

# **CHAPTER I**

## **INTRODUCTION**

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## 1.1 Introduction

Government of Tamil Nadu (GoTN) has been executing irrigation works with its own funds and funding assistance from Government of India (GOI), International Bank for Reconstruction and Development (World Bank), National Bank for Agriculture and Rural Development (NABARD), etc.

Tamil Nadu Irrigated Agriculture Modernisation and Water-Bodies Restoration and Management Project (TN-IAMWARM) is a multidisciplinary project with 85 *per cent* loan assistance from World Bank. Water Resources Department (WRD) of Public Works Department (PWD), Government of Tamil Nadu is the nodal agency for the implementation of the project. The project works were executed in the 63 selected sub-basins of the State to cover ayacut<sup>1</sup> area of 6.17 lakh ha from April 2007 onwards. The coordinating line Departments for TN-IAMWARM project are Agricultural Engineering Department, Tamil Nadu Agricultural University, Department of Agriculture, Department of Horticulture and Plantation Crops, Department of Agricultural Marketing and Agri-Business.

The project envisaged to measure the outcomes on the irrigation projects on the basis of following performance indicators:

- **Channel conveyance efficiency:** Conveyance efficiency is the ratio of quantity of water received in the tail end as compared to the quantum of water released from the canal. It is an important indicator to assess that the water released from the regulation point of the canal reaches the tail end of the supply channel *viz.*, fields.
- **Fully irrigated area:** Coverage of the pre-project non-irrigated areas (gap area) as irrigated area after implementation of the project.
- **Water regulation:** Comparison of water releases for irrigation with the actual demand based on requirements.
- **Water quality:** Quality of irrigation water with reference to the norms prescribed by the statutory organisations *viz.*, Central Pollution Control Board, Bureau of Indian Standards.
- **Participatory Irrigation:** Statutory obligation for farmers' participation in the management of irrigation systems and water regulations.
- **Storage loss:** The difference between designed capacity and capacity of utilisation due to accumulation of sediments in the reservoir over a period of time and it leads to underutilisation of the reservoir capacity.

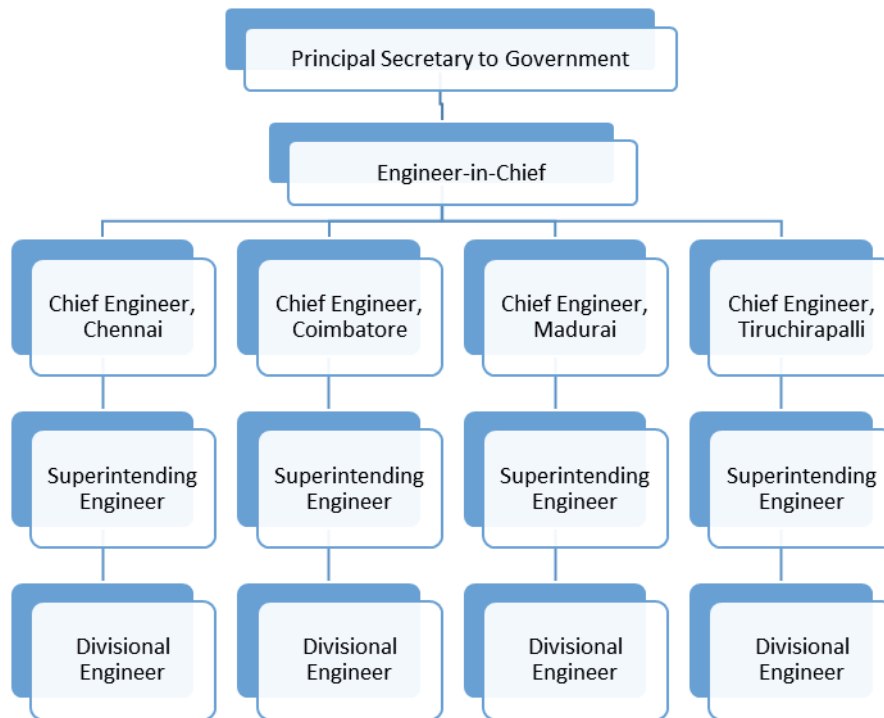
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<sup>1</sup> The area served by an irrigation project such as a canal, dam or a tank.

## 1.2. Organisational setup

Principal Secretary to Government is the administrative head of the PWD at Government level. WRD is divided into four<sup>2</sup> Regions based on river basin<sup>3</sup> framework. Engineer-in-Chief, WRD (EIC) is head of the Department who is assisted by Chief Engineers (CE) at Regional level, Superintending Engineers at Circle level and Executive Engineers at Divisional level. Organisational structure of Water Resources Department is depicted in **Chart 1**.

**Chart 1 – Organisation structure of Water Resources Department**



(Source: Details furnished by the Department)

## 1.3 Audit Objectives

Performance Audit was conducted to assess whether

- the Department harnessed the available surface water effectively and the outcomes *viz.*, improving the conveyance efficiency of channels and conversion of gap areas into irrigated areas as envisaged in the DPRs were achieved;
- the irrigation infrastructure was maintained effectively to ensure free flow of water for irrigation and adequate monitoring of the quality of water supplied for irrigation was undertaken in co-ordination with other departments; and
- the Water Users Associations were formed and functioning efficiently to benefit the farmers.

<sup>2</sup> Chennai, Coimbatore, Madurai and Tiruchirappalli.

<sup>3</sup> 34 rivers are grouped into 17 river basins and 127 sub-basins.

## 1.4 Audit Criteria

Audit criteria were sourced from

- Detailed Project Reports (DPRs) of TN-IAMWARM /Technical Sanctions of the work, Rules of Water Regulation, Government instructions/orders and Village G Returns<sup>4</sup> compiled by Economics and Statistics Department
- Tamil Nadu Protection of Tanks and Eviction of Encroachment Act, 2007, Indian Standard Guidelines for the Quality of Irrigation Water and Water Quality Criteria prescribed by Central Pollution Control Board
- Tamil Nadu Farmers Management of Irrigation System (TNFMIS) Act, 2000 and Rules 2002 thereunder

## 1.5 Scope and Methodology of Audit

In order to assess the actual achievement of the envisaged outcomes after implementation of the projects under TN-IAMWARM, the Performance Audit covered the major projects completed before 2015 and assessed the achievement during the period from 2015-16 to 2019-20 with measurable outcomes envisaged in the DPRs.

Audit selected the following six<sup>5</sup> out of 44 TN-IAMWARM projects completed before 2015 for assessment of outcomes envisaged in the DPRs based on surface water potential, gap area covered and expenditure incurred. In addition, two projects<sup>6</sup> with measurable outcomes which were completed in the same sub-basins with National Bank for Agriculture and Rural Development (NABARD) funding were also selected for detailed scrutiny.

The Department executed the works in the river channel, system tanks *viz.*, tanks which receive regulated supply of water from a river system and non-system tanks *viz.*, tanks which depend fully on the rainfall and these are not connected to any river system.

Audit noted that the non-system tanks of three<sup>7</sup> projects did not possess measuring devices to check and document the quantum of water received through rainfall, water utilisation through discharge, storage position, etc. by the field officials of WRD. In view of the above, the audit scrutiny was restricted to other three selected projects in sub-basins *viz.*, Amaravathi, Hanumanadhi and Pennaiyar upto Krishnagiri. The reservoir/channel selected in these three sub-basins and the basis of their selection are as follows:

- Out of 10 reservoirs in Amaravathi sub-basin, Amaravathi Reservoir alone had 42 *per cent* of total ayacuts of the sub-basin. Hence,

<sup>4</sup> G Returns are prepared for statistical purpose on village level data on land classifications, cropped area and source of irrigation. G Return comprises crop-wise extent of cultivated areas / irrigated areas with sources of irrigation in a village.

<sup>5</sup> Amaravathi, Kosathalayar, Girdhumal, Agniyar, Hanumanadhi and Pennaiyar upto Krishnagiri sub-basins.

<sup>6</sup> (i) Rehabilitation of Old Anicuts in Amaravathi River System and (ii) Excavation of a new supply channel to divert surplus water of Kelavarapalli Reservoir, with the NABARD loan assistance.

<sup>7</sup> Projects in sub-basins of Agniyar, Kosasthalaiyar and Girdhumal.

Amaravathi Reservoir was taken up for detailed audit in Amaravathi sub-basin.

- Out of four channel systems in Hanumanadhi sub-basin, Radhapuram channel system was taken up for detailed audit as it catered to 86 per cent of the ayacuts in the Hanumanadhi sub-basin.
- The Reservoir in Pennaiyar upto Krishnagiri sub-basin *i.e.*, Kelavarapalli Reservoir project which catered to 72 per cent of ayacuts of the sub-basin was taken up for detailed audit.

Due to Covid-19 pandemic, this Performance Audit was conducted in two spells during December 2019 to February 2020 and November 2020 to March 2021. Audit checked records at the Government Secretariat, Directorate of Agriculture, Office of Engineer-in-Chief, field offices of the Agriculture, WRD and Revenue Departments. Objectives of the selected projects were assessed through scrutiny of project documents, study reports, audit queries to the field officials.

Audit analysed the performance of the above selected projects on the basis of water regulations by the PWD, areas irrigated through surface irrigation<sup>8</sup> in their jurisdictions, crops cultivated as compiled in the G Returns of the Economics and Statistics Department. Audit also conducted the joint inspection of nine out of 19 channels in Amaravathi Reservoir system in Amaravathi sub-basin; the entire length of Radhapuram Channel in Hanumanadhi sub-basin; and 44 out of 48 km length of channels in Kelavarapalli Reservoir project in Pennaiyar upto Krishnagiri sub-basin with the officials of WRD to assess the effectiveness of water discharge through the reservoir/channels.

An Entry conference was held on 5 December 2019 with the Chief Secretary to Government and Principal Secretaries of the Public Works, Agriculture and Revenue departments wherein the audit scope, coverage, criteria and methodology were discussed. The Exit Conference was held on 2 July 2021 with the Additional Chief Secretary/Principal Secretary to Government, Public Works Department, Agriculture and Revenue departments wherein the observations were discussed. The views expressed at the meeting, the replies furnished by the Government were considered and duly incorporated in the relevant paragraphs of the Report.

## **1.6 Structure of the Report**

The Performance Audit Report has been structured on the basis of specific audit findings related to the three selected projects, *viz.*, Amaravathi Reservoir in Amaravathi sub-basin; Radhapuram Channel in Hanumanadhi sub-basin; and Kelavarapalli Reservoir in Pennaiyar upto Krishnagiri sub-basin as detailed below:

- Effectiveness of harnessing of surface water in three selected sub-basins (**Chapter II**);

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<sup>8</sup> Channels and tanks.

- Achievement of envisaged outcomes of
  - Amaravathi Reservoir in Amaravathi sub-basin (**Chapter III**);
  - Radhapuram Channel in Hanumanadhi sub-basin (**Chapter IV**);
  - Kelavarapalli Reservoir in Pennaiyar upto Krishnagiri sub-basin (**Chapter V**);
- Maintenance of the irrigation channels (**Chapter VI**); and
- Monitoring quality of irrigation water and functioning of Water Users Association (**Chapter VII**).

### **1.7 Acknowledgement**

We acknowledge the co-operation extended by WRD, Agriculture Department, Revenue Department, Economics and Statistics Department and other field officials in providing records and information for smooth conduct of Performance Audit.