CHAPTER 4

PROFILE OF THE STUDY AREA

4.1 INTRODUCTION

The foregoing chapters have introduced the problem of study and theoretical concepts of Irrigation System Performance and Management Information System. Application of MIS has also been dealt with a careful review of the literature. The Sathanur Irrigation System built across the River Ponnaiyar in Tamil Nadu has been selected for this research study. This system is selected for the reasons (a) It is a water shortage system, where there is a need for management towards efficient utilisation of water and (b) The infrastructure facilities such as computer, automatic water level recorders and communication facilities available in the system provide the scope for implementation of MIS in the field in the near future. The present chapter provides a profile of the study area by way of explicitly organising ideas on the 'context' of the study. Focus is on both before and after the Rehabilitation of the Sathanur Irrigation System under the National Water Management Project and elaborating the problems caused by the Old and New Operational Plans. The existing organisational and management procedures are presented in brief.

4.2 THE PONNAIYAR BASIN

The Sathanur Reservoir is located across the River Ponnaiyar at Sathanur Village about 32 km from Thiruvannamalai town in Thiruvannamalai - Sambuvarayar District of Tamil Nadu. The river Ponnaiyar starts from the Chennakesava hills of Karnataka, travels for
85 km in Karnataka and then enters Tamil Nadu. It passes through Dharmapuri, Thiruvannamalai-Sambuvarayar and Villupuram-Ramasamy Padayachiyar Districts and drains into the Bay of Bengal. The two major reservoirs, Krishnagiri and Sathanur were constructed across the Ponnaiyar river between 1956-61. These two reservoirs are hydrologically independent of each other in operation, except that flood surpluses of Krishnagiri reservoir may flow into Sathanur reservoir.

Thirukovilur Anicut, Ellis Choultry Anicut and Sornavur Anicut are the diversion weirs located along the downstream of Sathanur reservoir and they were constructed before Sathanur reservoir. The three anicut systems together irrigate about 33,000 ha mostly under tanks supplemented by the Ponnaiyar river and they are known as "Old Ayacut" (Figure 4.1). To safeguard the riparian rights of the old ayacut, the inflow into the Sathanur reservoir is shared between the Sathanur command and old ayacut based on certain limit flow conditions as detailed in the next section.

After the advent of the Sathanur reservoir, many diversion schemes have been developed across the Ponnaiyar river and its tributaries in the upstream of the Sathanur reservoir in the early 1980's. Inflows into the Sathanur reservoir is reduced by the upstream reservoir construction, accounting for 15 per cent of annual reduction in the inflow (Sanjeev 1994).

Developments and issues of the Sathanur reservoir system are described as those in two phases, one as before Rehabilitation of the system under NWMP (Section 4.3) and the other as after Rehabilitation (Section 4.4).
Figure 4.1 Map of the Ponnaiyar Basin
4.3 THE SATHANUR RESERVOIR SYSTEM BEFORE REHABILITATION

4.3.1 Development of Sathanur Irrigation System

The Sathanur reservoir system was commissioned for irrigation in November 1957, with a storage capacity of 129.5 million m$^3$ through the Left Bank Canal (LBC), starting at the pick up anicut, 7.2 km downstream of the Sathanur Dam. During the first stage of development, the LBC was designed with a capacity of 11.32 cumecs to serve 8,851 ha (inclusive of 1,455 ha of land under 41 tanks) fully localised for paddy between 15 December and 30 April, every year. With the improved storage capacity of (229 million m$^3$) in the early 1960s', the system facilitated to feed a new ayacut of 917 ha under the LBC and an ayacut of 2,000 ha for second crop paddy under the downstream Tirukovilur anicut.

There were surplus flows in 11 out of 14 years (1958 - 1971) in this project. Subsequently, the Right Bank Canal (RBC) came into operation in 1982 to utilise the surplus flow during the monsoon. RBC was designed with a capacity of 7.1 cumecs to irrigate groundnut, an irrigated dry (ID) crop in the direct command with 6,707 ha and the wet command of 1,707 ha under 49 tanks between 1 October and 15 February. However, the storage potential of the reservoir has not been very encouraging since the RBC has become operational. The unfavourable monsoons and the impounding of the available flows by the upstream anicut systems subsequently reduced the inflow into the Sathanur reservoir.

4.3.2 Old Operational Rules and their Repercussions

The old operational rules and regulation for Sathanur Reservoir and LBC came into effect in July 1976 and that for RBC in January 1983. The salient features of these rules are as follows.
(i) To maintain the riparian rights of the downstream users, the inflow into the Sathanur reservoir is shared between the Sathanur command and the old command based on the following limit flow conditions.

<table>
<thead>
<tr>
<th>Period</th>
<th>Discharge in</th>
<th>Cumecs</th>
<th>Cusecs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Jan - 15 Apr</td>
<td>56.7</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>16 Apr - 15 Jun</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>16 Jun - 30 Sep</td>
<td>56.7</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>1 Oct - 31 Oct</td>
<td>42.1</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td>1 Nov - 30 Nov</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>1 Dec - 31 Dec</td>
<td>42.1</td>
<td>1500</td>
<td></td>
</tr>
</tbody>
</table>

The rules stipulate that the inflows in excess of the quantities specified alone can be impounded for use in LBC and RBC.

(ii) RBC is opened for irrigation between 1 October and 15 February to command ID crop upto a total of 41.1 million m$^3$ and to command wet crop under tanks upto a limit of 18.4 million m$^3$.

(iii) LBC is opened from 15 December to 30 April to release continuous supply of water for paddy crop to the tune of 128 million m$^3$. 
4.3.3 Problems caused by the Old Operational Rules at Sathanur

i) While the upstream irrigation development reduced the inflow into the reservoir, the demands on the Sathanur reservoir have increased due to the construction of RBC. Their impact is high during the poor years of rainfall.

ii) The crop development in the commands of LBC and RBC was not as planned. Though LBC was fully localised for rice, groundnut was, and is, the predominant crop in the command except in the low lying areas with rice. The area under rice in the LBC declined after the commissioning of RBC.

iii) The early operation of the RBC in October had three important effects. First, the early release in October coincided with the monsoon rains and encouraged cultivation of paddy. Secondly, farmers who had sown groundnut in Dec/Jan in RBC had to face severe stress in the late season, that is, after closure of the canal in February. Thirdly, capacity of the RBC, designed for an ID crop, was not enough to meet the demands of the paddy crop and hence the RBC was operated for a longer period than planned. This in turn reduced the water available for LBC command, which is opened in December.

While in principle, the LBC receives priority over the RBC, the early releases into the RBC reversed the priority in practice. Also, in principle, the LBC is to be operated for a paddy crop and the RBC for an ID crop. But, in practice, this is also reversed. This has often resulted in conflicts between the commands of the LBC and the RBC.
4.4 SATHANUR IRRIGATION SYSTEM AFTER REHABILITATION UNDER NWMP

This section speaks of the developments in the Sathanur project under the National Water Management Project, a rehabilitation project. It also discusses the new operational plan and present issues in the Sathanur system.

4.4.1 National Water Management Project

National Water Management Project, a World Bank funded project aims at improving the existing irrigation systems with rehabilitation of the physical system and the managerial components, especially in the southern states of India like Andhra Pradesh, Karnataka and Tamil Nadu. Sathanur system has been chosen as a pilot project under the NWMP in 1987. The main objective of this water management project is to increase agricultural productivity and farm income in the existing irrigation commands by providing the farmers with a reliable, predictable and equitable irrigation services. The essential feature of this project is the preparation of an operational plan to improve the water distribution and management in the system. The necessary physical system improvements required for better management of the system were provided under this project.

4.4.2 National Water Management Project at Sathanur

To overcome the differences between the LBC and RBC, a new operational plan was developed under the NWMP (SAR 1987). The salient features of this new operation rules and regulations are given below:

i) Operation of the LBC and RBC simultaneously during the post monsoon season, that is, from middle of December to March.
ii) Provision of irrigation for an ID crop in the direct command on intermittent basis/rotational basis and supplemental releases to the tanks for irrigating rice in both the commands.

iii) Resorting to zonal operation for irrigation during the years of poor storage by dividing each main canal into three viable zones of equal size. The zones of the LBC and RBC are given equal priorities for operation depending on the storage in the reservoir, in rotation over years.

iv) Minimisation of human intervention in water distribution by introducing the micro network system (like Proportional Distributors (PD), Adjustable Proportionate Module (APM) and Open Flumes (OF) in the distribution system and Duck Bill Weirs (DBW) in the main canal) to maintain the level control. Physical improvements like cross regulators, tank feeders, lining of the canals and measuring devices are provided to facilitate better water management in the system.

v) Introduction of Monitoring and Evaluation practices at the scheme level. Preparation of regular reports on the outcome of the seasonal performance, that is, Water deliveries, irrigation deficiencies, cropped areas, farmers satisfaction and modification of the operational plan for the coming season based on the successes and failures of the previous seasons.

vi) Formation of a Scheme Level Irrigation Committee (SLIC) representing both the officials of PWD, AED and AD and farmers to meet and discuss the plan before the season; define rules for its implementation and meet and discuss the performance after each season.
4.4.3 Problems with the New Operational Rules

The new operational plan provides equal priority to the LBC and RBC commands by simultaneous operation of both the canals in the post monsoon season. This new operational plan has been submitted to the Government of Tamil Nadu for approval. However, it has been followed from 1991, since, most of the rehabilitation works have been completed. Experience in the last five years has shown that there are a few problems with the new operational plan too.

i) The main canals are not able to be operated on an intermittent basis as envisaged in the new plan. The farmers benefiting from the continuous supply have not agreed to the intermittent supply. Instead, the main canals operated continuously and rotations are practiced among the distributaries.

ii) Farmers make use of the residual moisture to sow groundnut crop. Mostly, they prefer to have the canal opening in January and subsequently shifting the closure of canal to April so as to raise an additional crop, sesame.

iii) Deliveries to the tanks are not made either in September or December as mentioned in the Rules. Instead, deliveries are made in spells in January, February and March.

iv) Storage in the reservoir during the period 1991-95 has been encouraging enough to operate both the LBC and RBC commands, giving equal priority. The potential impact of this priority has to be verified in the years of poor storage.
4.5 SATHANUR IRRIGATION SYSTEM - ORGANISATION AND COORDINATION

The Sathanur Irrigation System has been in operation since 1957. It is managed by the following four departments at different levels of coordination.

i) Public Works Department (PWD)
ii) Agricultural Engineering Department (AED)
iii) Agricultural Department (AD) and
iv) Revenue Department (RD)

The PWD is responsible for the Operation and Maintenance (O&M) of the system. It is in charge of the system from the reservoir up to the heads of the minors. The AED is responsible for On-Farm Development (OFD) works, promotion of Rotational Water Supply (RWS) within the 10 ha blocks and establishment of Block Committees. The AD takes care of the agricultural extension services and the RD collects the water taxes along with other taxes. Coordination at the State Level is looked after by the State Level Coordination Committee consisting of the Chief Secretary to the Government of Tamil Nadu, the Secretary (PWD), the Chief Engineer (O&M), the Chief Engineer (AED) and the Director of Evaluation and Applied Research Unit.

Interdepartmental Coordination at the Project Level in Tiruvannamalai by the Project Coordination Committee. The members of the committee include the Executive Engineer of O&M, the Executive Engineer of NWMP, the Assistant Executive Engineer of Project Preparation Cell (PP Cell), the Joint Director of Agriculture, the Superintendent Engineer of AED and the Collectors of Tiruvannamalai-Sambuvarayar and Villupuram-Ramasamy Padaichiar Districts.
4.5.1 Organisation for Operation and Maintenance

The organisation responsible for the O&M of the Sathanur system is shown in Figure 4.2. At the scheme level, the EE(O&M) placed at Tiruvannamalai is in charge of the operation and maintenance of the system. The Assistant Executive Engineer (AEE) at Sathanur Subdivision takes care of the Sathanur Dam and the water distribution in the system on an overall basis. There are four Section Offices, each being under the jurisdiction of an Assistant Engineer (AE). The AE at Sathnaur Dam is in charge of the operation and maintenance of the Sathanur Dam. The AE at Thenmudiyanur Section is in charge of O&M activities upto 15.400 km of the Left Bank Canal and 21.00 km of the Right Bank Canal. He has about 4,968 ha of the direct command and 456 ha of indirect command under tanks under his jurisdiction. The AE at Vanapuram West Section is in charge of the rest of the Left Bank Canal, covering about 5,946 ha of the direct command and 1,150 ha of the indirect command. The AE at Vanapuram East Section is in charge of the rest of the Right Bank Canal. He has about 4,106 ha of the direct command and 1,556 ha of the indirect command under his jurisdiction. There is a Work Inspector (WI) and one or two Lascars (Irrigation Assistants) under each Assistant Engineer to look after the operation and maintenance activities at the lower level. Each Lascar has about 1,000 ha under his jurisdiction.

4.5.2 Organisation for Design and Execution of Rehabilitation Works

NWMP Unit placed at Tiruvannamalai carries out the rehabilitation works and the PP Cell takes care of the project planning. Currently, it is carrying out the Monitoring and Evaluation Procedures in this system on a sample basis.
Figure 4.2 Organisation for Operation and Maintenance