3.9 IRRIGATION

Introduction

Tamil Nadu covers 4 percent of the geographical area (13.01 Million ha) and caters to 5.96 percent of the population of the country with 7.21 crore people living along the 17 river basins. More than 95 percent of the surface water potential and 80 percent of groundwater potential have been put into use. The total water potential of the State including ground water is 47125 Mcum (1664 TMCft.). The total surface water potential of the State is 24160 Mcum (853 TMCft) including the contribution (7391 Mcum or 261 TMCft.) from the neighbouring States, viz., Kerala, Karnataka and Andhra Pradesh. Table 3.9.1 depicts the water potential of Tamil Nadu. The annual per capita water availability in India is about 2200 M^3 whereas it is about 750 M^3 in Tamil Nadu. As per World standards (per capita availability - 1000 M^3), our State is under water scarcity.

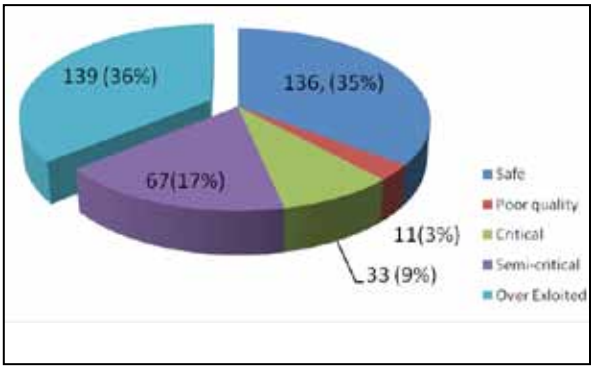
Table 3.9.1: Total Water Potential – (Tamil Nadu)

S. No	Details	Water Potential in TN	
		Million Cubic Metre (Mcum)	Thousand Million Cubic Feet (TMCft.)
1	Surface Water Potential		
	Within state	16769	592
	From neighbouring States	7391	261
	Sub-Total	**24160**	**853**
2	Ground Water potential	22965	811
	Total	**47125**	**1664**

Source: Water Resources Department, GoTN

The major problem is the conservation of water received through rainfall. The runoff coefficient is found to vary between 0.40 and 0.55 in Tamil Nadu. The normal annual surface flow works out to 6.07 million hectare metre (MHM) but the utilizable runoff is calculated as 2.33 MHM. The non-utilizable flow is due to lack of storage, unsuitable distribution of supply, evaporation and other losses. The total utilizable water resources of the State i.e., both surface and groundwater works out to about 5 MHM. There are 85 large dams and four small dams in the State with a combined storage capacity of 238.58 TMCft. The annual ground water replenishable resources of the State has been estimated as 811 TMCft. out of which, the net annual ground water availability has been assessed as 729.65 TMCft. and the present ground water requirement for irrigation has been assessed as 519.83 TMCft. As on 31.3.2009, out of the 386 blocks in the State (including Chennai), 139 blocks have been categorized as over exploited, 33 blocks as critical, 67 blocks as semi critical, 11 blocks as poor quality and balance 136 blocks as safe (Graph 3.9.1).

Graph 3.9.1: Blockwise Ground Water Status in Tamil Nadu



Area Irrigated and Sources of Irrigation

The State's irrigation potential in per capita terms is 0.08 ha. when compared to the all-India average of 0.15 ha. The three main sources of irrigation in the State are rivers, tanks and wells. There are about 41,127 tanks, 2,239 irrigation main canals and 18.26 lakh irrigation wells in the state. The area irrigated by various sources is furnished in the Table 3.9.2 and Graph 3.9.2

Table 3.9.2: Source-wise/year-wise Irrigated Area - Tamil Nadu (in L.ha.)

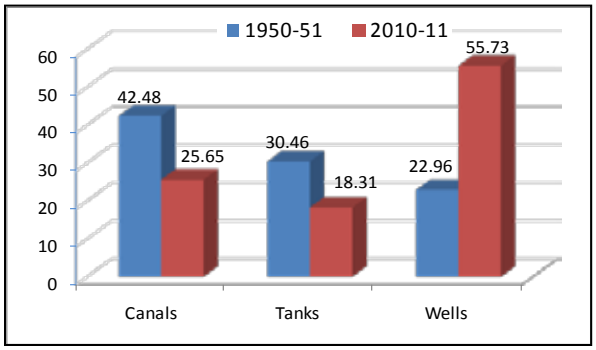
S. No.	Source	1950-51	2000-01	2010-11
1	Canals	7.88(42.48)	8.01(28.60)	7.47(25.65)
2	Tanks	5.65(30.46)	5.37(19.17)	5.33(18.3)
3	Wells	4.26(22.96)	14.49(51.73)	16.23(55.73)
4	Others	0.76 (4.10)	0.14(0.50)	0.09(0.3)
5	Net area irrigated	18.55	28.01	29.12
6	Gross area irrigated	24.45	34.12	33.48

Source: Season and Crop Report.(Various Issues)
Figures in parentheses indicate percentage to net area irrigated.

Agriculture is the single largest consumer of water in the State consuming 75 percent of the State's water resources. About 58.78 percent of the net area sown is benefited by irrigation. The State has a net irrigated area of 29.12 lakh hectares (L.ha) (2010-11). The irrigation intensity (ratio of gross irrigated area to net irrigated area), worked out to 129.32 percent during the 1950s, and it declined to 124.90 percent during the 1990s and it has come down further to 115.00 percent in 2010-11. The area irrigated by canals marginally increased from 7.88 L.ha in 1950-51 to 8.01 L.ha in 2000-01 and subsequently declined to 7.47 L.ha in 2010-11. However, the share of canal irrigation in the net area irrigated declined from 42.48 to 28.60 percent between 1950-51 and 2000-01 and has further fallen to around 25.65 percent in 2010-11.

Graph 3.9.2: Sources of Irrigation

(in %)



The approximate storage capacity of tanks in the State is estimated as 5,067 Mcum (178.94 TMCft - 21 percent of the annual water potential), which is almost equal to that of the reservoirs. However, the tank irrigation system has deteriorated over time, which is shown by the decline in the area irrigated under tanks falling from 30.46 percent in the 1950's to roughly 18.30 percent in 2010-11. This might be due to failure of monsoon, reduction in the storage capacity of tanks due to silting, lack of adequate management of tanks and the supply channels and unscientific water management practices followed by farmers.

Next to tank irrigation, lift irrigation through individually owned wells is the major source. The number of wells, which in 1951 was only 14,400, increased to 15.28 lakhs

by 1996 and to 18.26 lakhs in 2010-11. The drinking water and domestic needs are growing with the increase in population and also improvement in lifestyle. The drinking and domestic requirement has been projected as 2438 Mcum for the year 2010 and as 2791 Mcum for the year 2025 and as 3460 Mcum for the year 2050. As per the National Water Policy 2002, the drinking water gets first priority. (Report of the Expert Committee on Development and Management of Water Resources of Tamil Nadu- Vol I, March 2003). The total demand of water for all sectors works out to 54403 Mcum as of now which may increase up to 57716 Mcum by the year 2050. But the availability of water resources both ground and surface water in a normal year is only 47125 Mcum. Thus there will be a deficit of 10591 Mcum in 2050.

The Water Resources Department (WRD) piloted a multi-disciplinary approach to work in an integrated manner in modernizing irrigated agriculture over a demonstration area of about 3000 ha in Hanumanadhi sub-basin of the Tamiraparani river system. Under this project, interventions like system tank improvement, drip and sprinkler irrigation and introduction of tissue culture banana were undertaken. This approach is the first of its kind in the department which fostered engineer-extensionist-farmer linkages and helped line departments to work together. The Project Appraisal Document of ICR Mission for the Water Resources Consolidation Project (WRCP) reported that there was a perceptible change in the mindset of officers and farmers.

In the Eleventh Five Year Plan period, the multi-disciplinary approach continued and the Irrigated Agriculture Modernization and Waterbodies Restoration and Management (IAMWARM) project envisaged the promotion of activities of all the eight line departments with a view to ensure benefits to all the stakeholders at sub-basin level. During the Twelfth Five Year Plan period, the non-system and rainfed tanks, the anicuts/ diversion weirs and supply channels which are the life line to tanks and other tank appurtenances will be given importance for rehabilitation. This approach will ensure the sustainability of rainfed agriculture. The need for capacity building of farmers, functioning of Water User Associations (WUAs) in water management etc is seriously felt and towards this, appropriate training was imparted which paved the way for adoption of drip, sprinkler irrigation and System of Rice Intensification (SRI) method of rice cultivation.

Another aspect threatening water sector is the over-exploitation of groundwater. In order to overcome this issue and to augment the groundwater potential, Master Plan for Artificial Recharge scheme was conceived and construction of check dams, percolation ponds, recharge shafts etc., were implemented and such groundwater development schemes ensured the income for small farmers.

The past experiences revealed that floods and drought occur in a cyclic manner and both affect the agricultural activities. The management of floods has been given serious thought and right choice of schemes are posed and implemented with the grant assistance from the Government of India (GoI).

Present requirement for the State with limited water resources is to take up more number of Extension, Renovation and Modernization (ERM) projects with the funds under Accelerated Irrigation Benefit Programme (AIBP). Our State has not yet efficiently utilized the funds of GoI under AIBP. Apart from this, the utilization of surplus flood flows in the coastal areas through pumping schemes for the benefit of higher command, artificial recharge schemes, flood management programmes, coastal protection work, restoration of traditional waterbodies are the viable solutions which would lead the irrigation sector to cater to the increasing demand.

The Centrally Sponsored Scheme of Command Area Development (CAD) and Water

Management Programme (WMP) are being implemented by the Agricultural Engineering Department, since 1980–81 onwards, in the command areas of the State. The CAD and WMP has been completed in 22 commands of the State in the past three decades and it will be continued in 25 commands during the Twelfth Five Year Plan period.

Review of the Eleventh Plan

Major, Medium and Flood Control Works

Under the Eleventh Five Year Plan, an outlay of ₹2341.36 crore was provided for major, medium and flood control works, out of which ₹2291.97 crore was spent.

Modernization of PAP Contour Canal

The Technical Expert Committee formed by the Government in the year 2007, recommended for total rehabilitation of Parambikulam Aliyar Project contour canal at a cost of ₹184.50 crore. So far, 7 percent of the work has been completed and remaining work would be completed during the Twelfth Five Year Plan period.

Box 3.9.1: Abinavam Tank Renovation-A convergent Model

Convergence of eight line departments through IAMWARM project has yielded remarkable results in Abinavam, a remote village in Salem district. Abinavam become the convergent point for dissemination of technologies such as SRI, Tissue Culture banana, drip irrigation, commodity groups and farm pond aquaculture. Water Resources Department initially repaired the sluices and desilted the supply channel which helped to stabilize an ayacut area of 368 acres. The concept of 'More Crop per Drop of Water' was overwhelmingly achieved in this village.

Source: IAMWARM Project, GoTN

IAMWARM Project

The IAMWARM Project funded by the World Bank is a six year project (2007-2013) covering 61 sub basins of Tamil Nadu benefiting an ayacut of 6.69 lakh ha. The total project cost is ₹2547 crore, out of which the WRD component is ₹1785.62 crore. Works in 60 sub-basins are in various stages of implementation. In this project, it has been proposed to modernize 4910 tanks, 659 anicuts and 8552 km length of supply channel in 324 packages covering 61 sub-basins. One additional sub-basin viz., Amaravathy sub-basin covering an ayacut of 53000 ha with an estimate amount of ₹118 crore has been sanctioned in December 2011 for execution by utilizing the savings amount in the project. So far, 3277 tanks, 563 anicuts and 5900 km. length of supply channel were rehabilitated.

Linking of Rivers within the State

The Government has taken the initiative to link the rivers within the State to primarily serve as flood carriers and to divert flood runoff to reach the drought prone areas. While interlinking the rivers, following points are to be emphasized: Adequate attention should be given to the life of the river and existing irrigation and agricultural practices, Inter-basin transfers should be done on the basis of equal contours and the Detailed Project Reports (DPRs) should be community oriented DPRs rather than on the contractual work based DPRs. In this direction, the following links have been identified

a. Interlinking of Cauvery-Agniar-SouthVellar-Pambar-Manimuthar–Vaigai– Gundar.

As a first stage of linking the river Cauvery with Agniyar, South Vellar and Pambar, construction of barrage across the Cauvery river below 250 m from the existing Kattalai bed regulator in Karur district at a cost of ₹234 crore is in progress. The project is nearing completion.

Fig. 3.9.1: Cauvery - Gundar Link – Barrage Construction

lnterlinking of Tamiraparani-Karumeniar-Nambiyar Link

The scheme aims for creation of a flood carrier canal from Kannadian channel to drought prone areas of Sathankulam and Thisaiyanvillai upto M.L. Theri sand dunes, stabilising the water starved ayacuts of the Manimuthar Channel in III and IV Reach and interlinking of Tamiraparani, Karumeniyar and Nambiyar rivers in Tirunelveli and Thoothukudi districts. This project DPR for a cost of ₹453.44 crore has been drafted for implementation in four stages in anticipation of approval under AIBP. By implementing this scheme, an extent of 23,040 ha. of land will be benefited including 17,002 ha. of new ayacut. The ground water level in the nearby wells will get enhanced. Works in stage I and II are in progress.

Flood Management Programme (FMP)

The Flood Management Programme is a Central and State shared scheme implemented in the ratio of 75:25. Out of seven schemes for a value of ₹657.16 crore sent to Ministry of Water Resources (MoWR), five schemes have been cleared for ₹634.54 crore by the Government of India. Works are in various stages of implementation.

Jawaharlal Nehru National Urban Renewal Mission (JNNURM)

To avoid flooding in Chennai city, a Central and State shared scheme is being implemented which will be carried out over a period of three years. This scheme was commenced in 2010. The Central Sanctioning and Monitoring Committee (CSMC) approved a total cost of ₹1447.91 crore.

Coastal Protection Works

To alleviate the problems of coastal areas, 32 anti-sea erosion works at a cost of ₹47.31 crore were completed under the Twelfth Finance Commission Grant-in-aid programme. Ten anti-sea erosion works were completed at a cost of ₹6.65 crore with the State funds. The 13th Finance Commission has allocated a grant of ₹200 crore for taking up coastal protection works over a period of four years (2011-2015). The High Level Monitoring Committee for the 13th Finance Commission Grant-in-aid Programme has approved 50 coastal protection works at a cost of ₹199.93 crore. For the year 2011-12, 26 works for an amount of ₹50 crore were taken up. The balance 24 coastal protection works at a cost of ₹200 crore over a span of three years (2012-2015) will be taken up during the Twelfth Five Year Plan period.

Participatory Irrigation Management (PIM)

The term of office of the Managing Committees of 1552 WUAs constituted in the WRCP implementation areas ended in 2009. Election to reconstitute these WUAs was held in 2009. The Tamil Nadu Farmers' Management of Irrigation Systems Act (TNFMIS Act) was amended for this purpose and the term of office was extended by 6 months. The responsibilities of Operation and Maintenance (O&M) of the distribution systems have been handed over to these WUAs. Tamil Nadu is the pioneering State in the constitution of distributary committees and project committees in the country. 161 distributary committees and nine project committees were constituted in the WRCP command areas. Further, farmers'

organizations were also constituted under the World Bank aided IAMWARM Project. So far, 2361 WUAs have been delineated under the IAMWARM Project command areas.

Minor Irrigation

An outlay of ₹824.00 crore was provided for ongoing and new minor irrigation works under the Eleventh Five Year Plan period, of which ₹314.20 crore was spent which was only 38 percent of the outlay. Under NABARD assisted RIDF schemes, 167 minor irrigation works, modernization and rehabilitation works have been taken up with a total project cost of ₹930.00 crore during the Eleventh Five Year Plan period. 122 works costing ₹428.00 crore have been completed and 45 works costing ₹502.00 crore are in progress.

Master Plan Artificial Recharge Scheme

Tamil Nadu is implementing the Master Plan Artificial Recharge Scheme 2008-13, at a cost of ₹550.00 crore. So far, 11567 artificial recharge structures have been constructed.

Restoration of Traditional Waterbodies

Under the 13th Finance Commission Grant-in-aid programme, 674 works for restoration of traditional waterbodies at a cost of ₹200.00 crore are being taken up. The balance 511 works will be taken up in the Twelfth Five Year Plan period. In addition, standardisation of tank bunds, strengthening of feeder channel, sluices and surplus weir will be taken up.

National Agriculture Development Programme (NADP)

Under NADP, the Government has sanctioned 23 works at a cost of ₹24.51 crore, of which 14 works at a cost of ₹18.98 crore have been completed and the remaining works are in progress.

Hydrology Project-II

The Hydrology Project-II assisted by the World Bank at a cost of ₹25.27 crore for a period of six years (2006-12) is being implemented in Tamil Nadu. The objective of the project is to enhance water resources management capabilities of the State, by developing Decision Support Systems (DSS) and Hydrological Design Aids (HDA) at river basin level. The development of DSS in the Tamiraparani, Vaippar and Agniar river basins are in progress. The development of the Hydrological Design Aids has been

commenced. The World Bank/MoWR are considering extending the project till June 2014.

Groundwater (Development and Management) Act-2003

Ground water resources need to be maintained and conserved for preventing over exploitation of ground water for sustainable development. Realizing the importance of, this issue, the Government of Tamil Nadu has enacted, 'The Tamil Nadu Ground Water (Development and Management) Act' in the year 2003. The Act incorporates the formation of a Tamil Nadu Ground Water Authority to regulate and control water development in the State of Tamil Nadu. As a prelude to the implementation of this Act, a 'Well Census' was taken up. The Study revealed that there were about 37 lakh wells in the State. This Act envisages groundwater resources protection and provision of safeguards against over exploitation. The Act ensures planned development and proper management of ground water resources of the State and for matters connected therewith or incidental thereto. Framing of rules and constitution of State Ground Water Authority is under consideration. The Act extends to the whole State except the areas to which Chennai Metropolitan Area Ground Water (Regulation) Act 1987 is applicable. The CMWSSB Ground water Act covers the areas abounding the Chennai Metropolis. Wells sunk by small and marginal farmers, domestic users, Government and research institution are exempted from this Act. This Act prohibits the unauthorized movement of ground water from notified areas. The Act prohibits unauthorized sinking of bore wells for private or public use.

Box.3.9.2: Institute of Hydraulics & Hydrology - A laboratory for irrigation project designs

Institute of Hydraulics and Hydrology (IHH), Poondi founded in 1944 has a long legacy in designing irrigation projects. The nearly 70 year old IHH of Water Resources Department in Poondi reservoir in Thiruvallur district has done commendable job in project designing and the campus had models of several irrigation projects implemented across the State. The designs of several projects are referred to the Institute where they are studied for flaws and impact assessment is done before being approved. Many coastal projects, including construction of sea wall along Ennore Expressway were studied at the Institute. The decision to construct groynes in the Cooum river estuary was taken up after a study was conducted at this Institute. Materials used for shore protection are also tested in the labs. Nearly 30 physical models of various projects are in the campus. Some working models of schemes taken up in 1970s and 1980s are still retained on the campus. The institute studies the changes in Tamil Nadu coastline twice a month and the data assists in implementing projects in disaster prone areas. The Institute attracts engineering students to understand the working of irrigation systems, their catchment area, canals, storage and purposes. A research library in the Institute housing over 30,000 titles is available for reference.

Source: The Hindu dated 14.03.2012

Command Area Development and Water Management Programme (CAD& WMP)

Under the centrally sponsored scheme of CAD and WMP, farm development works such as construction of field channels, rotational water supply and construction of field drains are taken up with farmers' participation to improve water use efficiency in canal irrigated areas. One time functional grants at the rate of ₹1000/- (State share ₹450/-, Central share ₹450/- and farmers share ₹100/-) per ha. is given to farmers council for maintenance of assets created under the programme.

An amount of ₹114.11 crore was spent against an outlay of ₹148.00 crore covering an area of 1.10 L.ha.. During the Eleventh Five Year Plan, CAD&WMP was continued in the six ongoing projects. Besides this, the programme was taken up in the 11 new project command areas as per the approval by the Government of India.

Table 3.9.3: Performance of Command Area Development – Eleventh Plan

S. No.	Name of the Project	Area Covered (in Ha.)	2007-12 (₹ crore)	
			Expenditure	Expenditure (State Share only)
1	Cauvery Command	20012	71.07	26.56
2	Thamiraparani river basin project	2260	3.57	1.78
3	Gadana & Ramanadhi irrigation system	1554	2.69	1.35
4	Nambiyar river basin system	955	1.71	0.86

Table 3.9.3: Performance of Command Area Development – Eleventh Plan (Contd.)

S. No.	Name of the Project	Area Covered (in Ha.)	2007-12 (₹ crore)	
			Expenditure	Expenditure (State Share only)
5	Patchaiyar river basin system	704	1.49	0.74
6	Manimuthar irrigation system	4522	6.83	3.41
7	Ichampadi anaicut project	2008	3.97	1.98
8	Vaniyar reservoir project	3758	7.15	3.57
9	South Vellar river basin project	6017	13.12	6.56
10	Gundar Chittar Karuppanadhi project	14996	34.40	15.20
11	Tirukoilur anaicut project	9434	23.32	10.66
12	Wellington reservoir project	9731	24.91	11.45
13	Kodiveri anaicut project	8909	18.44	9.22
14	Vaigai project	22408	43.98	17.56
15	Kodaganar reservoir project	2743	5.22	2.61
16	Varadhamanadhi reservoir project	300	0.61	0.30
17	Kalingarayan anaicut project	300	0.61	0.30
	Total	**110611**	**263.09**	**114.11**

Source : Agricultural Engineering Department, GoTN

Twelfth Five Year Plan Objectives

The major objectives of Irrigation sector are: i) improving the overall efficiency of the system by rehabilitation of irrigation structures and proper upkeep, micro irrigation etc and ii) conveyance/lifting of surplus flood flows to drought prone areas. It also aims to improve the farmers' income and increase the productivity which would increase rural employment opportunities and fuel the economic growth by reducing rural poverty.

Strategies

Vision Tamil Nadu 2023 sets the plan for infrastructure development for the State and it envisages the development of eleven projects that will create a huge positive impact and provide significant spin-off benefits. In irrigation sector, a large watershed and water management project (programme) all over Tamil Nadu that increases the storage capacity (including that of groundwater) by 100 percent has been contemplated. Irrigation projects involving connectivity of farms with canals and dams and cleaning of water resources such as tanks, wells and dams has

also been planned in the Vision Tamil Nadu 2023. The following proposed strategies in irrigation sector in the Twelfth Five Year Plan are aligned to achieve the above objectives.

- Restoring the storage capacities of the old reservoirs and the tanks which are heavily silted up. All the tanks in the State can be brought under one umbrella. 21609 minor irrigation tanks under the control of Panchayat Unions and 3884 other important waterbodies will be restored and improved by dovetailing funds from various schemes like Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and NABARD loans during the Twelfth Five Year Plan. After rehabilitation, these tanks can be handed over to the stakeholders for further maintenance. Hence, all the tanks available in the State can be rehabilitated to the standards to increase the storage potential.
- To extend the multi-disciplinary approach based on the experiences gained through the IAMWARM project in an integrated manner.
- To utilize surplus flood flows draining into the sea by putting up small structures and conveying it to drought prone high level commands by pumping schemes.
- To extend the PIM activities in all the command areas and to hand over the distribution system maintenance to WUAs so as to bring about a reasonable reduction in the maintenance cost and efficient distribution of water. Collection of water rates for irrigation shall be handed over to WUAs. PIM experiences in other States need to be studied and appropriate measures will be taken for improving the PIM legislation.
- To implement the Ground Water (Development & Management) Act, 2003
- To remove the encroachments in waterbodies and protect them in an efficient manner.
- To give special emphasis for reducing the gap between the water potential created and utilized through bench marking of irrigation projects and water use efficiency studies in all the irrigation systems.
- To augment ground water potential through construction of artificial recharge structures and rain water harvesting systems for sustainable ground water development and management.
- To give priority for restoration of the flood affected water courses.
- To augment the surface water potential by way of inter-basin transfer by inter-linking of rivers within the State.
- To increase the gross irrigated area and irrigation intensity, Extension, Renovation and Modernization (ERM) projects to be taken up with the financial assistance from AIBP.
- FMP will be extended to all major rivers to tackle the floods in an efficient manner.
- To increase the water holding capacity, top priority will be given to Restoration, Renovation and Rehabilitation (RRR) of traditional water bodies.
- To ensure dam safety measures and to enhance the system efficiency by implementation of Dam Rehabilitation and Improvement Project (DRIP).
- To impart training to the WRD engineers on irrigation by organizing post graduate courses through reputed institutions on the following titles: 'Hydraulics and Water Resources Engineering, Irrigation Water Management, Environmental Engineering, Soil Mechanics and Foundation Engineering, Remote Sensing and GIS, Ocean Engineering and Management.
- Adequate training programme and refresher courses are necessary for the WRD engineers and field staff. The Irrigation Management Training Institute, (IMTI), Trichy has to be strengthened further by exploring the success of other State IMTIs, Water and Land Management Institute

(WALMI) etc. In addition, establishing institutions like Engineering Staff College of India, Human Resources Development Centre as in the neighbouring States may also be considered.

- To encourage crop diversification, considering the agro climatic conditions of the basin and water availability.
- To prevent the pollution of waterbodies such as rivers, streams, reservoirs, tanks, etc., and to reuse the treated effluent water for irrigation.
- To intensify the public awareness and training activities on water management in order to increase the efficiency of water use by implementing change management.
- To encourage more active participation by women in irrigation management.
- To ensure equitable distribution of water to all water users.
- To prepare and implement action plan for National Water Mission.

Proposals for the Twelfth Five Year Plan

The following major, medium and flood control schemes, minor irrigation and CAD&WMP schemes are proposed to be taken up during the Twelfth Five Year Plan viz., improvement to new Veeranam in Cuddalore district for water supply, providing irrigation facilities to 58 villages in Madurai district, Bathalapalli dam across Malattar river in Vellore district, new tank across Kallar Odai near Viswakudi in Perambalur district, rehabilitation of Nilayur channel in Madurai district, Palamparavoo and PT Rajan channel in Theni district, South Main channel of Srivaikundam anicut across Tamiraparani river and its tanks in Thoothukudi district.

Major, Medium, Minor and Flood Control Works - IAMWARM project

Under IAMWARM project, during the Twelfth Five Year Plan, remaining works in the tanks, anicuts and supply channel would be taken for rehabilitation and modernisation. Sub-basin modernistion works in Amaravathy sub-basin has been taken up additionally during 2012-2013 at a cost of ₹128.31 crore, thus benefitting a further 53000 ha. of ayacut area.

Comprehensive Groundwater Monitoring System

At present, there are 1,271 piezometers and 1,741 shallow observation wells in Tamil Nadu to monitor the ground water. The Union Planning Commission recommends for one ground water level observation piezometer per 100 groundwater abstraction wells. However, Tamil Nadu requires 20,130 observation piezometers. Thus, Tamil Nadu require 16,000 additional piezometers. Therefore, it is proposed to strengthen the ground water monitoring system by establishing one piezometer in all villages. An amount of ₹160.00 crore is provided for this scheme.

Accelerated Irrigation Benefit Programme (AIBP)

Accelerated Irrigation Benefit Programme (AIBP) was conceived in the year 1996-97 in order to expedite completion of selected on going major and medium irrigation projects. The revised AIBP guidelines issued in the year 2006 include the Minor Irrigation Schemes (benefitted ayacut less than 2000 ha.) and Extension, Renovation and Modernization (ERM) schemes for funding under this programme. The funding pattern for Central and State share in DPAP blocks is 90 :10 and other projects it is 25 : 75 under AIBP. It has been proposed to take up ERM of River Systems, renovation and modernization of anicuts / tanks, formation of reservoirs, construction of anicuts, check dams and excavation of new supply channels to assure benefits from the irrigation projects.

Linking of Rivers Within the State

During the Twelfth Five Year Plan, the following major river links in Tamil Nadu are proposed.

1. Pennaiyar (Krishnagiri Reservoir) to Palar
2. Pennaiyar (Sathanur Dam) to Palar
3. Cauvery (Mettur Dam) to Sarabanga (Namakkal)
4. Athikadavu – Avinashi Canal
5. Cauvery (Kattalai Barrage) to Gundar
6. Recharging of Ground Water Aquifers

I shall pass through this world only once and if any kindness to show I can or any good things to execute I can do for which - I shall not pass through this world again.

- Col. J. Penny Cuick

i) Linking of Pennaiyar (Krishnagiri Reservoir) to Palar

Linking of Pennaiyar (Krishnagiri Reservoir) to Palar envisages transfer of 3.5 TMCft. of annually available water at the Krishnagiri Reservoir as flood flows to Kallar, a tributary of Palar. This link canal (55.7 km length) with an off-take tunnel at 200m below the reservoir will have gravity flow. The scheme will stabilise an existing command area of about 2931 acres besides recharging the ground water potential of the Palar basin.

ii) Pennaiyar (Sathanur Dam) to Palar

It is proposed to connect the Pennaiyar in Thiruvannamalai district with Cheyyar river, a tributary of the Palar by construction of a new Head Regulator and excavation of a link canal for a length of 23.55 km. Surplus flow of about 3 TMCft. from the Sathanur dam can be diverted to the Cheyyar river by excavation of feeder canal for a length of 38.72 km to feed the Nandan channel. The diverted flood water will benefit 5 anicuts in the Cheyyar river. On completion of this scheme, about 10700 acres of ayacut will be benefitted. The DPR has been prepared for ₹200.00 crore and sent to GOI for seeking assistance under AIBP.

iii) Cauvery (Mettur Dam) –Sarabanga (Namakkal District)

It is proposed to excavate a link canal for a length of 182 km to augment the irrigation potential through the existing anicuts and tanks in Sarabanga, Thirumanimuthar and Musiri minor basin by utilizing the surplus water of the Mettur dam. Under this scheme, about 2 TMCft. water will be diverted through this link canal, thereby benefiting an ayacut of 30,430 acres in Salem, Namakkal, Perambalur and Trichy districts. The approximate cost of the scheme is ₹1134.00 crore.

iv) Athikadavu – Avinashi Flood Flow Canal

The Athikadavu-Avinashi Flood Canal Project envisages diversion of flood surplus of 2000 cusecs from the Bhavani river to feed 71 tanks and 538 ponds in Karamadai, Annur, Avinashi, Puliampatti, Palladam and Perundurai areas. This project has been conceived to mitigate the effects of flood by means of excavation of a flood carrier canal from the Pillur Dam water spread area. Necessary cross drainage works, cross masonry works and regulator have been proposed at required places. A DPR has been prepared for ₹1862.00 crore. It is proposed to seek the funds from GoI under the FMP.

v) Cauvery (Kattalai Barrage) to Gundar

It is proposed to divert 7 TMCft. of flood water from the Cauvery at the Kattalai Barrage through a canal for a length of 258 km to the Gundar. On completion, an ayacut of 1.86 lakh acres will be stabilized, besides bridging a gap of 32,871 acres. Trichy and Srirangam towns would be protected from flood. The DPR has been prepared for ₹5166 crore and sent to GOI seeking assistance under the Flood Management Programme.

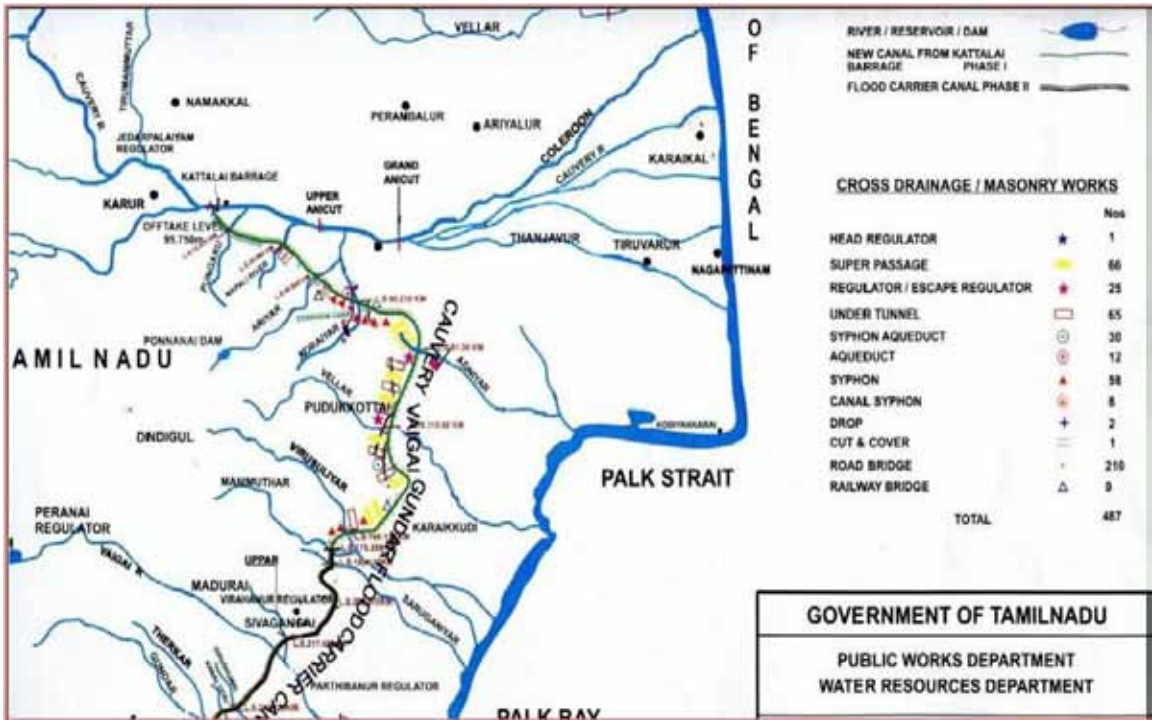


Fig. 3.9.2: Cauvery – Gundar Link

vi) Recharge to the Ground Water Aquifers

The ground water aquifers and flood plains of Cheyyar, Palar, Pennaiyar, Gundar and Vaigai are proposed to be recharged by using the surface flow at the intersection locations and downstream areas by constructing major check dams in the rivers and minor check dams across the tributaries.

Dam Rehabilitation and Improvement Project (DRIP)

Dam Rehabilitation and Improvement Project with World Bank assistance through Central Water Commission (CWC) is proposed to be taken up over a period of six years for 66 WRD dams and 38 Tamil Nadu Generation and Distribution Company (TANGEDCO) dams at a cost of ₹745.49 crore. The project aims to restore the capacity of the dams, achieve effective utilization of stored water and manage the long term performance of the dams. The funding pattern between the World Bank and the State is in the ratio of 80:20. The main components of the project are: rehabilitation and improvement of the dams, dam safety institutional strengthening through reservoir sedimentation studies, development of management information system and establishment of State project management unit. Tamil Nadu is one among the four States selected by the World Bank to implement this project. The break up details of project cost: a). WRD component. ₹469.94 crore, b). TANGEDCO component. ₹260.14 crore and c). AED component. ₹15.41 crore.

Desilting the Drains and Channels in the Cauvery Delta

Desilting of the drains and channels shall be carried out prior to the opening of Stanley reservoir in the Cauvery river at an outlay of ₹75.00 crore in order to ensure free flow of water up to the tail end.

One Time Functional Grant to Non Command Area Development and Water Management Programme.

This one time functional grant of ₹1000/ ha is shared by Central, State Government and farmers (45:45:10 ratio). This facility of funding is not extended to WUAs formed under other projects and programme launched in the State. In order to maintain a uniform approach to WUAs of the non CAD & WMP area, it has been proposed to extend the similar benefits through providing one time functional grant of ₹180 crore during the Twelfth Five Year Plan.

Artificial Recharge Schemes to Sustain Groundwater Resources

The scheme envisages construction of artificial structures like check dam, recharge shaft and percolation ponds in place where there is surplus water available atleast with 25 percent dependability and the lithology is favourable. The over exploited, critical and semi critical blocks will be given priority in the first two years and safe blocks in the subsequent year. An amount of ₹200.00 crore is provided for this scheme.

Jawaharlal Nehru National Urban Renewal Mission Project (JNNURM)

A comprehensive master plan on improvement to micro drains such as storm water drains, and macro drains like Buckingham canal, Otteri Nallah, Adayar river and Coovum commenced in 2010 with Centre and State assistance with an aim to avoid flood havoc in Chennai city. The total project cost is ₹1447.91 crore, which includes Corporation of Chennai component of ₹814.88 crore and WRD component of ₹633.03 crore.

The Redhills tank, one of the major water supply sources to the Chennai city, receives Krishna water from the Poondi reservoir through a feeder canal and Cholavaram tank through lower supply channel and from its catchment area. The Redhills tank surplus course has a length of 8.30 km. and a discharge capacity of 7500 cusecs. The surplus course is in urgent need of restoration work. During the flood seasons, the problems get aggravated causing inundation in the residential areas in the vicinity. To overcome this, rehabilitation of Redhills tank surplus course including four high level bridges will be taken up seeking funds under JNNURM II.

Special Flood Management programme

Cauvery delta districts are frequently affected by floods during the monsoon period. The irrigation cum drainage channel in the Cauvery Delta districts are having flatter terrain and also are in close proximity to the sea. During the north east monsoon periods, heavy rainfall occurs in this area and the villages and irrigation fields are subjected to massive flooding. To mitigate this problem permanently, the flood water from the upper reaches of Cauvery river is to be given improved drainage facilities for safe discharge into the sea. The proposal envisages providing proper inlets and outlets, removal of shoals and vegetation, providing sufficient waterways in the drains, protecting drains from silting and scouting etc.,

Utilisation of Surplus Flood Water Through Pumping Scheme

The surplus water during south west and north east monsoon periods drains off into the sea. Particularly the flood water realized in Cauvery, Tamiraparani and Vellar river basins are maximum and drains off into the sea. These surplus flows can be lifted by means of heavy pumps which can be conveyed through a system of pipe lines to the higher elevation commands and can be effectively stored in the waterbodies. The distribution may be done for irrigation

by gravity. This process augments ground water potential and ensures the drinking water needs of rural habitations. Special flood management programme to avoid flood damage permanently by providing suitable drainage facilities in Thanjavur, Thiruvarur and Nagapattinam districts is proposed for the Twelfth Five Year Plan.

Coastal Protection Works

In Tamil Nadu, the behaviour of the sea varies throughout the year. During the monsoon period, the problems get aggravated due to the formation of cyclones, depression and low pressure zones. It is of utmost importance that the coast line of the State should be sufficiently protected from sea erosion so as to prevent loss of lives and grave damages to infrastructure. The Hon'ble Chief Minister has directed a detailed study of the coastal erosion along the entire coast and review of the ongoing coastal protection works which would be taken up by a High Level Committee consisting of the Chief Secretary, Additional Chief secretary, Planning and Development, Member (Agriculture and Irrigation) SPC, Secretaries to Government-PWD department, and Animal Husbandry, Dairying and Fisheries, Commissioner of Fisheries, Engineer–in–Chief WRO, Chief Engineer, Institute of Water Studies and technical experts from academic institutions. The High Level Committee would identify the critical/affected coastal areas requiring immediate attention. It will also explore the need for additional anti sea erosion works and appropriate funds besides, already, identified works.

Coastal Storm Water Harnessing Scheme

Rainfall pattern of Tamil Nadu shows copious rainfall in the coast, due to depressions and cyclones, even in otherwise below normal rainfall years. The existing storage structures in the inland part of the river basin could not harness fully and hence, the excess flow goes into sea. The project proposes to construct a series of storage structures along the coast to collect and store the run off due to coastal storm events. An outlay of ₹220.00 crore has been proposed

Scheme on Modernising the Irrigation Canals and Related Infrastructure in the Cauvery Delta

Over 4.50 lakh acres of agriculture land in the Cauvery delta are to benefit from the project to upgrade the irrigation canals. It is proposed to modernize the irrigation canals and related infrastructure in the delta areas to prevent excess water in the river from flowing into the sea. The project will benefit Thiruvarur, Nagapattinam and Thanjavur districts. The Asian Development Bank (ADB) has approved ₹1092.00 crore as loan and total amount proposed was ₹1560.00 crore. An outlay of ₹1000.00 crore has been provided for the Twelfth Five Year Plan. The project will multiple the benefits viz., conserving surplus water, recharging of ground water and preventing the sea water intrusion.

Command Area Development and Water Management Programme (CAD&WMP)

The Centrally Sponsored Command Area Development & Water Management Programme is being implemented by the Agricultural Engineering Department, since 1980 – 81 onwards, in the command areas of the State to improve the water use efficiency through efficient water management practices and to enable effective and equitable distribution of irrigation water below the sluices with farmers' participation. The CAD&WMP has been completed in 22 commands of the State in the last 3 decades and to be continued in 25 commands during Twelfth Five Year Plan period viz., Pelandurai Anaicut Project, Kelavarapalli Reservoir Project, Kudhirayar Reservoir Project, Cheyyar Anaicut System, Ellis Anaicut Project, Vembakottai Reservoir Project, Pilavakkal Reservoir Project, Vattamalaikarai Anaicut Project, Manimuktha Nadhi System, Nandan Channel, Thondarai Anaicut, Melamathur Anaicut, Araniyar River Basin System, Kiliyar River Basin System, Baarur

System, Parapalar & Nanganjiyar, Uppar Reservoir, Kalingalar& Nichabanadhi, Deviyar, Hanumanadhi and Adavinainar command areas

Table 3.9.4: Twelfth Plan Outlay - Irrigation Sector

(₹ crore)

S.No.	Sector/Scheme/Project	Outlay
	Minor Irrigation	
	Ongoing schemes - State Schemes	
1	Master Plan Artificial Recharge Scheme	120.00
2	Rehabilitation of Thovalai channel in Kanyakumari District and Arakkankottai and Thadappali channel in Erode Dt.	11.00
3	Restoration of Traditional Water Bodies	200.00
4	Groundwater Survey	15.00
5	Institutional strengthening - SWaRMA, IMTI, IHH Poondi.	35.00
6	Other on going schemes	13.46
7	Hydrology Project II	7.00
	Total Ongoing Schemes	**401.46**
	New Schemes	
8	Seawater Intrusion Monitoring System	12.00
9	Artificial Recharge Schemes To Sustain Groundwater Resources	200.00
10	Comprehensive Groundwater Monitoring System and water bodies monitoring system	160.00
11	Development of Tamil Nadu Hydro Decision Support System for Integrated Water Resources Management in the river basins.	120.00
12	Setting up of River Basin organizations	24.00
13	Upgradation Of Peikkulam, Pottaikulam, Korampallam Kulam And Korampallam Reserve Tanks As Reservoirs In Thoothukudi Dist.	30.00
14	Accelerated Irrigation Benefit Programme (AIBP)	376.43
15	Repair Renovation and Restoration of Water bodies directly linked to Agriculture (in the ratio of 90:10exclusively for the drought prone blocks	100.00
16	Pilot study for reuse of waste water for irrigation in industrial area of Coimbatore and Thirupur Districts, irrigation efficiency study and Water development and management study	9.50
17	Desilting of Kadavadi and Devambadi tanks in Coimbatore District, Ponneri near Gangaikondon Cholapuram in Ariyalur Dt, Veeranam Tank in Cuddalore Dt, Sugarcane Ayacut area, Siruvani dam in Coimbatore Dt, Ramanad Big tank	180.00
18	Others- Rehabilitation, construction of check dams and Human Resource devt	8.70
	Total New Schemes	**1220.63**
	Grand Total - Minor Irrigation	**1622.09**

Table 3.9.4: Twelfth Plan Outlay - Irrigation Sector (Contd.)

(₹ crore)

S.No.	Sector/Scheme/Project	Outlay
	Command Area Development and Water Management Programme	
	Ongoing Schemes	
1	Command Area Development and Water Management Programme - Vaigai Project, Kodaganar, Vardhamandhi and Kalingarayan Anaicut projects	34.33
	Total-Ongoing Schemes	**34.33**
	New Schemes	
1	Palandurai Anaicut Project, Kelavarapalli Reservoir Project, Cheyyar Anaicut, Ellis Anaicut, Vembakottai Reservoir, Pilavakkal Reservoir, Vettamalaikarai Anaicut, Manimuktha Nadhi, Nandhan Channel, Thondarai anaicut, Melamathur Anaicut, Araniyar River, Kiliyar River, Baarur system, Parapalar and Nanganjiyar, Uppar reservoir, Kalingalar and Nichabandhi, Deviyar, Hanumanadhi, Adavinainar schemes	113.39
	Grand Total- CAD and WMP	**147.72**
	Major, Medium and Flood control	
	Ongoing schemes - State Schemes	
1	Modernization of Contour Canal	168.00
2	Rehabilitation, improvement and modernisation of Channel, Canals and Tanks	98.38
3	Construction of Kattalai Barrage across the Cauvery river at Mayanur village in Karur District	75.00
4	Improvements to New Veeranam in Cuddalore District for water supply	9.00
5	Providing irrigation facilities to 58 villages in Madurai District	9.00
6	Bathalapalli dam across Malattar river in Vellore District	20.00
7	New tank across Kallar Odai near Viswakudi in Perambalur District	19.00
8	Construction of Check Dam across Cauvery near Kambarasampettai (east of Mutharasanallur) in Srirangam Taluk of Trichy District	30.00
9	Construction of Bridge across LBP and Providing Screw Gearing shutters to all sluices in the LBP	3.60
10	Jawaharlal Nehru National Urban Renewal Mission Project (JNNURM)	153.03
11	Flood Protection works	315.00
12	Coastal Protection Works	200.00
13	Natural Calamities – Permanent restoration of the damaged irrigation infrastructure (North East Monsoon 2010)	75.00
14	Others	6.53
15	TN - IAMWARM Project	410.00
	Total - Ongoing Schemes	**1591.54**

Table 3.9.4: Twelfth Plan Outlay - Irrigation Sector (Contd.)

(₹ crore)

S.No.	Sector/Scheme/Project	Outlay
	New Schemes	
16	Cauvery-Agniar-South Vellar- Pambar- Manimuthar–Vaigai – Gundar	1166.00
17	Pennaiyar-Cheyyar	200.00
18	Dam Rehabilitation and Improvement Project (DRIP)	469.94
19	Water Sector Management	192.00
20	Rehabilitation of damaged masonries in Cauvery Delta Districts	200.00
21	Desilting the Drains and channels in Cauvery Delta	75.00
22	Athikadavu – Avinashi Flood Flow Canal Scheme	562.00
23	Accelerated Irrigation Benefit Programme (AIBP)	250.00
24	WUA-One Time Functional Grant To Non CAD & WMP Area, Election to WUA and implementation of TNFMIS Act	205.87
26	Floods Protection work and spl. Flood management works	651.08
27	Strengthening the eroded area is meandering portion of Vellar near Killai Railway track in Chidambaram Taluk of Cuddalore District	50.00
28	Coastal Storm water Harnessing Scheme	220.00
29	Coastal Protection Works	99.53
30	ADB assistance- Modernising the irrigation canals and related infrastructure in the delta to prevent excess water in river flowing into the sea	1000.00
	Total New Schemes	**5341.42**
	Grand Total - Major, Medium and Flood control works	**6932.96**

Table 3.9.5: Abstract of Twelfth Plan Outlay – Irrigation Sector

(₹ crore)

S.No.	Sector/Scheme/Project	Outlay
1	Major, Medium Irrigation and Flood Control	6932.96
2	Minor Irrigation	1622.09
3	Command Area Development	147.72
	Total	**8702.77**

Monitorable Target

Under command Area Development programme, it is proposed to cover an area of 1.47 L. ha. during the Twelfth Five Year Plan period.