CHAPTER I

INTRODUCTION AND RESEARCH DESIGN

1.1 INTRODUCTION

Water in life is an accepted biological phenomenon as it is one of the very five important elements to which human life owes its physical existence. When water fails, the functions of nature cease; thus when the rain fails, no men can walk in duty’s ordered way.\(^1\) The study of the history of Indian culture has also established that water has been assigned the highest priority for healthy human living by identifying it with the Gods, Varuna and Indra, and conferring motherhood on the rivers Ganga, Yamuna, Godavari, etc., as they were considered the sources of naturally medicated and fresh water. India like any other developing country, has almost exhausted all of its sources for water. Coupled with unbridled population, the turn of the country presents a very grim picture of the availability of water to the thirsty millions of India. Most of our known water sources are under threat of over exploitation. This is globally true as well. The World Watch Institute, U.S.A., has already predicted that if a Third World war is to take place, it will be mainly for water. Without clean water, the neither humans nor the environment which sustains them, can survive. While most natural

resources can be quantified in terms of wealth and revenue, fresh water’s most basic and important benefit is the health, health of the people, health of the ecosystem and the health of societies.

Realising the crux of the water problem around the world, the UNO declared the period 1980-90 as ‘International Drinking Water Supply and Sanitation Decade’. During the pre-independence period under the British colonial rule, the Central Government appointed the Bhore Committee (1944) to make recommendations on adequate water supply. For the first time, in the post-independence period, the Government of India appointed the Environmental and Hygiene Committee (1949) to prepare a comprehensive plan to provide water supply and sanitation services to 90 per cent of the population. Under the Indian Constitution, water is a state subject over which the central government has little direct authority. The Ministry of Health (1964-65) targeted the rural population to provide drinking water supply from local sources like wells.

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4Supplying Drinking Water is within the State Powers, Under List II (State List) – Entry 17 provides that water supplies, irirgation and canals, drainage and embankments come under state’s power.
It is only on the advice of the US Public Health Service (1967), the state governments in India established a separate organisation for the coordination and development of rural water supply schemes. In 1987, the Government of India passed legislation to ensure drinking water supply and water treatment. The National Water Policy of 1987 formed the basis for the state governments to administer drinking water supply and sanitation.\(^5\)

### 1.2 WATER SUPPLY SCHEME DURING PLAN PERIODS

#### First Five Year Plan (1951-1956)

During the First Plan Period, eight new water supply schemes covering two municipalities, three townships and three town panchayats and water supply improvement schemes in two cipalities were completed.\(^6\) Work on 17 water supply schemes was in progress at the end of the First Plan Period. A total sum of Rs.140.72 lakhs was spent on these schemes. Under the National Water Supply and Sanitation Programme, the Government of India gave an assistance of Rs.25 lakhs.\(^7\) 27 lakh people in the urban areas were covered by the water supply schemes. For the development of the rural water supply schemes, a special fund


\(^7\)The First Five Year Plan, Government of India, Planning Commission, Water Supply, p.497.
with an initial contribution of Rs. one crore was constituted in Madras state. The fund was supplemented by a grant of Rs.15 lakhs annually.\textsuperscript{8} During the First Plan, a sum of Rs.190.17 lakhs was spent towards the rural water supply schemes. Under the rural water supply (comprehensive scheme) 4,267 works were completed.\textsuperscript{9}

**Second Five Year Plan (1956-61)**

In respect of urban water supply, totally 59 schemes including the spill over schemes from the First Plan were taken up for execution. 18 water supply schemes covering 11 municipalities, six town panchayats and one township were completed and brought into beneficial use, besides the improvement works in 10 municipal towns.\textsuperscript{10} At the end of the second plan, 24 water supply schemes were under various stages of execution. A total amount of Rs.662 lakhs was spent, out of which Rs.389 lakhs was received from the Government of India as central assistance. The total urban population covered by water supply schemes was 32 lakhs, as against 27 lakhs at the beginning of the Second Plan Period.\textsuperscript{11}

\textsuperscript{8}Third Five Year Plan, Madras State, *Drafts Outline*, Finance (P & D), Department, Government of Madras, p.135.

\textsuperscript{9}Fourth Five Year Plan (1969-74), Madras State, *Draft Outline*, p.133.


\textsuperscript{11}Second Five Year Plan, Madras State, *Review of the Progress for First Four Years (1956-57 to 1959-60) and Programme for the Fifth Year*, p.171.
During the Second Five Year Plan Period, rural water supply schemes were executed under (i) the Rural Water Supply Comprehensive Scheme and (ii) the National Water Supply and Sanitation (Rural Scheme).

Under the Rural Water Supply Comprehensive Scheme provision of safe protected drinking water supply was intended in villages with a population of less than 10000. The Board of Revenue (Food Production) was in change of the administration of the schemes. A contribution of 25 per cent was collected from the beneficiaries for the works undertaken under this scheme. But in the case of Harijans, poor and backward people, the contribution was waived and the entire cost was met from state funds. After completion, the works were handed over to the local bodies concerned for maintenance. There were two types of works under this schemes: (i) simple well works for small villages (ii) composite schemes involving construction of overhead tanks and public fountains for the benefit of more than one village. For this programme, a five year provision of Rs.194.96 lakhs was made and the total expenditure incurred for the five years was Rs.171.78 lakhs.\footnote{\textit{Ibid.}, p.171.}

The National Water Supply And Sanitation (Rural Scheme) was intended to benefit rural areas with a population of less than 5000 in each village, vulnerable to attacks of cholera and other water-borne diseases. This scheme was

\footnote{\textit{Ibid.}, p.171.}
introduced in 378 selected villages in the districts of South Arcot, Thanjavur, Trichi, Ramanathapuram and Tirunelveli. The main measures contemplated under the scheme were the provision of safe water supply by construction of wells, etc., and also provision of better sanitation facilities. This scheme was eligible for half grant from the Government of India. The Board of Revenue and the Collectors concerned were in administrative charge of the scheme. After execution, the works were handed over to the local bodies for maintenance. A contribution of five per cent was levied from the beneficiaries for works undertaken under this scheme. In the case of Harijans, poor and backward people, this contribution was waived and the entire expenditure was met from state funds. The five year provision for this scheme was Rs.121.54 lakhs and the total expenditure for five years was Rs.120.37 lakhs.\(^\text{13}\)

**Third Five Year Plan (1961-66)**

During the Third Five Year Plan 71 water supply schemes, including 24 spill over schemes from the Second Plan, were undertaken. The outlay was Rs.665 lakhs. During this plan period, 19 new water supply schemes covering 11 municipalities, 6 town panchayats and 2 townships were completed. 10 improvement schemes to municipalities were also completed.\(^\text{14}\) At the end of this

\(^{13}\)Fourth Five Year Plan, (1969-74), Madras State, Draft Outline, p.133.

plan period 41 water supply schemes were in progress and the total expenditure incurred was Rs.598 lakhs.\textsuperscript{15}

In respect of rural water supply (comprehensive scheme) an outlay of Rs.350 lakhs was provided. This envisaged provision of (i) borewells with pumps attached, (ii) closed wells with overhead tanks and taps, (iii) connections from water mains of municipalities and (iv) draw wells. The target for the Third Plan was fixed at 10500 wells and 1100 composite schemes. Apart from this, water supply facilities were proposed to be provided in 682 villages affected by guinea worm disease.

**Fourth Five Year Plan (1969-74)**

In the Fourth Five Year Plan an outlay of Rs.10.10 crores was earmarked for providing new water supply schemes to seven municipalities, fourteen town panchayats and one township. A provision of Rs.9 crores was made in the Plan for rural water supply works with Rs.4.00 crores for well construction programmes and Rs.5 crores for piped water supply schemes. This provision was utilised through panchayat unions with an element of local contribution.

\textsuperscript{15}Draft Five Year Plan, 1978-83, Tamil Nadu State Planning Commission, Madras, p.269.
Fifth Five Year Plan (1974-78)

During the fifth five year plan, against an approximate outlay of Rs.28.00 crores, Rs.27.03 crores was spent towards execution of urban water supply schemes. Water supply schemes to 82 towns were targeted, out of which 64 schemes were completed.\textsuperscript{16}

In respect of the rural water supply schemes, funds were allocated by the State Government under the Minimum Needs Programme (MNP) and other rural water supply schemes. Water supply to villages was effected through piped water supply, wells, hand pumps and drilled wells. 15411 habitations were targeted and it was achieved in full. Against an approximate outlay of Rs.27.80 crores, Rs.23.23 crores was spent.\textsuperscript{17}

Sixth Five Year Plan (1978-83)

During the Sixth Plan Period, the massive Self-Sufficiency Programme (SSP) was launched from the year 1981-82, with the principal component of providing safe drinking water to all the problem habitations within a time frame. In the plan period, 7.226 problem census villages (18,167 problem habitations) were covered. The Tamil Nadu State Government expended Rs.63.00 crores

\textsuperscript{16}\textit{Ibid.}, p.270.

\textsuperscript{17}Seventh Five Year Plan, (1985-90), State Planning Commission, Tamil Nadu, pp.379-381.
under the MNP, Rs.89.84 crores under the SSP and Rs.24.79 crores under drought relief totalling to Rs.177.63 crores. Under the centrally sponsored ARWSP against the provision of Rs.26.67 crores, the actual expenditure was Rs.45.19 crores.\(^\text{18}\)

In respect of the UWS, as against the plan allocation of Rs.7500 crores, an expenditure of Rs.79.20 crores was incurred.\(^\text{19}\) Out of the 762 towns in the state, water supply schemes were in operations in all the two corporations (excluding Madras city), 93 municipalities, 5 municipal townships, 7 panchayat townships and 182 town panchayats. It was identified that in most of the water supply schemes, the supply had become inadequate. The water supply coverage in the urban area was 74.40 per cent excluding Madras city.\(^\text{20}\)

**Seventh Five Year Plan (1985-90)**

During the Seventh Five Year Plan, a sum of Rs.151.69 crores was expended towards rural water supply MNP, 17.40 crores through the EEC aid and Rs.26.21 crores from the WB aid, totalling to Rs.195.29 crores.


With regard to the UWS, a sum of Rs.103.31 crores was expended in the World Bank schemes and Rs.48.84 crores for the non-World Bank schemes, totalling Rs.145.15 crores. The target of 34 water supply schemes to urban towns and low cost sanitation facilities to 14 towns under World Bank assistance was achieved as proposed. Under the non-World Bank schemes, as against the target of 89 schemes, 61 schemes were completed.\textsuperscript{21}

\textbf{Annual Plans (1990-91 and 1991-92)}

During the Annual Plan Period (1990-91), it was targeted to cover 3200 habitations under the MNP and the actual coverage was 3706. Under the ARWSP, the target was 2000 habitations out of which 1778 habitations were covered. The total coverage was 5484 habitations. Under the ARWSP Rs.20.30 crores was incurred. In the Annual Plan Period (1991-92), 3989 habitations were covered under the MNP, and 1976 under the ARWSP, totalling to 5965. The revised estimate for the ARWSP for 1991-92 was fixed at Rs.23.00 crores. Further the GOI offered assistance under the Technology Mission for setting up of five district level stationery laboratories and one mobile laboratory. A total sum of Rs.15.18 lakhs was spent on this during the two annual plans. In addition to this, a sum of Rs.38.44 lakhs was spent during 1990-91 for installing iron removal plant and defluoridation plants, under GOI grant.\textsuperscript{22}

\textsuperscript{21}\textit{Ibid.}, pp.427 and 428.
\textsuperscript{22}\textit{Ibid.}, p.429.
In respect of urban water supply schemes, 3 schemes for municipalities and 15 schemes for town panchayats were targeted for the year 1990-91 and the schemes were completed in 3 municipalities and 7 town panchayats. During the Annual Plan 1991-92, the target was to provide water supply facilities to one municipality and 7 urban town panchayats.²³

**Eighth Five Year Plan (1992-97)**

During the Eighth Five Year Plan, period, an outlay of Rs.1450 crores representing 14.2 per cent of Tamil Nadu’s Eighth Five Year Plan outlay of Rs.10200 crores was provided for the water supply and sanitation sector.²⁴ As against an outlay of Rs.430.00 crores, 386.22 crores was expended towards the RWS. An amount of Rs.34.87 crores was spent under the drought relief programme and a total number of 8906 borewells were drilled. At the end of the plan period, out of the 66321 habitations, 36631 habitations were fully covered, 30000 habitations covered partially and there was no habitation uncovered. This was a significant achievement in the Eighth Plan Period.


In respect of the UWS, water supply schemes were executed in 2 corporations, 5 municipalities, 68 urban town panchayats, and 82 rural town panchayats, during the plan period. 85% of the urban population was covered totally upto the end of the plan period. Towards Research and Development activities, Rs.3.26 crores was spent.

In addition, a sum of Rs.71.50 crores and Rs.86.57 crores were spent under centrally sponsored schemes, and centrally sponsored schemes were shared equally between state and centre during the plan period.

**Ninth Five Year Plan (1997-2002)**

During the Ninth Plan, the outlay for urban water supply schemes was Rs.750.00 crores. Upto 2000-2001, the expenditure incurred was Rs.392.00 crores, and the augmentation of water supply to 153 towns was completed. During 2001-2002 the proposed coverage was 58 towns against an anticipated expenditure of Rs.208.18 crores. In the Ninth Plan Period, it was proposed to carry out works in 85 municipalitities. But new water supply schemes were taken up in 33 municipal towns and as a result, the budget allocation could not be fully utilised.

In respect of the RWS schemes, the outlay during the Ninth Plan was Rs.2,250 crores, out of which Rs.900.00 crores was state and the central share was
Rs.1,350.00 crores, including Rs.175.00 crores for the O&M as central share. During the initial four years (1997-2001) of the plan period, 16,589 habitations under the MNP, and 8833 habitations under the ARWSP were covered. It was proposed to cover 5500 habitations under the MNP and 7000 habitations under the ARWSP during the year 2001-2002. During the plan period, from 1997-98 to 2000-2001, an expenditure of Rs.1490.70 crores was incurred for the RWS programme, out of which Rs.1047.53 crores and Rs.443.17 crores were incurred from the MNP and the ARWSP funds. During the year 2001-2002, an expenditure of Rs.490.56 crores was anticipated to be incurred which included Rs.411.00 crores under the MNP and Rs.79.56 crores under the ARWSP.

1.3. WATER SUPPLY SCHEME IN TAMIL NADU

1. Water Supply to Coastal Fishermen Colonies

During the year 1994-95, coastal fishermen habitations, lacking basic amenities on various sectors in the coastal districts of Tamil Nadu, were identified by the Department of Fisheries. Water supply proposals were formulated by the Tamilnadu Water Supply and Drainage (TWAD) Board under sub-mission activities of the Rajiv Gandhi National Drinking Water Mission to provide safe drinking water to 160 coastal fishermen habitations in 10 districts, affected by brackishness. The proposal for 113 water supply schemes covering 160 habitations benefiting a population of 2,10,485 (1991 census) was approved by
the Government of India at a total cost of Rs.640.16 lakhs to be shared between the centre and the state in the ratio of 75:25. During the year 1997-98, it was proposed to take up additionally about 100 fishermen colonies lying in both rural and urban areas at an approximate outlay of Rs.3.10 crores.

**Water Supply to Adi Dravidar Colonies**

During the year 1994, a survey of the basic amenities available in the Adi Dravidar and Tribal habitations in the state was undertaken by the Adi Dravidar and Tribal Welfare Department, as a special drive for the welfare of the Adi Dravidars and Tribals and those habitations lacking basic amenities on various sectors were identified. The Government of India accorded 100 per cent grant under the centrally sponsored ARWSP, to provide protected water supply to 1180 Adi Dravidar colonies at a cost of Rs.22.00 crores and the schemes were implemented by the Tamilnadu Water Supply and Drainage (TWAD) Board.

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Water Supply to Fluoride Affected Habitations

Excess fluoride in drinking water causes serious health hazards. Fluorosis is a debilitating disease undermining human productivity and healthy life. It is roughly estimated that 60 per cent of the total intake of fluoride is through drinking water. In Tamil Nadu, 3032 rural habitations mainly spread over the districts of Salem, Dharmapuri, Tiruchirapalli, Coimbatore, and Periyar have the problem of excess fluoride in groundwater.\textsuperscript{29} Proposals were formulated by the Tamilnadu Water Supply and Drainage (TWAD) Board under sub-mission (control of fluorosis) to provide safe drinking water supply to habitations affected by excess fluoride. The project cost of the schemes is shared between the centre and state governments in the ratio of 75:25.\textsuperscript{30} The works were taken up for execution during the year 1995-96. Comprehensive water supply schemes to cover these habitations are under implementation at a total cost of 132 crores. So far 2210 habitations have been provided with water supply schemes.\textsuperscript{31}

\textsuperscript{29}Demand No.48, Water Supply (1995-96), \textit{op.cit.}, p.5.

\textsuperscript{30}Policy Note on Water Supply, Demand No.48, (2000-2001), Government of Tamil Nadu, p.4.

\textsuperscript{31}Policy Note on Water Supply (1997-98), \textit{op.cit.}, p.5.
Rejuvenation of Water Supply Schemes

Many of the water supply schemes implemented with substantial funding had become non-functional due to inadequate maintenance such as source failure, pumpset repair, pipeline damage and the like. These schemes were maintained by local bodies that did not have sufficient technical knowledge apart from lack of finance for Operation and Maintenance.\textsuperscript{32} The Tamil Nadu Government has taken a policy decision to rejuvenate such schemes. During 1996-97 an amount of Rs.52.00 crores was allocated for rejuvenating the non functioning water supply schemes over a period of two years. About 3100 individual power pump schemes and 225 combined water supply schemes were rejuvenated. The level of supply of water has tremendously increased in the habitations.\textsuperscript{33} On the same lines rejuvenation works were undertaken in respect of municipalities and town panchayats also in 1998-99 with a total outlay of Rs.52 crores. This programme was continued during 1999-2000 to the areas where the local bodies came forward to bear 50 per cent of the cost of the rejuvenation works.\textsuperscript{34}

\textsuperscript{32}Ibid., p.5.


\textsuperscript{34}Ibid., pp.17-18.
Anna Marumalarchi Thittam

During 1997-98 the Government of Tamil Nadu launched the “Anna Marumalarchi Thittam”, a special programme for providing all basic amenities for a selected village panchayat in each rural Assembly constituency. The funding for this programme was from the Basic Minimum Services Programme. Accordingly, 4869 water supply schemes were taken up in 636 village panchayats under this programme, at a total cost of Rs.179 crores.

Periyar Memorial Samathuvapuram

The Government of Tamil Nadu, with the aim of realising a society with all the people living together harmoniously without any differences based on caste and creed, established the Periyar Memorial Samathuvapuram from 1997-98 onwards. Water supply schemes to 90 Periyar Memorial Samathuvapurams were taken up at a cost of Rs.6.85 crores and 70 water supply schemes were completed upto 31.3.2000.


36Ibid., p.3.

**Water Supply to Schools**

A scheme to provide water supply to 18,511 schools with not less than 1000 litres per day per school covering elementary schools, middle schools, high schools and higher secondary schools has been taken up. As on 31.3.2002, 14131 schools have been covered at a cost of Rs.21.90 crores.\(^{38}\)

**Drinking Water Supply to Primary Health Centres**

As a new initiative, during the year 2001-2002 the Government proposed a special programme to provide water supply facility with a 1000 litres capacity elevated water tank on the premises of Primary Health Centres with a view to provide drinking water to the patients and the public visiting the Primary Health Centres located in rural areas. During the year 2001-2002, 995 Primary Health Sub-centres were covered against the target of 700.\(^{39}\)

**Mini Power Pump Schemes**

During the year 2001-2002, a new programme was taken up to provide mini power pump schemes with ground level reservoirs in place of the existing hand pumps to relieve the stress and strain that women face in extracting water


from handpumps where water level has gone below 40 metres. The programme is being implemented enlisting the active co-operation of the local women and the responsibility of the Operation and Maintenance of the programme has been proposed to be vested with the local users. During 2001-2002, 4383 hand pumps were converted as mini-power pumps. Out of the 10000 hand pumps proposed to be converted as mini-power pumps for the year 2002-2003, 4000 mini power pumps are to be installed for the exclusive benefit of SC/ST habitations. This scheme will be implemented at an estimated cost of Rs.60 crores.

Sector Reform Projects in Rural Water Supply Sector

The Rural Water Supply Programmes are now being implemented with total grant from the state and central governments. The Government of India, from the financial year 1999-2000 onwards, intended to change the existing supply driven approach to a demand driven basis with community participation at every stage of the implementation of the rural water supply programmes. The Government of India is providing incentives to the states, which initiate steps for institutionalising community participation in the rural water supply programme in the form of additional funds over and above the funds allotted under the ARWSP.

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To avail the incentives, the State Governments are required to implement the Sector Reform Process, broadly consisting of the following elements.\textsuperscript{42}

i) Adoption of a demand driven approach based on empowerment of villagers to ensure their full participation in the project through a decision making role in the choice of scheme design and management arrangement.

ii) Focusing on village level capacity building (formation of district level and village level water and sanitation committees).

iii) Ensuring an integrated service delivery mechanism by streamlining the functions of the agencies involved in project implementation.

iv) 10% minimum capital cost sharing by users. The contribution can be in the form of cash or kind (labour, land or material).

v) Taking up conservation measures for sustained supply of water through rainwater harvesting and groundwater recharge structures.

Under this scheme, 10% of the capital cost of the water supply project has to be borne by the user community. The balance 90% cost will be met by the Government of India as grant. The following water supply/sanitation works can be undertaken under this programme.\textsuperscript{43}


\textsuperscript{43}Policy Note, Demand No.48, Water Supply (2000-2001), \textit{op.cit.}, p.5.
i) Providing hand pumps; (ii) formation of percolation ponds; (iii) provision of deep borewells and construction of pump rooms; (iv) construction of new overhead tanks and new ground level service reservoirs and implementing new water supply schemes; v) carrying out repairs to the existing overhead tanks and ground level service reservoirs; vi) extension of pipe lines; vii) providing water supply to the schools, noon-meal centres and public places like community centres; viii) construction of latrines in schools; (ix) construction of community latrines and x) providing running water supply to latrines.

The programme is under implementation in Coimbatore, Vellore, Cuddalore and Perambalur (composite) districts and the Government of India has sanctioned Rs.40.00 crores for each district. The progress achieved as on 31.3.2002 is given below.
TABLE 1.1
EXECUTION OF SECTOR REFORM PROJECTS

<table>
<thead>
<tr>
<th>Description of Activities</th>
<th>Pilot Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coimbatore</td>
</tr>
<tr>
<td>Community Contribution</td>
<td>194.50</td>
</tr>
<tr>
<td>Rs. in lakhs</td>
<td></td>
</tr>
<tr>
<td>Schemes completed (Nos.)</td>
<td>350</td>
</tr>
<tr>
<td>Total Expenditure incurred (Rs. in lakhs)</td>
<td>929.10</td>
</tr>
</tbody>
</table>


The performance of the state in the implementation of the Sector Reform Project has been appreciated by the Government of India. Coimbatore and Vellore are among the best performing sector reforms districts in the entire country. In appreciation of the good performance registered by the state, the Government of India has extended the programme.

Swajaldhara Rural Drinking Water Projects

The Government of India has launched a community-based rural water supply programme with reform initiatives. This programme is called Swajaldhara,

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with the following key elements:\(^{45}\) (i) demand driven and community participation approach; (ii) panchayats/communities to plan, implement, operate, maintain and manage all drinking water schemes; (iii) partial capital cost sharing by the communities upfront in cash, (iv) full ownership of drinking water assets with Gram Panchayats; and (v) full operation and maintenance (O&M) by the users/panchayats. Gram Panchayats and Blocks adopting the reforms principles will be eligible for Swajaldhara projects.

Accordingly, the Beneficiary Group (BG) should be a registered society and would submit a proposal through the Gram Panchayat or Block Panchayat as the case may be. The Swajaldhara projects will be sanctioned by the Department of Drinking Water Supply, if the proposals are found to have (a) the commitment of the concerned District Implementing Agency and the State Government for compliance of reform principles; (b) 10 per cent of the estimated capital cost of the scheme (5 per cent in case of SC/ST Gram Panchayats/Villages where 50 per cent of the population is SC/ST as per the 2001 census) is paid by the community, in cash, as their contribution to the implementing agency. The cost of the project excluding community participation, will be fully met by Government of India. The State Government/State Water and Sanitation Mission will engage the existing agency undertaking rural drinking water supply programmes and will be termed as the District Implementing Agencies (DIA) for these projects. For the

\(^{45}\)Ibid., p.57.
implementation of the projects, the sanctioned funds will be released in two equal installments to the DIA which will be responsible to release it to the concerned Block Panchayats/Gram Panchayats/village water and sanitation committees/Beneficiary Group, and also for the proper management of the funds.

The DIA would also be responsible for (a) the formulation, implementation and management of the project; (b) receipt and management of central funds for the project; (c) selection of agencies for project implementation by the Block/Gram Panchayats/VWSC/BG and (d) sanctioning of the schemes and entering into bipartite/tripartite agreement between BG/Gram Panchayat/VWSC/Block Panchayat.

Block Panchayat/Gram Panchayat/VWSC/BG will be responsible for (i) the execution of the sanctioned schemes, (ii) placing the progress of scheme implementation in each Gram Sabha meeting, (iii) ensuring community participation in scheme activities; (iv) arranging community contribution towards capital cost in cash; (v) opening and managing bank accounts for the management of project funds; (vi) procuring construction materials/goods and selecting contractors for construction activities; (vii) supervising construction activities; (viii) commissioning and taking over completed water supply works and (ix) collecting funds, and managing the O&M of water supply works.
After the completion of the scheme, it shall be commissioned and taken over for operation and maintenance by the Gram Panchayat/VWSC/BG in a Gram Sabha meeting. In the case of the implementation of schemes by any Government agency, no centage/departmental/administrative/overhead charges will be admissible.

A one time O&M grant would be released to the BG/GP/VSWS/BP within six months of the take over of the schemes by them. This start up grant is not in lieu of community contribution for O&M but to maintain as O&M revolving fund. In case BG/GP/VWSC/BP desires the DIA to operate and maintain the scheme, the community contribution for O &M along with the O&M grant shall be remitted to the DIA.

**Water Supply Status Survey (1986)**

The next survey was conducted in the State of Tamil Nadu during the year 1986 to assess the existing water supply status of rural habitations.\textsuperscript{46} In this survey, the rural habitations were classified as not covered (NC), partially covered (PC) and fully covered (FC). For full coverage status, 40 lpcd supply has to be provided. Habitations with water supply service level status between 1 to 39 lpcd were classified as “partially covered”; habitations not provided with potable water supply were termed as “not covered”. Specific code numbers were earmarked for

districts, panchayat unions, census villages, panchayats and habitations. The status of rural habitations as per this survey were as follows.

Status No. of Habitations
NC-Not Covered 16085
PC- Partially Covered 27356
FC-Fully Covered 20642
Total 64083

**Water Supply Status Survey (1990)**

The next survey to assess the status of water supply in rural habitations as on 01.04.1990 was conducted during 1990 and the results of the survey showed the following status:

**TABLE 1.2**

**STATUS OF RURAL HABITATIONS AS PER SURVEY 1990**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Status</th>
<th>No. of Habitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Not Covered (NC) habitation which do not have any sources of water supply (no source habitation/ not covered)</td>
<td>3,400</td>
</tr>
<tr>
<td>2.</td>
<td>Partially covered (PC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) habitation do have sources of water supply which fails totally for many months during the year (service level is ‘zero’ lpcd)</td>
<td>10,418</td>
</tr>
<tr>
<td></td>
<td>b) Habitations with service level of 1-39 lpcd</td>
<td>35,521</td>
</tr>
<tr>
<td>3.</td>
<td>Habitations fully covered (service level of 40 lpcd and above)</td>
<td>26,441</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>75,780</td>
</tr>
</tbody>
</table>

The habitations classified as “zero” level of service really pose a challenge to locate a potential source for obvious reasons like the sources created earlier have either failed since they are in hard core pockets or turned into non-potable due to their proximity to the sea coast.

**Water Supply Status Resurvey (1992)**

Though the survey on the status of the rural habitations was done once in five years, a re-survey was taken up in 1992 at the insistence of the Government of India. During this survey, some of the cluster of habitations found to lie closer within a distance of 250 m from each other were clubbed together and counted as a single habitation. On account of this fact, there was a reduction in the total number of rural habitations in the 1992 survey from that of the 1990 survey.

A salient feature of the 1992 re-survey was that habitations affected by various quality parameters such as excess iron, fluoride and salinity were also identified. Out of the 66631 habitations, 826 contain excess iron, 3032 habitations were affected by fluoride, 852 of them denoted excess nitrate and 7 habitations arsenic.

Priority was given for coverage of not covered habitations and partially covered habitations with lesser service level status and habitations affected by
various quality parameters, while selecting water supply schemes for implementation.

An analysis of the data shows that out of the total rural habitations of 66631, about 4717 habitations were affected by quality problems, constituting more than 7% of the habitations. It is pertinent to note that even if one quality parameter is not within the acceptable standards, the water source is non-potable. Further, it was identified that the districts of Dharmapuri, Salem and Erode were mostly affected by excessive fluoride pollution in the water resources.

The survey to assess the water supply status of rural habitations was last conducted in 1992. Based on the survey, the status is as follows:

**TABLE 1.3**

**STATUS OF RURAL HABITATIONS AS PER SURVEY, 1992**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Status</th>
<th>As on 1.4.1996</th>
<th>As on 1.4.1997</th>
<th>As on 1.4.1998</th>
<th>As on 1.4.2000</th>
<th>As on 1.4.2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fully covered habitations</td>
<td>34459</td>
<td>37155</td>
<td>41655</td>
<td>49629</td>
<td>55929</td>
</tr>
<tr>
<td>2.</td>
<td>Partially covered habitations</td>
<td>32018</td>
<td>29476</td>
<td>24976</td>
<td>17002</td>
<td>10702</td>
</tr>
<tr>
<td>3.</td>
<td>Not covered habitations</td>
<td>154</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>66631</td>
<td>66631</td>
<td>66631</td>
<td>66631</td>
<td>66631</td>
</tr>
</tbody>
</table>

Survey (2002)

The status of water supply is a dynamic concept rather than a static one. As per the current practice, as and when a habitation is provided with full coverage, it is reclassified as a fully covered habitation. Any change in the status after the installation of the water supply scheme is not taken into account until a new survey is carried out. Thus, although 61615 habitations were classified as fully covered as on 01.04.2001, in reality several of these habitations may get only partial supply because of the factors like, (i) increase in population, (ii) decrease in the performance of the local sources due to over extraction, (iii) quality degradation, (iv) deficient recharge of groundwater due to monsoon failures and (v) failure of system units.

The State Government has decided that rural water supply programmes from the year 2002-2003 should be based on a fresh survey to truly reflect the ground reality. The Government has also decided that in addition to the comprehensive surveys, the database should be updated at least once a year by devising a system of getting regular feedback from rural habitations.47

The financial year 2002-03 will be the first year of the Tenth Five Year Plan. The programme for this year is scheduled to be held based on the new survey conducted during 2002. The tentative results of the survey indicate that out

of 80,241 habitations, 28,623 are fully covered, 51,294 are partially covered and 504 habitations have no reliable source of water supply round the year.\textsuperscript{48}

Even-after extensive coverage made over the years; self-sufficiency as well as a reasonable service level remain unrealised and elusive in the rural water supply sector on the following perceptible factors.

i) The groundwater sources, relied upon heavily for the execution of rural water supply schemes, generally tend to dwindle due to the failure of monsoons.

ii) Increase in the population of habitations beyond the projected level and increase in the number of new habitations affected the service level.

These factors influence and the change in status of the habitations like fully covered in one survey to partially covered and not covered in the next survey.

Apart from such inherent bottlenecks in providing sustainable, potable and safe water supply to rural habitations, the difficulties encountered by the TWAD Board and the constraints involved in achieving the targets within the specified time-frame can be narrated as below on close observation of the progress of works over the years.

i) Very high per capita cost due to the non-availability of source nearby the villages.

ii) Non-availability of potable and dependable source.

iii) Difficulties encountered in the procurement of quality materials in time.

iv) Non-availability of drilling machinery at the appropriate time, particularly during drought season.

v) Non-availability of reliable executing agencies.

vi) Non-availability of continuous power supply in the rural feeders.

vii) Delay in getting power supply from the Electricity Board.

viii) Local objections in locating sources.

ix) Communal problem in implementing and maintaining water supply schemes.

x) Delay in getting inter-departmental permission especially from the highways.

An analysis of the year-wise coverage data with reference to 1992 survey presented in the table shows that year after year from 1996 onwards the full coverage level has been increasing upto the level of 61615 habitations indicating a percentage level of 92.47 per cent. However, on comparison with the full coverage as per the 2002 data, the coverage level has dwindled to 35.67 per cent.
This shows the alarming dimension of the sustainability issue, which is to be addressed on an urgent basis to augment the sources.

1.4 REVIEW OF LITERATURE

Jack Hirshleifer, James C. De Haven and Jerome W. Milliman\textsuperscript{49} (1960) in “Water Supply, Economics, Technology and Policy” dealt with the unique importance of water, public concern in water problems, water resources, the economics of the utilisation of existing water supplies, municipal water rates, investment in additional water supplies, the practical logic of investment efficiency calculations, technological features and costs of alternative supplies of water, water law and trends in water law.

The technical aspects of ground water resources are the focal point attempted by T.G.K. Charlu and D.K. Dutt\textsuperscript{50} (1981) Ground water potential in India is analysed by them from the geographical, geologic, and tectonic framework. They also deal with ground water management, desalination and utilisation of water for various purposes.


Dealing with the physical aspects of water and water management, John R. Mather,\(^5\) (1984) in “Water Resources Distribution Use and Management” highlights the societal uses of water resources like municipal, industrial and agricultural uses. A brief history of the U.S. water laws and doctrines and a comparative study of the Soviet and American water laws have been attempted.

Critically analysing the gaps in water economy, causes and consequences, R. Maria Saleth\(^6\) (1985) in “Water Institution in India” deals elaborately with the water pricing policy, potential and prospects, and factors behind ground water buying decisions. He also throws light on the legal and institutional perspectives, reviews the legal issues and water law reforms towards building a New Water Institution.

In the various articles published in “Water Resources and their Utilisation” by Vinita M. Bhati,\(^7\) (1986) valuable information regarding global water resources and water resources of India have been furnished. River basins, planning, development and management, ground water resource development and management, water resources exploitation, urban-rural water supply in India,

flood management, and environmental impact assessment of water resources development have been evaluated succinctly.

Elaborately covering the areas of Hydrogeologic framework for ground water and the institutional framework for protecting groundwater in the United States, G. William Page\textsuperscript{54} (1987) in his book “Planning for Ground Water Protection” dwells at length on the interrelationship between drinking water and health, technological approaches to removing toxic contaminants, organisational requirements for local planning, and ground water protection.

Warren Viessman, Jr., and Mark. J. Hammer,\textsuperscript{55} (1987) in their voluminous book “Water Supply and Pollution Control”, extensively discussed the water management institutions and technology, the environmental considerations in water management, water requirements, water supply and waste volumes, objectives of water resources development, water quality aspects and drinking water standards have been portrayed vividly.

In the book “Ground Water Assessment, Development and Management”, R. Karanth\textsuperscript{56} (1990) exhaustively deals with the hydraulic cycle and processes, ground water flows, quality of ground water, saline water intrusion, ground water


exploration, artificial recharge, ground water recharge, discharge and balance, ground water development and management.

“Drinking Water and Science (An Indian Experiment)” authored by Shubhatra Chakravarthy\(^{57}\) (1990) portrays the mission approach in the accelerated development of the weaker sections and covers the cost effective technology for potable water in villages. She also analyses the integrated approach for ground water management in India and water resources and their development in the tropical system. Surface water potential and their utilisation in India, the mission approach for quality management of drinking water, technology for safe drinking water, training of professional engineers for a multi-disciplinary approach in water supply management and support services from international agencies have been discussed convincingly.

Focussing extensively on the factors influencing domestic water use, water and health, Swadesh Kumar Battarcharya\(^{58}\) (1998) in “Urban Domestic Water Supply in Developing Countries” discusses water quality, metering domestic water supply, pricing domestic water supply, and community participation in domestic water supply.


Dale Whittington, (2002) have studied about the municipal water pricing and tariff design in developing countries. He concluded that the political decision necessary to effect the changes in the institutional arrangements for the delivery of urban services need to be informed by the substantive issues involved in tariff and pricing reform. Without sound pricing and tariff reforms, institutional reforms cannot work. Political leaders must therefore have a clear vision on the major elements of the pricing and tariff reforms that will make the institutional reform process successful.

Rameshwari Pandya, (2002) analyzed about the water pollution, its sources and preventive measures and practices related to water management for better health. She concluded that the modernizing water supply systems should aim not only at releasing women from traditional tasks, the this might determine what is the social status that they enjoy in the rural communities. The aim instead should be modernize women’s role in rural water supply, preserving the importance of their contribution, but reducing hardships. Such a course of action is also supported by evidence showing that village involvement in the construction and maintenance of rural water systems is crucial for the success.

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Ing-Marie Gren., and et.all (2005)\textsuperscript{61} have investigated the relative advantage of tow alternative decentralized decision units for water quality management: Jurisdictional and drainage basin. It is assumed that there is a relatively large coastal water recipient which can divided into several coastal basins. Further, there are transports of pollutants among coastal basins which constitute spill-over effects among decision regions. There is also a choice between tow decision rules: Maximization of net benefits, or minimization of cost for achieving perspective targets. Analytical results show that relative performance between the two decentralized decision units depends on asymmetry in pollution benefits, pollutants transport within and among regions, and choice of decision rule. An application to an estuary located approximately 100km southwest of Stockholm, Sweden, shows that the relative advantage of the jurisdictional (municipality) and drainage basin decision regions depends on choice of decision rule, and under maximization of net benefit-the size of the benefits of water quality changes.

William Blomquist and et. all., (2005)\textsuperscript{62} have studied about the institutional and policy analysis of river basin management. This study cover the river basin management allows decentralized management of water resources in the Murray-


Darling Basin in Australia. They are also attempting to achieve an ambitious portfolio of ecological restoration objectives, which is distinct from their past focus of balancing water supply and demand for human consumption. And they undertake these efforts at a time when national-level bodies and becoming more actively involved in water policy, creating a national water policy framework into which the Murray-Darling will be expected to fit.

Wahidul K.Biswas and John Merson,(2005)\textsuperscript{63} have attempted to the arsenic-and salinity-affected areas of Bangladesh, rural people still struggle to procure safe drinking water due to technological, institutional and policy barriers. They identify and analyses these barriers by using a policy orientation approach. Social and decision process are mapped to demonstrate the historic and present day trends and conditions for water supply. They concluded that the rural poor in the inland and coastal zones of Bangladesh are the ultimate victims of arsenic poisoning and saline groundwater consumption. Social, economical, technical, environmental and institutional factors are all involved in failure to develop a sustainable system which can supply safer water to rural people.

Ratna Reddy.V., (2005) studied the ground water in India, through a community resource, is de facto treated as a private resource. The groundwater management is the integrated approach of groundwater development and exploitation with surface water bodies like tanks. This ambiguity results in the farmers assuming that they have absolute rights over the exploitation of groundwater. This has resulted in overexploitation by a few people who deprive others of their genuine rights.

Chaulya.S.K., (2005) studied the water resource management in lignite mining area in the coastal region of the state of Gujarat in India. The study covers assessment of water resources for the present and future water balance status and formulation of a management and conservation strategy for the area. Inter-basin transfer of water is also required to artificially recharge the aquifers for the augmentation of the groundwater potential of the area so as to meet the future demand.

Ramaswamy.R.Iyer., (2005) have studied about the UNICEF’s experience in rural water supply. He have pointed out that at least some of the increasing pressure on this finite resources arises form bad resource management,
it recognizes that water scarcity is a present reality in some area and future prospect in other.

Sumathi.M.G., and Kanmani.S (2005)\(^{67}\) studied the treatment of Oorani water by filtration and solar disinfections in Ramanathapuram district, Tamil Nadu. They found that the water treatment system was developed to treat Oorani water by filtration and solar disinfections and experiments were conducted by collecting samples from two types of Ooranies.

Srinivasan,T.,(2005)\(^{68}\) analysed the role of Geographic Information System (GIS) in water supply in Coimbatore, Tamil Nadu. He found the GIS have a wide range of use. Water supply can use GIS in conjunction with the source water assessments to help protect the various water supply system. With an adequate database, GIS can serve as a powerful analytic and decision making tool for water supply system. Furthermore, it can also be used for management and to test consequences of development.


Tushaar Shah and Barbara Van Koppen, (2006), have made an attempted to review the Indian water policy discussion. It had shown that the current global discourse are as demand for water scarcity, embracing a clutch of direct demand management practices and policies, commonly referred to as Integrated Water Resources Management, can help us mitigate water poverty and confront water scarcity. The as Integrated Water Resources Management implementing water pricing and water withdrawal permits have proved administratively challenging: renaming territorial agencies into river basin organization had failed to result in water management at river basin level. The Water policy challenge in India then is eschewing initiatives that are unimplemented-such as enforcing water withdrawal permits, groundwater rights, metering tube well.

The literature mentioned above analyses various dimensions of water extraction, identifying sources and the use of modern technologies for water supply for various purposes. These books and reports cover water issues from a pure scientific point of view and they are more general in nature. A managerial approach to drinking water supply has not been attempted. The best use of managerial techniques may help in augmenting the water supply system and the optimum use of the available water resources. The present study attempts to fill such existing gaps in water resources management. Besides, the study is area

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specific, and is applied to the state of Tamil Nadu. The administrative perspective of drinking water supply and drainage through a Board type of organisation is an interesting area of study in the academic of public administration.

1.5 STATEMENT OF THE PROBLEM

India faces tremendous challenges in the management of drinking water supply. The states in India have the constitutional obligation to provide safe drinking water both for urban and rural areas. The scarcity of water resources in Tamil Nadu made the government of Tamil Nadu make best use of the administration to face the challenges due to drinking water scarcity. The creation of the Tamilnadu Water Supply and Drainage (TWAD) Board as a drinking water supply and drainage administrative institution formed the basis for providing potable water supply to the people of Tamil Nadu with optimum utilisation of scarce water resources. As it is board type of organisation, it is imperative to study the administrative problems faced by the Tamilnadu Water Supply and Drainage (TWAD) Board in meeting its cherished goals and objectives.

The administration of the Tamilnadu Water Supply and Drainage (TWAD) Board in its operation and decision making has been influenced by the organisational development interventionist. Therefore, it is again an important dimension of Tamilnadu Water Supply and Drainage (TWAD) Board, which must be studied in the context of its management decisions regarding water supply. The
Tamilnadu Water Supply and Drainage (TWAD) Board as a drinking water supply administrative authority must provide for avenues for public involvement because the government control mechanism has its own limitations. As a result, a study like the present one must be undertaken to create alternative administrative mechanism and the creation of a management system where it can face the problems of drinking water crisis in Tamil Nadu.

Developing an appropriate administrative machinery which is capable of balancing the need for harnessing the available water resources judiciously and broad social objectives is a critical challenge for the drinking water administration which must be addressed.

1.6 OBJECTIVES OF THE STUDY

1. To trace the historical profile and development of the drinking water supply administration in Tamil Nadu.

2. To study the organisational structure of the Tamilnadu Water Supply and Drainage (TWAD) Board and its development.

3. To analyse the trend and growth of habitations taken up under the various schemes.

4. To analyse the trend in budget allocation and expenditure incurred in the Water Supply Schemes in the Madurai Circle.
5. To sum up the entire study as conclusion and to suggest remedial measures for future.

1.7 METHODOLOGY

The methodology adopted is descriptive, historical as far as tracing the evolution and development of drinking water supply administration in Madurai Circle is concerned. The study is based on secondary data.

1.7.1 Data Collection

The historical and explanatory method of scanning through the materials available in the Tamilnadu Water Supply and Drainage (TWAD) Board is extensively utilised. In keeping with the objectives of the study, the secondary data for the study are obtained from the Annual Reports of the Tamilnadu Water Supply and Drainage (TWAD) Board Board and in consultations with the top executives in the administrative hierarchy.

Analytical and statistical skills are used to study budgetary allocations and to highlight the cost effectiveness of the public fund utilised. Published and unpublished documents, periodicals and reports of international, national and regional sources are adequately exploited. Various water policies of both central and State governments with particular reference to Tamil Nadu are gone through.
Besides, the website resources through Internet services are also made use of to accumulate various ideas and opinions on the selected field of study.

1.7.2 Period of Study

The present study covers the period of 10 years from 1996-97 to 2005-06.

1.8 TOOLS OF ANALYSIS

In order to compare the different sets of data Arithmetic Mean (\(\bar{X}\)) has been obtained by adding the values of all observations and dividing it by the number of observations.

\[
\bar{X} = \frac{\sum X}{n}
\]

To examine the stability of the variables over a period, the co-efficient of variation was applied. The series for which the co-efficient of variation (C.V) is less is said to be relatively more stable.

\[
C.V. (\%) = \frac{\text{S.D.}}{\bar{X}} \times 100
\]

Where

- S.D. = Standard Deviation of variable
- \(X\) = Arithmetic Mean.
Linear trend equation of the following form has been fitted to analyse the behaviour of data.

\[ Y = a + bt \]

Where

\( Y = \text{Variable} \)

\( t = \text{time} \)

\( a \) and \( b \) are the parameters to be estimated.

The compound growth rate has been computed by using the following formula,

\[ \log Y = a + bt \]

Where

\( Y = \text{Variable} \)

\( t = \text{time} \)

\( a \) and \( b \) are the parameters to be estimated.

The above models were estimated by the method of least squares.

\[
\text{Compound growth rate} = (\text{Antilog } b - 1) \times 100
\]

1.9 **LIMITATIONS OF THE STUDY**

The personnel management of the Tamilnadu Water Supply and Drainage (TWAD) Board is not covered in this study due to the fact that the number of employees of the Board is around thirty. Further some of the employees are casual labourers.
1.10 SCHEME OF WORK

The present study “Performance Evaluation of Tamilnadu Water Supply and Drainage Board with Special Reference to Madurai Circle” has been classified into six chapters.

Chapter I introduces the subject and deals with water supply schemes during the Plan Periods, water supply schemes in Tamil Nadu, water supply status, review of literature, statement of the problem, objectives of the study, design of the study, limitations and scheme of work.

Chapter II discusses the history and development of the drinking water supply administration in Tamil Nadu.

Chapter III analyses the organisational structure of Tamilnadu Water Supply and Drainage (TWAD) Board, its major functions, powers of the Board and the role played by the organisational interventionists for improving the organisation.

Chapter IV analyses the working performance of the Tamilnadu Water Supply and Drainage (TWAD) Board in Madurai Circle for implementing the water supply schemes under different programmes.
Chapter V highlights the financial administration of the Tamilnadu Water Supply and Drainage (TWAD) Board. It brings out resource mobilisation by the Tamilnadu Water Supply and Drainage (TWAD) Board from various bodies and also projects the trend and growth of budget allocations and expenditure incurred.

Chapter VI presents the summary of major findings and various suggestions for further improvement of water supply administration.