CHAPTER-1

INTRODUCTION

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INTRODUCTION

It is widely believed that resource capabilities may reach their limit while demands on resources continue to escalate. There is some consensus on the need to bridge the gap between the available resources like knowledge, technology, products, services, natural resources and their usage. The issues related to the use of these capabilities to meet the growing needs, therefore, have become more important and relevant now than ever before.

Agriculture and related activities constitute the principal occupation of India’s population. While providing employment, Agriculture caters to the basic human needs such as food, fabric and fat. Prosperity in agriculture depends on the availability of water and its utilization. Therefore, management of irrigation systems and effective management strategies of irrigation facilities to crops for better yields, has gained utmost importance.

Considering the importance of irrigation, various state governments in India have given top priority for the construction of many major, medium and small irrigation projects to store water and to utilise the same for irrigation, power generation, drinking purposes, industrial usage and recreational activities. The huge investments made in India for creating reservoirs and irrigation systems can be justified only when they are put to optimum use and productivity of the lands benefited by them is increased.
AGRICULTURE IN THE INDIAN CONTEXT

Agriculture is described as the backbone of Indian economy. It plays a key role in the overall economic and social well being of India mainly because of three reasons; first, agriculture constitutes largest share of country’s national income, second, more than half of the Indian workforce is employed in agricultural sector and third, growth of other sectors of the economy depends on performance of agriculture to a considerable extent. Hence, agriculture is a source of livelihood besides providing food security.

The share of agriculture in the national income was 49 percent during 1948 - 49. In 1950 – 51, its share in the domestic product was reckoned at about 56 percent and during the following 10 years, it remained above 50 percent. However, the contribution of agriculture has declined, over the years due to rapid increase in the production of industrial goods and services. Agriculture continues to contribute a substantiated, though declining share to the national output.

In respect of providing work and jobs to the people, agriculture enjoys a pride of place. According to census 2001, among the agricultural workforce of 23 crores, more than 13 crores (around 57 percent) were engaged in agriculture and activities connected with livestock, forestry, fishing etc., as shown in Table -1.1.
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Population</th>
<th>Rural Population</th>
<th>Cultivators **</th>
<th>Agricultural Labourers **</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>361.1</td>
<td>298.6 (82.7)</td>
<td>69.9 (71.9)</td>
<td>27.3 (28.1)</td>
<td>97.2 (100.0)</td>
</tr>
<tr>
<td>1961</td>
<td>439.2</td>
<td>360.3 (82.0)</td>
<td>99.6 (76.0)</td>
<td>31.5 (24.0)</td>
<td>131.1 (100.0)</td>
</tr>
<tr>
<td>1971</td>
<td>548.2</td>
<td>439.0 (80.1)</td>
<td>78.2 (62.2)</td>
<td>47.5 (37.8)</td>
<td>125.7 (100.0)</td>
</tr>
<tr>
<td>1981</td>
<td>683.2</td>
<td>523.9 (76.7)</td>
<td>92.5 (62.5)</td>
<td>55.5 (37.5)</td>
<td>148.0 (100.0)</td>
</tr>
<tr>
<td>1991</td>
<td>846.4</td>
<td>628.9 (74.3)</td>
<td>110.7 (59.7)</td>
<td>74.6 (40.3)</td>
<td>185.3 (100.0)</td>
</tr>
<tr>
<td>2001</td>
<td>1028.7</td>
<td>742.6 (72.2)</td>
<td>127.3 (54.4)</td>
<td>106.8 (45.6)</td>
<td>234.1 (100.0)</td>
</tr>
</tbody>
</table>

Figures in parenthesis show the percentage of rural population.

Figures in parenthesis indicate distribution of agricultural workforce by cultivators, labourers.


Historically, agricultural sector, or more generally the rural sector, has been the supplier of manpower to industry. The findings of the Royal Commission on Labour are indicative of such contribution made by the rural sector. "The Indian factory operatives were nearly all migrants from rural areas".

1"The Indian factory operatives were nearly all migrants from rural areas".
<table>
<thead>
<tr>
<th>Period</th>
<th>Food grains production (Million Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937-1947</td>
<td>61.4</td>
</tr>
<tr>
<td>1947-1951</td>
<td>58.3</td>
</tr>
<tr>
<td>1952-1956</td>
<td>66.0</td>
</tr>
<tr>
<td>1957-1961</td>
<td>75.5</td>
</tr>
<tr>
<td>1962-1965</td>
<td>83.3</td>
</tr>
<tr>
<td>1965-1966</td>
<td>72.4</td>
</tr>
<tr>
<td>1970-1970</td>
<td>107.8</td>
</tr>
<tr>
<td>1980-1981</td>
<td>130.0</td>
</tr>
<tr>
<td>1984-1985</td>
<td>190</td>
</tr>
<tr>
<td>1999-2000</td>
<td>209.8</td>
</tr>
<tr>
<td>2000-2001</td>
<td>196.8</td>
</tr>
<tr>
<td>2001-2002</td>
<td>212.8</td>
</tr>
<tr>
<td>2002-2003</td>
<td>174.1</td>
</tr>
<tr>
<td>2009-2004</td>
<td>212.0</td>
</tr>
</tbody>
</table>

Source: "Agriculture at a Glance" the Directorate of Economic and Statistics, Ministry of Agriculture, New Delhi
The Labour Investigation Committee (1946) also concluded that factory workers were largely immigrants but mentioned that majority of them had little stake in agriculture. The rate of increase in urban population was higher than that of the total population. This is due to lack of opportunities for employment and income in rural areas on the one hand and lure of employment, higher income and urban facilities on the other. The production of all food grains accounted for about 196.8 million tones in 2001-02. A cursory look at table 1-2 reveals the steady increase in the food grain production over the decades. Besides, agriculture also provides fodder that is needed to sustain livestock, which is the largest in number in the world.

In addition to providing sustenance to the people and the livestock, agriculture has an important place in the national economy by supplying raw materials to host of industries engaged in manufacture, trade and transport. It is no surprise that the supply of agricultural commodities such as cotton, jute, oil seeds and rice alone supported nearly one-third of India’s industrial output. In addition to providing the needed inputs to manufacturing sector, agriculture occupies an important place in the country’s export trade.

As shown in able 1-3, though the share of agricultural commodities has come down from 41 percent in 1950-51 to 13.58 percent in 2002-2003, yet its share still is quite substantial. Further, with seven out of every ten persons living in villages, and almost 50 percent of national income derived from land, it is rightly said that nothing moves in the Indian economy unless agriculture moves. And it is a truism to state that agriculture cannot move unless water moves into agriculture.
Table 1 – 3
Share of Agricultural Exports to Total Exports, 1950-2003

<table>
<thead>
<tr>
<th>Year</th>
<th>% Share of Agricultural Exports to total Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950 -51</td>
<td>41.00</td>
</tr>
<tr>
<td>1970 -71</td>
<td>36.80</td>
</tr>
<tr>
<td>1980 -81</td>
<td>34.00</td>
</tr>
<tr>
<td>1984 -85</td>
<td>32.00</td>
</tr>
<tr>
<td>1989 -90</td>
<td>28.00</td>
</tr>
<tr>
<td>2000-01</td>
<td>14.23</td>
</tr>
<tr>
<td>2001 -02</td>
<td>14.22</td>
</tr>
<tr>
<td>2002-03</td>
<td>13.58</td>
</tr>
</tbody>
</table>

Source: Agriculture at a Glance 2004, The Directorate of Economic and Statistic, Ministry of Agriculture, New Delhi

The foregoing account amply makes clear the vital need for irrigation. Sufficient irrigation turns an agriculturist as optimist. Production and productivity rise. Dry lands get their thirst quenched; Considerable land gets released from other uses. Different crops are fed as per the requirements of their healthy growth. As a result, land comes alive. In fact, the man in agriculture flourishes.6
AGRICULTURE IN TAMIL NADU

As indicated, Agriculture continues to be the most predominant sector of the economy of Tamil Nadu state as well as 70% of the population is engaged in Agriculture and allied activities for their livelihood. The Agriculture Department of the state has taken up the challenge to achieve higher growth rate in agriculture by implementing several development schemes and also by propagating relevant technologies to step up production. Intensive Integrated Farming systems, massive Wasteland Development Programmes, comprehensive watershed development activities, water management through micro irrigation systems, organic farming, soil health improvement through bio-fertilizer including green manuring, adoption of Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) technologies are given priority through various programmes besides crop diversification to fetch better return and value addition to agricultural produces.

The three basic requirements of agricultural production are soil, seed, and water. In addition to the above, fertilizers, insecticides, sunshine, suitable atmospheric temperature and human labour are also needed. Of all these, water appears to be the principal ingredient for achieving growth in agriculture.

WATER RESOURCES

The major source of water available either for agriculture or human consumption is obtained from the rain that falls on the earth's surface. South-west
monsoon, north-east monsoon, cyclonic depressions and local storms contribute to rainfall in different seasons in various regions of the country. Rainfall in India, is mainly due to the southwest monsoon from June to September. The rainfall is not even and has spatial and temporal variation causing droughts in some parts of the country and floods in others. The all India annual average rainfall is 1,170 mm but it varies from 100 mm in western Rajasthan to 11,000 mm in Meghalaya in northeastern region.

Besides the seasonal and local uneven distribution, the variation from year to year is so much that in every five years there is said to be one good, one bad and three normal years. On the whole, water in India continues to be an undependable basic input of agriculture and severely short for major part of cultivable land. This renders Indian agriculture “a gamble of monsoons”. Arranging water for every field thus gains vital significance in a country where the natural distribution of water is deficient both spatially and temporally.

India Water Vision 2025

India is fortunate in that it has a few mighty rivers like Indus, the Ganges and the Bramautra which flow into neighbouring countries. Further, it has rivers like Narmada, Mahanadhi, Godavari, Krishna and Cauvery, to mention a few, across the various states within the country. With land area of about 2.11% of the world, India possesses about 4.9% of the world’s annual runoff. Late Dr.K.L.Rao, an eminent Water Resources Engineer has assessed the total
average annual runoff from the river systems in India as 1645 billion cubic metres (BCM).(Refer Table -1.4). But out of these, only 690 BCM is assessed as utilisable for various reasons of topography, timing of availability, etc. Replenishable groundwater is another 396 BCM. The total availability share is thus 1086 BCM annually.

Table 1- 4

<table>
<thead>
<tr>
<th>Source</th>
<th>Quantity in BCM (Billian Cubic Meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Major rivers</td>
<td>1406</td>
</tr>
<tr>
<td>44 Medium rivers</td>
<td>112</td>
</tr>
<tr>
<td>Various Minor rivers</td>
<td>127</td>
</tr>
<tr>
<td>Total</td>
<td>1645</td>
</tr>
</tbody>
</table>

Source. Mohanakrishnan⁹

annually renewable and utilisable. After an analysis of the present scenario and future projections, the Indian Water Vision 2025 has come out with the following estimates with regard to the demand for water by 2025⁹.
Table 1- 5

Estimated Demand for water by Purpose, 2025

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Quantity in BCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>730</td>
</tr>
<tr>
<td>Water supply</td>
<td>70</td>
</tr>
<tr>
<td>Ecological</td>
<td>77</td>
</tr>
<tr>
<td>Industry</td>
<td>120</td>
</tr>
<tr>
<td>Energy</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>1027</td>
</tr>
</tbody>
</table>

Source: Mohankrishnan

With increasing population and virtually no area available to extend cultivation, India has to face a challenge to meet the rising demand for food and fibre and faster growth is needed in irrigation and agricultural sectors. Studies and analysis have brought out that the irrigated area has to increase from 71 m.ha (1994-95) to 118 m.ha by 2025 which will mean that water required for irrigation which is 427.7BCM (1994-95) has to reach 730.6 BCM.

IRRIGATION DEVELOPMENT IN INDIA

Though the average rainfall in India, being 125 cm is fairly high it is seldom normal over the vast subcontinent. Excepting a few areas where it is high, regular and certain, by and large, it is scarce, uncertain, irregular and unevenly distributed. There are vast tracts in which annual precipitation is so light that cultivation is not possible without artificial water supply. More than 80 percent of
the rainfall is generally received in most parts of the country during June-
September, besides the seasonal and local uneven distribution, the variation from
year to year as mentioned elsewhere, is also very high.\textsuperscript{11}

**Progress of Irrigation – A Review**

The artificial application of water to soil for the purpose of crop production is
called as Irrigation\textsuperscript{12}. Irrigation in many countries is an old art - as old as
civilization, but for the whole world it is a modern science – the science of
survival\textsuperscript{13}.

Simply, Irrigation is said to be the oldest applied science in the world. Man, since the time he began a settled life, used to tap the water resources by
bunding the course of water streams. References to irrigation abound in the
folklore and ancient literature of any country. There are instances in which the
most dry and backward areas have become prosperous and civilized, mainly due
to the introduction of irrigation facilities\textsuperscript{14}.

In India also, historical records bear testimony to the exercise of a
number of old works in different parts. In north India, perennial rivers like the Indus
and the Ganga made it relatively easy to divert flood-flows through inundation
channels. In the South where the rainfall is scanty, the practice of storing water in
large tanks was wide-spread. In areas that have a high groundwater table, lift
irrigation from wells was common.
During the Vedic period (400 B.C.) people used to irrigate their crops with dug wells or inundated waters. Irrigation was gradually extended during the later Hindu, Muslim and British periods. The Viranarayanar and Gangaikonda Cholapuram tanks in Tamil Nadu and the Anataraja Sagara in Andhra Pradesh were constructed as early in the tenth and thirteenth centuries respectively\textsuperscript{15}.

The British initiated activities in the area of irrigation with the renovation, improvement and extension of the existing works. Modern irrigation development could be traced to 1832 when the first major work of modern times, the eastern Jamuna Canal in Uttar Pradesh commenced its operation\textsuperscript{16}.

However, although conscious of the urgent need for irrigation in India, upto the middle of the 19\textsuperscript{th} Centuary British Indian rulers seemed to appreciate the irrigation facilities in vogue during those days, but did not pay sufficient attention to new irrigation works. As a result, some of the works which they inherited from their predecessors were ruined due to neglect\textsuperscript{17}. The British thought of irrigation in India in its right perspective only in the latter half of the 19\textsuperscript{th} century. Several repair and revival of the old works were undertaken.

When enough experiences and confidence have been gained, the Government ventured on new major works, like the Upper Ganga Canal, the Upper Bari Doab Canal and the Godavari and Krishna delta systems which were all diversion works of considerable size. The period from 1836 to 1866 marked the investigation, development and completion of these major works\textsuperscript{18}.
The recurrence of drought and famines (1876-78) necessitated the development of irrigation during the last quarter of the nineteenth century. The gross irrigated area in British India at the close of nineteenth century was 7.5 million hectares by public works and 5.7 million hectares by private works. The total gross area sown was 12.2 million of which only 16 percent was irrigated.

With regard to sources of irrigation, canals irrigated 45 percent, wells 35 percent, tanks 15 percent and other sources five percent of the total irrigated area. The indispensability of planned and rapid development of irrigation was pronounced by the two great famines of 1897-98 and 1899-1900. The economic considerations necessitated irrigation development due to the need for food to sustain the population. The First Irrigation Commission was formed in 1901 to report on irrigation as a means of protection against famine in India. Based on the recommendations of the First Irrigation commission and their implementation, the total area irrigated by public and private works increased to 16.0M.ha in 1920-21. 

In fact, a real beginning of river water diversion scheme was made during the British regime by Sir Arthur Cotton, a British Engineer, who does not have a parallel even to this day in respect of irrigation development particularly in South India. The Cauvery diversion schemes, the Godavari and Krishna water works were all carried out and constructed under his personal supervision during the second half of the 19th century. Writing on Sir Arthur Cotton, Uddaraju Ramam
describes “India has known many great engineers, but of all of them, Sir Arthur Cotton is a class by himself. He is not merely an engineer, but an engineer with a passionate soul, a visionary, for him, the flowing waters were ‘liquid gold’. Harnessing the river waters for irrigation, navigation, flood control etc., was his creed. He was a pioneer in the field of irrigation and left a blazing trial for centuries to come.\(^2\)

In the process of the execution of several irrigation works in South India, the frail health of Cotton had put him to untold sufferings. Added to this, he had to encounter several difficulties from official sources\(^3\).

\(^2\) It was in 1822 that Cotton was first assigned the task of supervising the repair works of several tanks in the districts of Combatore, Madras, Tiruchinopoly and Tanjore of the present Tamil Nadu state. On successful completion of these works he was called upon to attend to much bigger works like river diversion schemes, notably the Cauveri, Godavari and Krishna. When he first visited the Circar Districts of then Madras presidency (presently Coastal Andhra), he was shocked to witness the prevailing drought and famine conditions. Deeply moved by such a plight of the people inhabiting in the areas through which the mighty rivers Godavari and Krishna flow, Cotton forwarded his proposal to the British Government for the construction of an Anaicut across the River Godavari at Dhavaleswaram, to start with. His proposal were accepted in toto and the work began in 1848. Soon after its completion, another anaicut across that river Krishnan at vijayawada was taken up and under his guidance by Captain Orr who was his valued and trusted assistant. (Irrigation works in India, Lecture by Lt. General Sir Arthur Cotton, compiled by Uddaraju Ramam, Vijawada, 1968. p. 1.
Thanks to the missionary zeal of Cotton, the Godavari and Krishna Anaicuts constructed in the second half of the 19th century so thoroughly transformed the socio-economic conditions of the coastal districts (East Godavari, West Godavari, Krishna and Guntur) of Andhra pradesh that they have found pride of place in the agricultural classes who are most prosperous in the country. The prosperity of the ryots is evident even to the most casual observer. The gradual substitution of tiled houses and upstairs buildings for the thatched, the better dress, the more universal adoption of rice as an article of diet rather than Indian corn are all silent but certain indications of the improvement of the agricultural and even of the labouring classes22.

The following were the recommended works of First Irrigation Commission, in South India, ie., in the then Madras province

(a) Improvement of the Kurnool – Cuddapah Canal

(b) Storage works on the rivers Cauvery and Krishna
   (about 210km.upstream of Vijayawada)

(c) Investigation of the Tungabhadra project

Cotton was so deeply and emotionally committed to the creation of irrigation facilities in India which may be seen from his statement made in 1879 before the House of Common select committee on east India Public Works, 'I have never made this a personal matter, and trust I am not going to be gin in my old age, I never asked for an appointment, or for anything else, except to be allowed to irrigate India. I never possessed property, not even took a share in any speculation, that I might have nothing even to occupy my thoughts or warp my judgement, but might give myself upto my duty of helping to raise India in this particular point". (Lady Hope,’ General Sir Arthur Cotton, His Life and Work’ reprinted by the Institution of Engineers (India), Calcutta, 1964,p.80.
In the Princely states also several new projects were sanctioned. The Nizam Sagar Project in Hyderabad and the krishnaraja Sagar Project in Mysore are notable among them. Yet the percentage of irrigated area to the total sown area could increase only up to 19.1 percent by the end of 1950.

Progress Under the Five-Year Plans

When India attained Independence in 1947, the Government faced a tremendously thirsty agriculture crying for water. Despite some growth of Irrigation facilities during the British rule, Indian agriculture was found to be largely conditioned by the uncertain and unevenly distributed rainfall. All this necessitated the Government to take immediate steps for the irrigation development.

The first Prime Minister of India, the great visionary Shri Pandit Jawahalal Nehru established the Union Planning Commission in 1950 and launched the five-year plans for the overall development of the country with a long term vision.

A very high priority was assigned to the irrigation development in the planning process that commenced from 1951. As a result, came the giant schemes like Bakra Nangal, Damodar Valley, Hirakud, Nagarjuna Sagar, Kosi project, Thunga Bahdra, etc. These are the major projects seriously initiated during the first and second five year plans in addition to a number of medium and minor irrigation projects.
The planning commission gave more emphasis to the construction of giant irrigation projects. In subsequent plan periods, in almost all the plans, total outlay on major and medium irrigation was higher than the outlay on minor irrigation potential created by various sources. The progressive development of irrigation in India during various plan periods is given in Table 1-11. The area under irrigation increased from 22.50 m.ha in 1951 to 72.85 m.ha upto end of 1991-92.

The huge investments made in India for creating irrigation systems can be justified only when they are put to optimum use and productivity of the lands benefited by them are increased.

**IRRIGATION SCENARIO IN THE STATE OF TAMIL NADU**

Tamil Nadu, one of major states of Indian union, with a geographical area of 13 million hectares is ranked eleventh in size among the Indian States. The net area sown in Tamil Nadu is about 6 million hectares of which cultivable area of about 3 million hectares (50 percent) is endowed with irrigation facilities under various canal systems, tanks and wells. The remaining 50% of the cultivable land is rain fed. The annual average rainfall is 943 mm of which 450 mm is received during north - east monsoon period, 300 mm in the south-west monsoon period, 50 mm in the winter and 143 mm in the hot weather period. Lying in the tropical zone the state has good sunshine for most of the year except in the months of November and December when the cloud cover is usually heavy.\textsuperscript{24}
Irrigation in Tamil Nadu is of ancient origin. There are references to irrigation in the Sangam literature. The Grand Anaicut built by Karikala Chola in the 2nd Century AD is acknowledged to be a marvellous structure built on sandy bed of a flowing river with knowhow then available, perhaps the first kind attempted anywhere in the world and still continuing to serve. Several hundreds of diversion structures across the streams and rivers and thousands of minor irrigation tanks for harvesting the monsoons rains for storage and use were built. They, in fact, benefited learning the art of irrigation by observing the irrigation practices here and there and tried to supplement by adding the two storages, namely, Periyar reservoir on the west flowing Periyar river and Mettur reservoir on the river Cauvery. Each of these two reservoirs was unique at that time.

The Periyar project was perhaps the first attempt in the world of large scale trans-basin diversion. The water of the river Periyar is dammed, stored and conveyed through a tunnel punctured in the Western Ghats to flow down towards east and join the waters of the river Vaigai for creation of new command for nearly two lakh acres. Similarly the Mettur dam was the first longest straight gravity of large height built in masonry anywhere in the world creating the then largest man made lake in Asia.

* Sangam literature is the oldest known Dravidian literature, written in Tamil, and deals with love, war, governance, trade, eloping, bereavement, and mourning.
During the post-Independence era, thanks to the vision of the then and power were given top priority. In Tamil Nadu, the lower Bhavani project for the formation of a reservoir on Bhavani river, a tributary of Cauvery was taken up as the first major irrigation project in the first Five Year plan. With a masonry cum earth dam capacity 929M.Cumec (32.8TMC) to irrigate an extent of 2,07,000 acres in the Periyar and Trichy districts. The project had cost Rs1034.00 lakhs and was completed in 1955.

The Parambikulam Aliyar Project can be termed as another most prestigious irrigation project executed by the Tamil Nadu state during the plan periods. It is a multi-valley, multi reservoir project designed to pool the flows in a few west flowing streams, store them in reservoirs, route them through tunnels from one reservoir to another across the Western Ghats to the eastern plains to serve the drought prone areas. This project was possible only through the natural utilisation of the flow generated both in the Tamil Nadu limits and also in Kerala territory but flowing west and surplusing into the Arabian sea. Eight reservoirs have been built in the folds of the Anamalai hill ranges, 23.034 running metres of tunnels have been made, 53km. of the most difficult contour canal has been built on the slopes of the hills and 244km. of main canal and several kilometres of branch canals, distributaries and minors have been executed to irrigate an area of (2.40 lakh acres). Power house with installed capacity of 158 MW had also been integrated in the multi-purpose project.
In Tamil Nadu, particularly, having conceived and executed all possible schemes for most of the surface waters, the future lies only in two possibilities. One, securing additional waters from neighbouring states where there is surplus that can be spared and the other by managing our own water resources carefully so that the maximum benefit can be got from it.

Management of water resources thus becomes not only relevant but also essential. Since a large percentage of consumptive use is through irrigation, management of water is to be given a high priority. Necessary training for the irrigation management is to be given to all those who are in water regulation and in-charge of the irrigation systems. With this objective Irrigation Management Training Institute (IMTI) has been set up in the state with assistance from USAID.

IRRIGATION MANAGEMENT

The proper management and maintenance of irrigation systems, created during various five year plans and annual plans is essential to safeguard the systems in the long run to get better output from them.

The principal requirement of any good irrigation water distribution must involve minimum loss of water and ensure timely, reliable and equitable water supply to all cultivators in the command, irrespective of location of these fields in the command area.
Uttar Pradesh, Punjab, Haryana and Rajasthan states in India are adopting Osranabandhi system for distributing irrigation water where as Maharashtra and Gujarat states are following Shejpadi systems. Likewise different states are following different systems, which have been evolved over the years depending upon the availability of land and water resources, agro-climatic conditions and habits of the farmers etc. Most of the regional systems like Warabandhi, Osranabndi, Shejpadi, Block and Satta systems have some drawbacks and do not have countrywide applicability. They continue to be practiced even now as the concerned projects had been planned and designed keeping such operational practices in view. Many of them cannot ensure equitable allocation and distribution of water to all the cultivators.

As such, needless to say that effective management and distribution of water across the state lies on the effectiveness of the personnel engaged in the department of Public Works in general and the people of the various specialised agencies like agricultural Engineering and agricultural department. At the same time, it depends on the farmers who are the ultimate beneficiaries of any irrigation projects for getting optimum output from the projects.

Hence it is found essential that the personnel who are involved in the irrigation activities must be trained to equip themselves for operating the irrigation system in right way and at the same time to enhance their knowledge on par with latest technical developments.
In order to create awareness and exposure and transfer of technology, Government of India and state Government have established many national level as well as state level training institutes throughout the country.

IRRIGATION MANAGEMENT TRAINING INSTITUTE

In Tamil Nadu state, the Public Works Department of the Tamil Nadu state is the operating and administrating agency of all these sources of irrigation. With a view to train the officials and staff operating at various levels in the different irrigation systems as well as the end users; the farmer, the Government of Tamil Nadu has setup an Irrigation Management Training Institute (IMTI) during the year 1984 at Tiruchirappalli, a district head quarters town of Tamil Nadu.

Training and development activities are usually undertaken to maximise the operational efficiency of the officials in any organisation, improve their competence and skills, foster a higher level of motivation and build behaviour adaptability to increase the effectiveness of the organisation. All these objectives could be achieved only when the organisation perceives and attaches importance to training and development of its officials and plan to ensure successful conduct of training programmes for the employees.

Training is differentiated from education; in that training should be concerned with increasing knowledge and skill in doing particular job, where as education with general knowledge and understanding of the total environment.
The contribution of the training institute to the training process is threefold. The first contribution is to the participants. Staffed by competent, flexible trainers and administrators under a responsive principal, the institution provides participants with a program and an environment that consistently promotes learning relevant to more effective behavior at work. It is a setting that keeps on motivating them to learn more and to improve their performance, which offers challenges they can handle, that provides the opportunities to discover effective responses and then reinforces them. Second contribution is to the trainers, that the institution is to provide steady support: the collaboration of colleagues, where necessary; supporting services of many kinds, easy of access; a climate that is both stimulating and satisfying. Thirdly, for the society in which it works, the institution is an agent for development. It permeates the social fabric with its own qualities of inquiry, active response, and evaluation of effectiveness, above all with its enthusiastic and skillful engagement in society and its tasks. Each type of institution operates differently and has slightly different target audiences and each center may offer a slightly different curriculum.

Any organisation's effectiveness depends on the ability to accomplish the following three objectives: To achieve its goals, To maintain itself internally, and to adapt to its environment. The other three factor which could necessitate training activity are technological advances, organizational complexity and human relations.
Based on the above premises, IMTI has conducted many training programmes for the officials of development departments and farmers since its inception. The training programmes conducted at IMTI have not been subjected to a systematic analysis in order to assess its efficiency and effectiveness as well as contents and objectives set by the planner have been met by the training programme. This thesis is an attempt to fill this void, with a view to assess the achievement against the operating plan and to suggest appropriate policy and theoretical conclusion regarding training and development strategies, philosophy, operating structure, course curriculum, learning programme etc., to make the training programmes more effective and cost efficient.

PRESENTATION OF THE STUDY

The research Study presented in this thesis entitled ‘Irrigation Management Training Strategies’- A Case Study of Irrigation Management Training Institute at Tiruchirappalli.’ This Thesis is divided into seven chapters. Chapter one deals with agriculture in the Indian context, agriculture in Tamilnadu, irrigation management in India and importance of utilization of water. Chapter two deals with an importance and significance of study need for the study, methodology, sampling and review of literature. The profile of Irrigation Management Training Institute is presented in chapter three. Chapter four deals with the Trainers’ perspective. Trainees’ perspective (official) is presented in chapter five. Chapter six highlights the Trainees’ perspective (farmers) and finally, summary and conclusions are given in the seventh chapter.
REFERENCES

1. The Report of the Royal Commission on Labor, p.10


4. The livestock census, Govt. of India, 1997.


6 Anjaneyaswamy, G., ‘Agricultural Entrepreneurship in India’ Chugh Publication, Allahabad, 1988, p.44.


17. The then British government gave top most priority to the construction of railway, which used for the colonial exploitation of Indian raw materials for export to England and of Indian markets for the import of English manufactures.


20. It was in 1822 that cotton was first assigned the task of supervising the repair works of several tanks in the districts of Coimbatore, Madras, Tiruchinopoly and Tanjore of the present TamilNadu state. On successful completion of these works he was called upon to attend to much bigger works like river diversion schemes, notably the Cauveri, Godavari and Krishna. When he first visited the Circar Districts of then Madras presidency (presently Coastal Andhra), he was shocked to witness the prevailing drought and famine conditions. Deeply moved by such a plight of the people inhabiting in the areas through which the mighty rivers Godavari and Krishna flow, Cotton forwarded his proposal to the British Government for the construction of an Anicut across the River Godavari at Dhavaleswaran, to start with. His proposal were accepted in toto and the work began in 1848. Soon after its completion, another anicut across that river Krishnan at Vijayawada was taken up and under his guidance by Captain Orr who was his valued and trusted assistant. (Irrigation works in India, Lecture by LLt. General Sir Arthur Cotton, compiled by Uddaraju Ramam, Vijayawada, 1968, p.1.

21. Cotton was so deeply and emotionally committed to the creation of irrigation facilities in India which may be seen from his statement made in 1879 before the House of Common select committee on east India Public Works, ‘I have never made this a personal matter, and trust I am not going to be gin in my old age, I never asked for an appointment, or for anything else, except to be allowed to irrigate India. I never possessed property, not even took a share in any speculation, that I might have nothing even to occupy my thoughts or warp my judgement, but might give myself up to my duty of helping to raise India in this particular point”. (Lady Hope,‘ General Sir Arthur Cotton, His Life and Work’ reprinted by the Institution of Engineers (India), Calcutta, 1964, p.80).
22. Lady Hope,’ General Sir Arthur Cotton, His Life and Work’ reprinted by the Institution of Engineers (India), Calcutta, 1964,p.76


26. Warabandi or Rotational Water Supply is a system of equitable water distribution, by turns according to a predetermined schedule specifying the day, time and duration of supply to each farmer in proportion to his holding size in an outlet command.

27. Osranabandhi is the synonym for Warabandhi. Under this system, water is supplied according to a predetermined schedule to each farm according to the turn. The supply of water from tail end to head to ensure that the farmers in the head reaches do not receive excess waters resulting in unequal distribution. This system is practised in Uttar Pradesh, Punjab, Haryana and Rajasthan states in India (Theme Paper on Human issues in involved in water resources Development, Indian Water Resources society, 2000.)

28. Shejpadi system, in which the farmer applies for water for specific crop by a due date. On sanction of the application by the Government agency, water is supplied according to the requirement of crop by rotation. The schedule of supply is notified in advance. This system has been followed in parts of Maharstra and Gujarat states in India. (Theme Paper on Human issues in involved in water resources Development, Indian Water Resources society, 2000.)
29 Block system followed in Maharastra ensures long-term guarantee of supply to the farmer for a period of 6 to 12 years against supply limited to one year or less in case of other system. While sugarcane blocks are sanctioned for a period of 12 years and two seasonal crops sanctioned for a period of 6 to 12 years. This system has created islands of prosperity and also entails less efficient use of water in terms of production per unit quantity of water. (Theme Paper on Human issues in involved in water resources Development, Indian Water Resources society, 2000.)


