suitable schemes should be devised to use the additional water accrued from seepage as a part of command area development programme. Also enough drainage facilities may be provided so as to flush out the excess water accumulated by way of rise in under ground water level.

11.3.3.2 Surface Water

By way of import of water through this link, there would be an increase in the surface water availability in the region. At the crossing of natural drainages by the link canal suitable cross drainage works are proposed for smooth passage of flows in these drainages. The regeneration from the command area is likely to add to the available flows in these natural drainages.

11.3.3.3 Pollution and Industrial Development

The project command area does not have any major industries at present and, as per available data no additions is anticipated in the immediate future, as such, the area is free from industrial pollution.

The introduction of irrigation is likely to give an impetus for the growth of agro-based industries leading to some pollution in a very few limited pockets of the area, where strict measures may have to be undertaken to control the pollution. However, this is not expected to lead to any large-scale pollution.

11.3.3.4 Aquatic Life

There is no specific information available in respect of fish production in and around the Pennar-Palar-Cauvery Link Project command area. The formation of the link canal is not likely to cause any impact on the aquatic life. However, the fish production in the districts falling in the command area during the year 1997-98 is given in Table 11.1.

Table 11.1
Estimated Fish Production During the Year 1997-98

Sl. No.	Name of district	Fish Production in tonnes
1	Nellore	13935*
2	Chittoor	1046*
3	Tiruvallur	7585
4	Vellore	4990
5	Kancheepuram	6050
6	Tiruvannamalai	4649
7	Villupuram	4600
8	Cuddalore	3040
9	Pondicherry	4900*

* Statistics of 2001

Source: (1) Statistical Handbook of Tamil Nadu -1998 (2) Statistical Handbook of Pondicherry- 2001 (3) Statistical Handbook of Nellore & Chittoor Dts.-2001

The formation of the link canal is not likely to cause any impact on the aquatic life.

11.3.3.5 Public Health

The area as at present does not come under malaria zone and no health risks are anticipated. However, formation of a water body in the shape of the link canal and conversion of the hitherto dry area into wet area might result in introduction of water borne diseases unless precautionary measures are taken. Adequate supplies of medicines to the public health centre will have to be ensured to prevent and contain the flare up of epidemics, apart from creating adequate infrastructure facilities for the same.

11.3.3.6 Water logging and Salinity

The ground water table is well below the root zone of the crops. However, the irrigation supplies to the command area would add to the ground water recharge. This may raise the ground water table in some areas, which may lead to water logging and salinity conditions. Adequate natural drainages are available in the area to drain the water from the command area. Though no serious water logging problems are anticipated, studies and regular observations on the behavior of the soils in the area will have to be carried out for a few years before and after introduction of irrigation in the area.

11.3.3.7 Climate and Ecology

The construction of the link canal is not likely to cause any significant change in the ecology of the area. The climate and ecological conditions of the area continue to be more or less same even after construction of the link canal.

11.3.3.8 Natural Resources

No mineral resources are likely to be lost as a result of construction of the link canal.

11.3.4 Beneficial Impacts of the Link Canal

11.3.4.1 General Benefits

The link project would greatly help in improving the general prosperity of the region on account of the following:

- i) Introduction of the irrigation in about 4.912 lakh ha of the area hitherto almost devoid of any irrigation facility, would increase the agricultural production by about 10 times. This would lead to substantial rise in the average annual income of the local population, as they are mostly dependent on agriculture.
- ii) Agricultural development by introduction of irrigation would give impetus to agro-based small scale and cottage industries, dairy and poultry development, development of communication network, infrastructural, health and education facilities, rise in the economic activities, rise in the living standards of the general public and several other aspects of socio-economic development.
- iii) Environmental improvement of the region on account of afforestation program on the banks of link canal, branch canals and distributaries.
- iv) Adequate protected and fresh assured drinking water supplies to the rural and urban population, major chunk of which is hitherto suffering from acute shortages of potable drinking water.
- v) The link project would create a lot of employment opportunities to the local population during its construction period spreading over number of years. The continuous and increased agricultural operations due to irrigation and development in industrial, infrastructural and economic aspects would largely enhance the continued employment opportunities even after construction of the link project.

11.3.4.2 Employment Generation During the Construction of the Project

The data on employment generation in respect of Upper Ganga Canal Development & Modernization project (Govt. of U.P.) has been taken into consideration for assessing the employment generation in this project. This project is one of the nine irrigation projects considered by the Advisory Group on Expenditure and Employment Generation in Major and Medium Irrigation Projects set up by Central Water Commission in their study. As no data on employment generation by any other project is available, the employment generation norm of 35 persons per annum per investment of each crore rupee as on 1991-92, achieved in this

project has been taken into account for arriving at the employment likely to be generated during the construction of the link canal project.

The total estimated cost of the Pennar–Palar-Cauvery link project is Rs.6769 crore (based on 2003-04 price level). The employment generation potential of the project following the norms as mentioned above will be 12184 personnel per annum in the order of 2571 in the technical and 9613 in the non-technical categories. The technical category comprises of 808 engineers, 818 other technical, 945 skilled and semi-skilled personnel whereas the non-technical category comprises of 7340 un-skilled and 2273 administrative personnel, annually.

11.4 Impact Matrix

An impact matrix including the beneficial/adverse impacts, relating to physical, biological and socio-economic aspects is given in Table 11.2.

Table 11.2
Impact Matrix of Pennar – Palar – Cauvery Link Project

Sl. No.	Impact	Assessment
(A)	Physical Impacts	
(i)	Sedimentation	No significant sedimentation is expected.
(ii)	Seismic	Inconsequential, as no new storage reservoirs are proposed for the link project.
(iii)	Forest area acquired	1025 ha to be acquired along the link canal.
(iv)	Other area acquired	An area of 11683 ha consisting of both private and government land is to be acquired for construction of the link canal . Adequate provision towards cost of acquisition is kept in the estimate of the link canal.
(v)	Ground water recharge	The ground water condition will improve along the link canal and in the command area due to irrigation.
(vi)	Natural resources	Nil
(vii)	Irrigated area	An area of 491200 ha will be provided with irrigation by the link project. Because of regeneration and ground water recharge, the area currently under irrigation from tanks, wells, and other sources, etc. in the proposed command which is about 269000

		ha would also get stabilized.
(viii)	Hydropower	Nil
(ix)	Historical Monuments and archaeological structures	No historical monuments and archaeological structures are affected by the construction of the link project.
(x)	Salinity intrusion in delta and estuaries	Lean season flows in natural drainages do not get reduced but get increased to some extent and thus reduce the adverse impacts
(xi)	Salinity in irrigable area	No serious impact is anticipated
(xii)	Water logging	-- do --
(xiii)	Availability of drinking water	As the link canal is planned for providing domestic water to enroute areas, availability of water for drinking would improve
(xiv)	Quantity of water diversion	8565 Mm ³ at the off-take point
(B)	Biological impacts	
(i)	Public health aspects	No hazards are expected. Infrastructures for health aspects are likely to improve.
(ii)	Wild animals and birds	No adverse impacts are expected
(iii)	Other species	-- do --
(iv)	Availability of bio-mass	Increases.
(c)	Socio-economic impacts	
(i)	Socio-economic aspects	The project will increase the social status of all beneficiaries.
(ii)	Resettlement plans	Nil
(iii)	Land acquisition	A total area 11683 ha of land is to be acquired for the purpose of laying the canal. Suitable provision is made in the link project estimate.
(iv)	Farmers to be benefited	All the farmers of the land holdings of the command area will get the irrigation facilities.
(v)	Water quality downstream of storage	Water quality in the streams will improve with the addition to the lean season flows due to irrigation.

(vi)	Employment generation	Tremendous potential for employment generation during the construction of the project and continued large scale employment opportunities thereafter, are expected.
(vii)	Infrastructure development	Impetus to various infrastructure development aspect like industries, agricultural and related activities, communications, economic activities, health, education and all other spheres of socio-economic aspects is expected.
(viii)	General prosperity	The living standards of the population will substantially improve and the general prosperity of the region would get boosted during and after implementation of the project.