CHAPTER – 1

IRRIGATION IN ANCIENT AND MEDIEVAL INDIA
Water is essential for life on the earth. The importance of water has been recognized from the primitive days. The largest volume of water in the world is used for irrigating lands, especially for the production of food grains. For the growth of plants, water must be available in the appropriate quantities and at the right time, depending on the species of plant, the soil and other climatic condition.\(^1\) Efficient utilization of water resources is essential for agricultural production for meeting the challenge of feeding the ever-increasing human population. Land and water being limited, their efficient use is basic to the survival of an ever-increasing population in the world. The conservation of moisture in soil is needed for optimum crop production.\(^2\)

Economic and social development to a great extent depends upon the creation of surplus agricultural produce. This often requires extension of agriculture through new irrigation projects or the improvement of existing irrigation systems and practices to ensure optimum land utilization. Improved water management (including irrigation and drainage) can contribute to the increase of agricultural production, both of food and other crops.\(^3\)

The part played by irrigation in Indian agriculture is significant due to the unequal distribution, as well as the insufficiency of rain. In large parts of the country, rainfall is the only source of the water supply and its failure causes almost famine conditions. The “Irrigation works although almost un-known in Northern East

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\(^2\) Ibid.

have existed in India from time immemorial.” The oldest and most famous was the Cauvery delta system of canals which Sir Arthur Cotton strengthened and improved in 1835 and the success of which encouraged him to propose the Godavari works which he afterwards constructed.⁴

I

Irrigation may be explained as the process of harvesting rainwater and harnessing to the field as per the requirements. Early man by trial and error method had gained experience and his irrigation works are still giving evidence to his ingenuity. Some of them are referred to in the literature. In a tropical country like India water is considered to be as precious as gold. Indeed it is considered to be "liquid gold" in the East. As Sir Charles Trevelyan put it, "irrigation is everything in India. Water is more valuable than land, it increases its productiveness at least six fold and generally a great deal more, and it renders great extents of land productive which otherwise would produce nothing or next to nothing."⁵ It is an often said that given sufficiency of water and manure, the ryot would grow a crop even upon the stones. Water is the "universal solvent," the sovereign remedy for all the economic ills of the country, declared Arthur Cotton in his study on Public Works in India.⁶

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⁶ A. Cotton, *Public Works in India: Their Importance with the Suggestion for their Extension and Improvement* (London: Richardson Brothers, 1854), p. 238.
The word "irrigation" means the application of water to the soil for the purpose of increasing the growth of plants. Farmers in India have been irrigating their crops for more than two thousand years. Modern Irrigation and the associated practices of drainage, fertilization, mechanization, and mass production for special markets under professional management have revolutionized agricultural operation.

J.S. Kanwar writes "Indian irrigation is as old as agriculture. It is a means to mitigate the impact of irregular, uneven and inadequate wild fluctuation in rainfall from year to year." It is a field that links and serves several people with different purposes. But it throws out innumerable problems to be solved in its day – to day management. It requires continuous monitoring and improvement.

Irrigation performs two quite distinct functions: One for extension and intensification of cultivation; and another for protection of crops from drought. The use of irrigation for agricultural purpose can be traced to the early Egyptians, who were irrigating fields with water from the Nile River by 5000 B.C. Evidence shows that other ancient civilizations, such as those of the Babylonians and the Chinese, also developed largely as a result of irrigation - based agriculture.

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Importance of Irrigation in an Agrarian Economy:

Irrigation in an agrarian economy assumes the same importance as blood in human body. Irrigated agriculture as a technology increased the food production in India and helped to feed growing population. Irrigation is the obvious means of making the Country's agriculture relatively independent of the vagaries of rains and of putting on a more secure footing the agricultural economy of the nation on which to great extent the welfare and happiness of the largest section of people in a predominantly agricultural country revolves.⁹

Irrigation has played a vital role in this continuous process of agricultural development. In most of the early civilizations as well as in many countries of the present day, irrigated agriculture provided, and continues to provide, the basic human resource for survival and subsistence. Given the importance of irrigation to the India's food supply and the vast resources already spent on irrigation development, it is tragic that the actual returns of irrigation systems are disappointingly poor.¹⁰

We have no way of ascertaining at what period of time organized irrigation came to be practiced by the various farming communities. It is believed that irrigation was practiced extensively in the Punjab and Sind in the Indus Valley in the north and in the Cauvery Delta in the south and this practice compared favorably with contemporary irrigation practices in Nile delta in Egypt and the Euphretus and Tigre’s

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⁹ B.N. Poddar, Development of Irrigation and Indian Agriculture, p. 17.
valleys in Mesopotamia in West Asia. Excavations in Mohan-Jodaro and Harappa have confirmed the existence of extensive irrigation systems in the Indus Valley. We have the Grand Anaicut built by Karikala Chola in the beginning of the second century B.C. on Cauvery still functioning at the head of the delta. We are thus in possession of ancient structure of this kind. This structure founded in the sandy river with no rocky base speaks of the native skill in masonry.  

II

Irrigation in Ancient and Early Medieval India:

Agriculture being the main occupation of about 74% of the population of the country, the history of ancient India is replete with references to irrigation projects. The Arthasastra of the Mauryan period refers to check-dams for agriculture built in Gujarat, which were renovated under King Asoka in the third century B.C. Some hillside check-dams in western India have remained under local management till the present times. Irrigation served a dual purpose in our agricultural economy. First they provide protection to crops against damage done by failure of rain and secondly, they increase the yield of crops even in normal years.

In Arthasastra, Kautilya prescribes a norms and punishment for violations against the use of sluice gates of tanks.

"Persons letting out the water of tanks at any other place than their sluice-gate shall pay fine of six panas; and persons who obstruct the

Irrigation in India can be traced back to prehistoric times. An ancient Indian scripture make reference to wells, canals, tanks and dams, the operation and maintenance of which were the responsibility of the State. According to the ancient Indian writers, the digging of a tank or well was considered to be a good act which could benefit the human beings. Brihaspathi, an ancient authority on law and politics, writes that “the construction and the repair of dams are pious works and their burden should fall on the shoulders of rich men of the land.”

Similarly, 'Atharva Veda', the ancient Hindu Scripture, describes the digging of canals to take water from rivers, symbolizing a river as a cow and canal as a calf. There is historical evidence of the respective duties of kings and the people in respect to irrigation works having been defined in some parts of India as early as 30 B.C.

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14 B.N. Poddar, Development of Irrigation and Indian Agriculture, p. 56.
The remains of canals constructed by Hindu as well as Muslim rulers indicate that irrigation has been given importance in India from very early times. Sir William Willcocks, wrote in his book *Ancient Systems of Irrigation in Bengal*, while speaking of the overflow of canals of Bengal in the past, which were then called ‘Dead Rivers’, observed that "they fall behind the great irrigation works of other countries."  

The country traversed by these canals is the Ganges and the Damodar has an irrigated area which could not have been under 70 lakh acres. These canals aligned and designed on the soundest principles worked for many hundreds of years and were only dislocated by a generation of civil war and discord.

There is evidence of large-scale irrigation systems existing during the time of Indus Valley Civilization (2500 B.C.). The spread of agricultural settlements to less fertile and irrigated area led to co-operation in irrigation development and emergence of larger irrigation Works in the form of reservoirs and small canals. While the construction of small schemes was well within the capability of village communities, large irrigation works were to emerge only with the growth of states. The king had the power to mobilize labour for irrigation works. During the Mauryan period (300 B.C.), a revenue tax of one-fourth of the produce was paid to the state for water used from rivers, lakes and dams. If privately managed dams were neglected for five years, they were taken over by the state.  

\[15\] Ibid.  
There are ancient Indian literatures which throw light on Irrigation. For example, Kautilya's *Arthashastra* (300 B.C.) says that the king, should construct dams, or reservoirs filled with water either perennial or drawn from some other sources, or he may provide sites, roads, timber and other necessary things to those who construct reservoirs of their own accord. It is significant to note that Kautilya knew the rain-gauge. He writes about the construction of a special *kunda* or tank of definite dimensions with opening of the size of a cubit of the middle length towards the sky to serve as a rain-gauge.\(^\text{17}\)

The Mahabharata mentions that sage Narada advised Yudhishthira to excavate large lakes to store water and make cultivation independent of rainwater. According to Kautilya’s *Arthashastra* there were officers to superintend fresh water sources, dams, tanks and irrigation systems. The Sangam work *Pattinapaalai* refers to the existence of two tanks – Suryakundam and Chandrakundam in the port city of Poompuhar. In the 11\(^{th}\) century, King Bhoja created a huge lake across two hills in Madhya Pradesh, covering an area of over 65,000 ha and fed by 365 streams and springs.\(^\text{18}\)

In South India, perennial irrigation began with the construction of the Grand Anaicut by the Cholas in the second century A.D. Wherever the topography and terrain permitted, it was an old practice in the region to impound the surface drainage water in tanks or reservoirs to store excess water, and build a sluice at a


suitable level to irrigate the land below. Some of the tanks got additional supply from stream and river channels.

*Amuktamalyada* of Krishnaraya in Telugu emphasizes the Importance of irrigation in the following statement: When a State is small in extent then both virtue (*dharma*) and prosperity (*artha*) will increase only when tanks and, irrigation channels are constructed.19

### III

**Irrigation in Tamil Nadu:**

Sangam literature mentions paddy cultivation both in terms of river and tank irrigation. However, technology during this period was most rudimentary: probably irrigation depended on inundation of low-lying areas by rivers etc., at that time. Gradually, the valley developed as the core area of irrigated paddy cultivation and became the symbol of Tamil Civilization.20 Simultaneously, in the traditional area called Tondaimandalam (representing Chengalpattu and parts of North and South Arcot), the wealth of the Pallava rulers (550 - 850 A.D.) seemed to flow "from huge irrigation tanks, called *eri*, manmade lakes behind earthen walls to store rain and runoff for use in paddy fields down slope".21

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Similarly, in two other traditional areas known as Pandya-mandalam (representing most of Madurai and Tirunelveli) and Cholamandalam (comprising Thanjavur in particular), inscriptional evidence reveal the expansion of irrigated agriculture during the rule of Pandya and Chola Kings (800 - 1300 A.D.). The dams which were constructed initially - both in Cholamandalam and Pandyamandalam - were temporary, but they were capable of raising the level of water to pass into short system of channels to irrigate paddy fields in the up-river tract. Further improvements were noted when large, permanent stone dams or anaicuts were built, with longer system of channels and tanks connected with it. "The most impressive of these was the Grand Anaicut, seventeen miles below modern Tiruchirappalli, a masonry dam over 1000 feet long, up to 60 feet thick, and 18 feet high. More technically reliable estimates of the date of Grand Anaicut place it in the middle or late Chola times".  

Similarly, the system irrigating Tirunelveli area well-established by the thirteenth and fourteenth centuries stretched "from two dams through two channels, over sixteen miles" and irrigated "land several dozen feet above and several miles distant" from the Tamiraparani River.

Water Resources Development in Tamil Nadu dates back to 1st century A.D. Silappadhikaram of Ilango Adigal, belonging to the period gives clear evidence of irrigated agriculture. Ilango Adigal mentions about the noise produced by water flowing out of a sluice (Madhagu) which indicates that there was regular irrigation

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22 Arun Bandopadhyay, The Agrarian Economy of Tamilnadu, p. 43.
23 Ibid.
with controlling devices.\footnote{C.S. Kuppuraj, "History of Irrigation in The Last 2000 Years", \textit{Water Resources: Development and Management in India through The Ages}, p. 22.} People were using water for their daily use from nearby water resources such as rivers, tanks and domestic wells. In olden days whenever there was famine due to vagaries of monsoon, rulers of the area used to create water resources by building tanks and digging wells.\footnote{S.M. Krishnan, "Water Resources Development and Management in Tamil nadu, Then, Now and Future", \textit{Water Resources: Development and Management in India through the Ages}, p. 40.}

Tamil Kings constructed a lot of irrigation tanks, most of them in chains so that surplus water of one tank spilled into the next lower tank and so on and so forth. In this way the rain water was utilized to the maximum. History is repeated with water harvesting done by our forefathers.\footnote{\textit{Ibid.}}

Ordinary types of lifting mechanisms such as picottah, \textit{kamalai} were used wherever needed to lift water from rivers, tanks and wells. Diversion structures such as anaicuts and cross masonry works using granite stones were constructed for diversion of river water. \textit{Kodimelazhagan} and \textit{Nadhiunmi} anaicuts across Tamiraparani and Godavari respectively and \textit{Kalingarayan} anaicuts across Bhavani are some of the oldest structures built across rivers.

As the state of Tamil Nadu lies on the rain shadow area of Western Ghats, the torrential rain of Southwest monsoon has little effect over Tamil Nadu. On the other land, the Northeast monsoon that is less dependable but is often
accompanied by cyclones, pour heavily in short spells over Tamil Nadu. Under this geographical condition, irrigation has played a key role in the development of agriculture in the State.

The total geographical area of Tamil Nadu is 130 lakh hectares. Out of this an extent of 9.3 lakh hectares are irrigated by reservoirs and canal systems; about 9.1 lakh hectares by about 39,200 tanks and about 10 lakh hectares by private wells, tube wells and spring channels. So, of the 28.4 lakh hectares of irrigated area, 7.9 lakh hectares are irrigated by 23 per-plan irrigation systems.\(^{27}\)

**Evolution of Irrigation System in Tamil Nadu:**

Tamil Nadu has a good record of achievements in irrigation. The Chola, Pandya and Pallava dynasties have built large number of irrigation works, The Grand anaicut in Cauvery is a monument to the skill and industry of the ancient Tamils. In Vaigai and Tamiraparani basins a large number of anaicuts and channels were built in the days of Pandya kings. The practice of constructing *Corumboo* for miles in the river bed to divert water to the open head channels prevails even to this day.\(^{28}\) Whatever limited resources the rulers had they were utilized in the most economical and useful manner to develop the irrigation resources.

The native rulers were fond of building tanks as good works or as the means of transmitting their names to posterity. They erected them “at an expense far beyond what the land can yield as an adequate return for when they were broken


down by floods, their successors did not always think it advisable to repair them."

It is said that a Chola King, seeing his country suffer from drought took steps to bring the Cauvery water to his country. He was probably one of the earliest to have realized the importance of irrigating the lands with the river water.

Karikal Chola constructed the Kallanai in 1st A.D. across Cauvery and closed the major breach due to unprecedented floods in the river Cauvery and restored adequate supply to Thanjavur Cauvery delta besides making Kallanai as an escape to divert the excess floods in to it. Another Chola king by name Kochengkannan constructed 108 Siva temples with Theppakulams in each temple for domestic use and to have the water table in the drinking water sources at reasonable depth. He also connected the Theppakulams through link canals from the nearest river course, to keep the water clean and useful for the public. We can see that most of the temples are located adjacent to the rivers and where the temples are away from the rivers were connected to the Theppakulams and ponds. These canals were called as Rajavoikals and in the names of the Kings.

Not only Chola kings, but Chera, Pandia and Pallava kings and their successors made it a point to ensure that they will be remembered not by their victories over other kingdoms but only by their welfare projects and irrigation works.

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The public also named the anaicuts, canals and tanks in the names of those who were responsible for their construction or naming them associated with locations. The following are some of the examples:

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**Welfare Projects and Irrigation Works of Ancient Kings**

<table>
<thead>
<tr>
<th>Tank Name</th>
<th>District</th>
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</thead>
<tbody>
<tr>
<td>Veeranam Tank</td>
<td>South Arcot District</td>
</tr>
<tr>
<td>Kandiratheertham Tank</td>
<td>Tiruchirappalli District</td>
</tr>
<tr>
<td>Gangaikonda Cholapuram</td>
<td>Tiruchirappalli District</td>
</tr>
<tr>
<td>Cauverypakkam Tank</td>
<td>Kanchipuram</td>
</tr>
<tr>
<td>Pameswarar Thadagam</td>
<td>Chengalpattu District</td>
</tr>
<tr>
<td>Samuthiram Tank</td>
<td>Thanjavur</td>
</tr>
</tbody>
</table>


It was also claimed that the Chola kings understood the meaning of the proverb: “Raise the ridges, the fields improve; cultivate the fields, kings prosper.” This Tamil saying has great many meaning suitable for all times. Agriculture forms the basic and solid foundation of Indian economy. Agriculture without irrigation is beyond imagination. Therefore right from the early times there have been schemes and methods to harness the waters of the river Cauvery and utilized them to the fullest possible extent. It is also claimed that the earliest among them was the crowning achievement of Karikala Chola. He was the first king to harness Cauvery waters purposefully for better use in his kingdom. It is also claimed that he constructed the Grand Anaicut across the Cauvery, which was subsequently strengthened by a latter Chola under Vira Rajendra also called Karikala.
Information from Inscriptions:

An interesting story is found from an inscription dated 1369 A.D. on the two stone slabs in a nearby temple at Gangaikondacholapuram. The Inscription also gives specifications for the selection of tank site and its construction and enumerates the following twelve requisites. 32

1) A king endowed with righteousness and desirous of acquiring fame;

2) A person will versed in ‘Pathas Shastra’ (Hydrology);

3) Bed of tank of hard soil;

4) A river conveying sweet water from a distance of about 24 miles (38.4 km);

5) Two projecting portions of hills in contact with it (the dam);

6) Between these projecting portions of hills a dam built of compact stone, not too long but firm;

7) The two extremities of the hills to be devoid of fruit bearing land;

8) The bed of the tank to be extensive and deep

9) A quarry containing straight and long stones

10) Fertile low and leveled area in the neighborhood to be irrigated

11) A water course having strong eddies in the mountain region; and

12) A group of men skilled in the art of tank construction. 33

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It is also interesting that the inscription enjoins that the following six faults should be avoided.

1) Cozying of water from the dam
2) Saline soil
3) Site at the boundary of two kingdoms
4) High ground in the middle of the tank
5) Scanty water supply and an extensive area to be irrigated and
6) Too little land to be irrigated and excessive supply of water

Thus it is clear from the above mentioned details that the Tamil Kings evinced keen interest in scientifically devising the irrigation systems of the country.

The Cholas ruled from 850 to 1280 A.D. in southeast India. The borders of their kingdom were fluctuating and imprecise, but the major part consisted of the areas covered by the present districts of Tanjavur, Tiruchirappalli and Pudukkottai. By the time the Cholas came to power, the area had large-scale tank irrigation, and its rice cultivation could support a dense population. There were important cities, but the bulk of the population was rural.\(^{34}\)

The early Cholas carried out a plan to control a river at the head of a delta. Their method of dealing with the delta land for purposes of irrigation has been followed everywhere. They built the great 'Grand Anaicut' on the Cauvery as also the main channels for irrigation. Legends attribute to Karikala Chola the construction of

the flood banks of the Cauvery. He is also credited with the construction of many irrigation tanks.\(^{35}\)

Several irrigation tanks formed centuries back are devoid of the exact timing of their creation. The time of creation of the largest irrigation tank viz, Chembarambakkam tank with a capacity of 3120 Mcft. 26 km. west of the city of Madras is a case in point. Similarly we have large tanks at Mahendravadi and Cauverypauk in the Palar basin believed to have been created by the Pallava dynasty. Rajasingamangalam in Ramanathapuram district was big tank perhaps built by Pandyan kings which are serving the people of the locality even now.

The capital of the Cholas was Uraiyyur; but a place of still greater importance was the now deserted Kaveripattinam (at the mouth of the Cauvery) which was at that time a great seaport. The Chola country was called Punal Nadu or the land of floods. It comprised the greater part of the Thanjavur and Tiruchirappalli districts and extended beyond Kanchipuram in the north.\(^{36}\) In the tenth and eleventh centuries they extended their territories conquering both the Pallavas and the Pandyas and also the Eastern Chalukyas, with whom they subsequently maintained friendly relations for three generations by intermarriages, until eventually an Eastern Chalukya prince ascended the Chola throne about the close of the eleventh century. Rajaraja Chola, who came to the throne at the end of the tenth century, and was perhaps the greatest of their kings, seems to have ruled over almost all of what is now the Madras


Presidency, as well as Mysore and Coorg. He had an organized army and a regular system of civil administration. He did much to beautify his capital city. It was about this time that a careful survey of the cultivable land in the Tamil country was conducted. His successors followed in his footsteps and expended their wealth in the construction of beautiful temples and useful irrigation works among the latter the Grand Anaicut and several channels in the Thanjavur delta. The dynasty declined towards the end of the twelfth century, falling before the Pandyas of Madura, the Hoysalas of Duvarasamudra, and the Kakatiyas of Warangal, and was eventually overthrown by the Musalman invasion of 1310.  

The Cholas were great builders; builders not only of cities and temples but also of useful irrigation work. Starting from the ancient Chola Karikala, believed to have built the embankments on the Cauvery, we find many works other undertaken by later rulers. The names of most of the main channels of irrigation at present watering the Cauvery Delta occur in the inscriptions of this Chola rulers. The following two examples indicated the importance attached to artificial irrigation works in those days. Across the town of Thanjavur along the road to Trivadi, there is a river is now known as Vadavaru (northern river). This river is called, in the inscriptions, Vira-Sora-Vadavaru. (There is another Viracholan river branching from the Cauvery, a few miles below the bridge at few Kumbakonam). This was evidently cut out from the Vennar by Virachola to feed a big irrigation tank in the now postal town of Vadavaru in the Mannargudi taluk. The other one is the

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large artificial reservoir at Gangaikondacholapuram in the Udayarpalayam taluk of the Tiruchirappalli district. ‘There is an embankment sixteen miles long running north and south, provided with several substantial sluices and, of great strength, which in former times must have formed one of the largest reservoirs in India. The tank has been ruined and useless for many years and its bed is now almost wholly overgrown with high and thick Jungle’.

Irrigation, which received the attention of the earlier Cholas, was greatly developed by their successors. It was apparently by them that the Grand Anaicut, the bulwark of the fertility of the Thanjavur country, was built, while the old work remained the base on which modern improvement was done. The names of most of the irrigation channels which still lead from it are mentioned in the inscriptions of this period. The head sluice of the Uyyakondan channel, which supplies water to the town of Tiruchirappalli, is referred to in a grant of Kulottunga III dated 1205-06 and is in existence to the present day. The head sluice of the Periyavaykkal near Musiri in the Tiruchirappalli district was built in 1219.

A dam that was constructed at Tiruchirappalli where the Kollidam branches off from the Cauvery was a pioneering irrigation effort. But even when all precautions are taken to store water to serve a needy day, continuous failure of rains could nullify even the best efforts to help the farmer.

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IV

The earliest figure who stands out clearly in Chola history is the great Karikal Chola who constructed sluices and canals for irrigation from the Cauvery existed in his time. It was he who raised banks to prevent the river flooding the country. His embanking of the river is mentioned in a grant issued by Rajaraja I. (985-1013 A.D.) as well as in some of the records of the Telugu Cholas found in the Telugu country. Karikala established the Chola capital at Kaveripattinam. For the construction of irrigation works, it is believed that the labourers were in paid in gold, paddy and any other form that they desired during the Kulothunga’s III period. The head sluice of the Uyyakondan channel which supplies water to the town of Tiruchirapalli is referred to in a grant of Kolottunga III issued in 1205-06 A.D.

The lands on the banks of Cauvery, the unfailing river of the Chola kingdom, were developed by Karikala for agricultural operations by the gradual clearance of forest and creation of irrigation tanks. It was done in an attempt to prevent migration of people from his country by offering them inducement to stay on. Pattinappalai refers to a large tank with raised bunds located within Kaveripumpattinam. Excavations conducted by the Archaeological Survey of India at Kaveripumpattinam have unearthed a beautiful reservoir, with an earthen bund and a

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facade built of bricks. The feeding channel was small and was leading from the Cauvery River or one of its offshoots. While describing the *marudam* land of Karikala’s Chola country, *Pattinapalai* gives an account of the sugar cane fields, unfailing in their yield. Sugar industries located within such field were described as emitting smoke and spreading sweet smell. Paddy fields had so much abundant yield that buffaloes with their calves fed them and the calves slept on the shades of paddy without being disturbed. Paddy was harvested with sickles paddy heaps stored for threshing looked like mountains. So much was the fertility of the land that one *Veli* of land produced thousand *kalams* of Paddy.\(^{46}\)

Literary works of post-sangam period and certain inscriptions of the eleventh and twelfth centuries attribute to Karikala the construction of the flood banks of the Cauvery with the aid of his feudatories. Melepadu plates of Punyakumara, a Telugu Chola king of the seventh or eighth century, also mentions that the work was executed by Karikala.\(^{47}\) The flood bank built by Karikala, known as the Grand Anaicut, prevents the high flood waters of the Cauvery from emptying into Kollidam, thus avoiding water scarcity in the delta. The anaicut consists of a solid mass of rough stone in clay 1,080 feet in length, 4,250 feet in breadth and 15 to 18 feet in depth. It stretches across the outlet into the Kollidam in a serpentine form. The work stands as a monument of the skills of the irrigation engineers of the distant past. Karikala is said to have employed 12,000 men captured in a war with Srilanka for the construction of the Grand Anaicut as per the version of Mahavamsa.\(^{48}\)

\(^{46}\) *Ibid.*


\(^{48}\) *Ibid.*, p. 34.
The Grand Anaicut across the Cauvery is considered the greatest engineering work carried out in India before British rule began and an amazing Engineering feat of the Tamils. This is a marvelous piece of hydraulic structure built across a mighty river in its sandy bed and serving to this date excellently well. The Science of building structures safely on a permeable foundation developed in the past 200 years only. It formerly consisted of a solid mass of rough stone in clay 1,080 feet in length, 40 to 60 feet in breadth and 5 to 18 feet in depth stretching across the outlet in a serpentine form. It served its purpose for centuries, and rendered Thanjavur comparatively independent of the vagaries of the monsoon.49

**Importance of the Cauvery:**

Cauvery is the only major river in Tamilnadu now. It has become an interstate river having share of its water between Karnataka, Kerala and Pondicherry. It is interesting to note the flow direction of the river Cauvery. The original route of Cauvery, just above Hohenakkal follows the path of the river Thenpennayaru. This continuation was inferred from the satellite imageries. Thenpennayaru is also capable of discharging more than two lacks cusecs. Due to a geological fault took place between Hohenakkal to Kodumudi, a few million years ago, Hohenakkal falls was formed, the river took the path of the fault, turned from east towards south up to Kodumudi and then turned east towards sea.50

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50 Kodumudi Shanmugan, “Irrigation Technics of India in the Distant Past”, *Water Resources: Development and Management in India through the Ages*, p. 44.
Rivers Bhavani and Noyyal and Amaravathi are the major tributaries to the river Cauvery. Bhavani has two major anaicuts otherwise called bed dams. Kalingarayan anaicut\(^{51}\) near Bhavani was one that was built-around 1263 A.D. by a local Chief by name Kalingarayan. This is 59,757 feet long anaicut capable of discharging 1,25,000 cusecs in the river during flood times. The canal is about 57 and half miles long finally ending at the River Noyyal. A stone aqueduct is situated inside Municipal area in Karungalpalayam, turned from Karungalpalayam. Another marvelous work is an under tunnel in the rivulet Kuranganpallam just above Vengambur near Kodumudi. Engineering skill is well exhibited in the formation of the canal. This has an ayacut of about 1, 40,000 acres, irrigating three seasons in a year.\(^{52}\)

The other anaicut is near Kodiveri, about 10 miles from Sathyamangalam in Coimbatore district, built 500 years ago during reigns of Vijayanagar Kings. The anaicut is 496 feet long capable of discharging 1,22,000 cusecs. Two channels take off from here. One is Arakkankottai channel, 20 miles long taking a discharge of 386 cusecs. The other is Thadappalli channel, 48 miles long carrying a discharge of 735 cusecs. Both the channels carry water for 11 months in a year.\(^{53}\)


\(^{52}\) Kodumudi Shanmugan, “Irrigation Technics of India in the Distant Past”, *Water Resources: Development and Management in India through the Ages*, p. 44.

\(^{53}\) Ibid.
Thirumanimutharu, a tributary of Cauvery, originating from Yercaud Hills and joining Cauvery above Paramathy Velur has 13 anaicuts of yester years, all feeding major tanks. Around 3 feet depth of silt collected in the Idumbankulam, a tail tank of Thirumanimutharu will stand testimony to their age. The system of forming korambu, similar to groins, was prevalent in the early days. The tributaries of Cauvery also had many such groins. These groins were subsequently replaced with small anaicuts. Noyyal River had 32 such anaicuts. Amaravadi River had 6 old anaicuts in the Dharapuram taluk almost all of them are still functioning. 54

Rajavaikkal from Cauvery once drawn from korambu, was replaced by an anicut at Jedarpalayam, by a Chieftain by name Allala Ilayaa Naayagar of ParamathyVelur in Namakkal district. Kongu Mandala Sadagam of Valasundarakavirayar gives details of the anicut. Mohanur channel from Cauvery is still flowing from korambu for hundreds of years. The remains of an old stone anicut are found near Poolaampatty in Salem district. 55

Even though the rulers developed water resources, the local people maintained them. From the stone inscriptions found in Uthiramerur, we could see there existed (in the 10th Century) an Eri Varium containing a group of people under Nattamai from the village to maintain the tanks (Eris), 56 Even the procedure how the members were to be selected for Eri Varium is also mentioned in the inscription.

54 B.S. Baliga, Madras District Gazetteers – Coimbatore, p. 264.
55 Ibid.
Inscription further says that person with integrity only should be selected. It says that corrupt persons and their relatives should not be selected.

Every year before the onset of monsoon they clean the feeding supply channels and strengthen the bunds and maintain the channels to the fields. These works were carried out by local people collectively by taking personnel from each family. The system above mentioned is called "Kudimaramath" and it existed up to the advent of British. In certain areas "Neerkatti" (Water Guides) were engaged under the Nattamai or headman to distribute water to the fields equitably. Neerkatti were paid in kind during harvest. There were also watchmen (appointed by the beneficiaries) to prevent misuse of drinking water wells and kulams (ponds). Thus the beneficiaries were able to maintain their water resources in good condition.

**Kallanai – Maintenance:**

One Anaicut that really stood the test of time is KALLANAI in Thanjavur district. When, how and who built this historic structure. There are too many stories told about this anaicut. The Kallanai was constructed on B.C. 11, says a poem in *Perunthogai*, collected by Mu. Ragava Ayyangaar, Kaliyugam 3090 to be deducted from 3101 to get 11 B.C. Bengal Engineers, a unit of the British, studied this anaicut well and confirmed that this anaicut is 2000 years old.⁵⁷ The anaicut was constructed with huge jetty stones with clay to fill up gaps. The British Engineers opened this anaicut and provided a sand vent. The Engineering technique is a marvelous one even for today.⁵⁸

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⁵⁷ Kodumudi shanmugam, “Irrigation Technics of India in the Distant Past”, *Water Resources: Development and Management in India through the Ages*, p. 46.

Tank Irrigation:

Tank is an important component of irrigation. Tanks are either river fed or rain fed. Bank, surplus weir, sluices are the main members of a tank. Bank is mostly made up of earth consolidated well to form a homogenous structure. This is capable of storing water, mostly without seepage. Surplus weir is called *Karchirai* which means stone jail, since it keeps water under protection. In olden days one end of the bund where rocky surface is available is chosen to locate the weir. Kalingal, kalingula, are also refer to surplus weir. One such *karchirai* is referred in *Maduraikaanji*, line 725.\(^{59}\)

Anaicut constructed across a river is also called *karchirai*. *Tholkappium* a Tamil grammar book of fifth century B.C. compares to a war hero standing alone fighting with the soldiers, diverting them to another route. Weir also diverts water coming in the river to the channel leading to a nearby tank.

\[\text{\textit{Tholkappium}}\text{ a Tamil grammar book of fifth century B.C. compares to a war hero standing alone fighting with the soldiers, diverting them to another route. Weir also diverts water coming in the river to the channel leading to a nearby tank.}}\]

Thiruvalluvar in couplet 523 warns people about the dangers of a tank without a surplus weir. A tank will overflow in the, absence of a surplus tank causing damage to the bund. Similarly one who does not treat his relatives appropriately will perish.

\[^{59}\text{Ibid., p. 47.}\]
\[^{60}\text{Thiruvalluvar, Thirukural, Kural :523.}\]
Tanks and Inscriptions:

Tamilnadu had the tradition of having a committee called the committee for “Supervision of tanks”. This type of committee is found to have existed only in one type of villages - the “Caturvedimangalam” that is in Brahmin villages. There are about 116 old tanks of this type whose capacity is more than three million cubic meter. Many tanks are found to contain inscriptions in stone giving details of information about the King in whose period the tank was built, who donated money for the construction of the weir, the method of construction.

Kidangil tank near Thindivanam, had an inscribed stone, now in Thindivanam museum informing a technology change. Madai adaithu thoombum seivithan Panaip Poongizhan Thambi Kumaran. Madai is an earlier version in which there is no control arrangement. Thoombu refers to the sluice with Naazhigai vaassl and conical cover. A tank in Genji taluk bears a name Gunamili. Gunamili is a title for Mahendra Varman of seventh century A.D. The Tank should have been formed during his period. Gunamili means nirgunan, no colour like that of water. The name of another tank in Thirukkovalur taluk is Thittittu - venran. This inscribed stone is still available in the tank itself and not yet brought to the Viluppuram museum. Neelamega thadagam was the name of the Tank of Uthiramerur. Naming tanks after kings and places was very common in those days.

\[61\] A. Appadorai, *Economic Conditions in Southern India*, p. 222.

\[62\] Ibid.

In one of the tanks in Genji, the old sluice pillar had the figure of Lord Vinayaga in the seated position over a lotus. The engraver had put in an engineering idea in the figure. When the tank is full, only Lord Vinayaga will be visible, lotus will be submerged. The reduction in water level can be very easily known by seeing the figure. This engraved stone is now available in Thidivanam museum.\textsuperscript{64}

Ayandhur tank in Thirukkovalur taluk is another oldest tank with inscribed sluice stone, which is now available in Viluppuram museum. This has two inscriptions, one belonging to fourth century A.D. with a reading \textit{sagara visaadharappenn}. The other side contains an inscription of fourteenth century A.D. which reads \textit{vakkaran paakkamudayaan kongarayan}. This piece of stone gives us the story that the Ayandhur tank was formed much earlier than fourth century A.D. The weir of the Madhuranthagam tank, which can be seen from the bye pass road, has an old sluice pillar, and engraved with Tamil numerals. The additional weir of Madhранthagam tank was built by the East India Company, prior to the formation of the Government.

From inscriptions it is seen that the responsibility of watching the tank is given to the fisherman who spend most of the time on the tank. Another set of people who spent their time on the lake are washer men. One washer man and his wife Thazhivadugi donated enough money to build two sluices in Chinneri near Vazhapadi. This stone is now available in the Salem PWD museum.\textsuperscript{65}

\textsuperscript{64} \textit{Ibid.}

\textsuperscript{65} \textit{Ibid.}, pp. 48-49.
There is one Purambuk kanmay near Melur in Madurai district, which has an inscription giving details of the formation of the bund. This is a hill slope tank, built during Maaravarman Sundhara Paandiyan (1216-1239 A.D.). Karai kulayaamal kallum paduppithu, kalingum nattu is the reading of the inscription. The purpose of revetment is explained here. The surplus weir here is a trimmed existing rock surface bye wash. 66

Paadur Eri near Ulundurpettai was constructed with dressed stones like that of a temple. The surplus weir and old sluice are still performing well. The Eri and other works are of the kings of Sendamangalam on the banks of Kedilam River. Sakalapuvana Chakravarthigal Kaadavaraayan Kopperunjingan is their title. 67

Sabhas:

Irrigation under the Imperial Cholas was managed by village sabhas (Tamil: Sabai) or assemblies comprising the adult males of the village. In many cases the sabhas had Tank Supervision Committees to maintain the tanks. The sabhas were strongest in villages that were given as grants to Brahmans (Brahmadeya villages). These sabhas allocated various common agrarian resources to citizens of the village. In non-Brahmadeya villages there were village assemblies called ur, which also managed common resources. They functioned especially from the ninth to the fourteenth centuries. 68

66 Ibid., p. 49.
67 Ibid.
The sabhas and urs were at the village level, while above them were the Nagarams (towns) and the Nadus (territories). Over 500 Nadus have been identified from Chola inscriptions. The powers and responsibilities of these village assemblies with regard to water management were the ur or the sabha invested in major irrigation, and allocated water rights; allocated the common village lands to village servants; sold common village land to chiefs or temples, or gifted it to temples.  

69

Tank Maintenance:

Boats were used to remove the silt from dams. Removal of silt in a tank was made from endowments given specifically for the purposes. For the repair of breaches in tank-bunds and other accidental damages beyond the control of the villagers, money was often obtained from private of state donation. A part of the income from dams and canals also was used for their maintenance. The right of fishing was leased out to bidders. The income was spent on the maintenance of the dams including their deepening by removing silt.  

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Local Administrative bodies like the village Assembly are often mentioned as making provision for the maintenance of irrigational works. Management of local temples also looked after their maintenance. Besides the local bodies, public spirited private individuals willingly offered themselves and took much

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69 Dharmakumar, Colonialism, Property and the State, pp. 124 -125.

interest in the maintenance of irrigation works. The custom of *Kudimaramath* was in existence. According to this system free labour was offered by certain cast groups.\(^{71}\)

**Reference to Tank Irrigation in Chola Records:**

During the Chola times the rules and restrictions were well defined and enforced in the strictest terms. An epigraph of Parakesarivarman Uttama Chola (A.D. 970 - 985) found at Konerirajapuram gives the following *Vyavastha* (declaration of conditions) regarding the grant:

"These lands (shall enjoy the privilege of) being irrigated by channels dug out as per rules for the distribution of water. Others shall not cut or dig out diversions from these channels, nor put up small picottah, not bale (out) water by baskets, nor obstruct (the flow) with cross-banks. The water (thus made) available must not be wasted. The water must be economically used . . . Canals flowing across other villages to irrigate the land of the village and vice- versa shall not be permitted to over-flow over the boundary line and to cast-up silt. Besides, the embankments of tanks shall be allowed to be raised within their limits so that they may hold maximum quantity of water".\(^{72}\)

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\(^{71}\) *Ibid.*

Some more interesting details are given in the Anbil plates of Sundara Chola Paratanka II (956-73 A.D.). While recording the gift as an *ekha bhoga - bramadeya* of ten *velis* (one Veli = 6.6 acres) of land by the king to Aniruddha Brahmadiraja, the plates enumerate the rights and privileges as well as the restrictions:

"He shall be at liberty to erect halls and upper stores with burnt bricks; to dig wells, big and small to dig channels in accordance with the watering requirements; not to waste sennir (fresh water for drinking), but to dam such water for irrigation; no one shall employ small piccottahs or baskets (kudainir), etc., for lifting such water”.

The conditions laid down in the plates for the enjoyment of the grant by the donees are still more interesting. They are thus detailed as follows.  

(1) *When the fresh channels have to be dug, they shall be done so as to admit of an easy flow of water. With their aid the lands of the village shall be irrigated. After the fields are irrigated, the waste or the excess shall be collected and led away.*

(2) *Water passing in the existing channels for irrigating the lands of this village shall be allowed to do so as usual and the excess water shall, consistently with prevailing custom, be collected.*

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(3) Good water (intended for drinking) shall not be used for common purposes, but that water may be dammed and made to irrigate lands.

(4) Large wells shall be sunk".

In the same plates we also notice in unmistakable terms the efforts of the state to secure peace and harmony among the people of adjacent villages and the safeguard of their legitimate rights. The two relevant clauses are: 1. Irrigation channels passing through the lands of this village to other village in the outskirts shall be permitted to flow without any impediment to the done. 2. The channels passing through outside villages to irrigate the lands of this usage shall be allowed to flow uninterrupted by the people of the out-lying villages.

We find in the Tiruvelangadu plates (North Arcot) of Rajendra Chola I (1012-1044 A.D.) the conditions on the use of water which merits special mention here:

"The lands of this village shall be irrigated by canals dug (proportionally) as per water assigned from these canals; others who are tenants of the devadana lands shall not be permitted to cut branches from these canals; the water (thus) assigned shall not be wasted. Such water shall be (appropriately) used for irrigation after being regulated. Channels and springs passing across the lands of other villages to irrigate the lands of this village shall be permitted to flow over the boundary line and cast up (silt); channels and springs passing across the lands of this village to irrigate the lands of outside villages, shall also be permitted to flow over and cast up (silt)\(^74\)

\(^74\) ibid., pp. 126 -127.
In the text the phrase *melnadai-nir* occurs generally in the description of the boundary line of a village when this cuts across a channel, the waste weir of a tank or a stream. Waste weir is nothing but a small dam built so that some of a stream's water flows over it and thus the waterfall is formed from this. The plates further states: "the embankments of the tanks of the village shall be permitted to be raised within their own limits to any suitable height so as to hold the almost quantity of water that may let into those tanks"  

The rules and restrictions were so elaborate covering almost all the aspects of water management that persons (anniyar = outsiders) other than the grantee were not permitted to cut open branch channels. Sometimes, the restrictions were placed by the terms of the gift on the rights of the donee and his successors to sell or mortgage the land.

It is probable that the Cholas retained a firm hold over the whole of the lower basin of the Cauvery and Kollidam from a point near Karur to the sea, during the entire period as a sovereign power. Tiruchirappalli, or at least the greater part of the district, always continued under them.

After the Kalabra interregnum, the Chola Empire rose to power and successive Rulers took keen interest in the development of irrigation facilities in addition to their extensive programs of Temple construction. A brief list of the branches of river Cauvery formed by the Chola kings are given below:-

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<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of branch</th>
<th>King who built it</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Veera Chola Vadavaaru flowing North of Thanjavur</td>
<td>Paraanthakan (907 - 955 A.D.)</td>
</tr>
<tr>
<td>2</td>
<td>Madhuraanthaka Vadavaaru flowing North of Kollidam</td>
<td>--do ---</td>
</tr>
<tr>
<td>3</td>
<td>Manniyaaru flowing north of Koneriraajapuram</td>
<td>Raaja Raajan (985 - 1014 A.D.)</td>
</tr>
<tr>
<td>4</td>
<td>Uyyakondan Channel flowing through Tiruchirappalli Town and Periya Vaaikkal</td>
<td>--do ---</td>
</tr>
<tr>
<td>5</td>
<td>Mudikondan aaru branching off from Sundara Perumal Koil</td>
<td>Raajendran (1014 - 1044 A.D.)</td>
</tr>
<tr>
<td>6</td>
<td>Veera Cholan aaru branching off from Cauvery near Mananjeri</td>
<td>Veer Raajendran (1063 - 1070 A.D.)</td>
</tr>
<tr>
<td>7</td>
<td>Vikrama aaru branching off from Cauvery North of Kuttalam</td>
<td>Vikrama Cholan (1118 - 1135 A.D.)</td>
</tr>
</tbody>
</table>


Regarding development of irrigation and practices prevailing in the Chola period, K.A. Nilakanta Sastri writes in his well-known book on ‘The Cholas’ as follows:

"The prosperity of an agricultural country depends to a large extent on the facilities provided for irrigation and the importance of providing an adequate water supply was recognized in South India from very early times. Natural streams and dependable channels leading off from them were the first source of supply, but for the passing mention in an inscription in Thiruvaduthurai of a Parakesari Karikala
Chola, who raised the banks of the Cauvery, we hear little in inscriptions, of the methods adopted to turn natural streams to account. Much literacy evidence could be cited to show that the prosperity of the Chola country proper was a gift of the Cauvery, and particularly all the names now known of the many branches of this great stream in the delta country are traceable in Chola inscriptions. In the absence of natural streams, recourse was had to tanks and the bulk of the evidence on irrigation form the inscriptions relates to the care bestowed on the proper maintenance of the tanks. The Chola-Varidhi of Sholinghur, the Kaliyaneri near Annaimalai in Madurai, the Kalli nangai kulam at Solapuram, the Vaira megha thadagam at Uthiramerur dating from Pallava times, the Big Tank of Bahur and the Rajendra Chola perya eri at Punganur are only the leading examples of a very large number of irrigation tanks mentioned in the inscriptions. The primary care of the village assemblies was to get the silt removed (every year before the rains set in) from the tanks under their control in time for them to secure the proper depth needed to store the full supply for the next year. Such examples furnish clear evidence of the vivid realization of the people about the importance of irrigation and of their readiness meet and solve irrigation problems in a reasonable spirit.76

In between the early Cholas of the second and third centuries and the later Cholas of the ninth and tenth centuries, there was period when the Pallavas were dominating the Southern country, in the sixth, seventh and the eighth centuries, when the glory of the Cholas was subdued. During this period also the Pallavas took keen interest in irrigation development and constructed many irrigation tanks. Some of the important tanks are as follows:

TABLE: 1–3

Important Tanks of Pallavas

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name of the tank and its location</th>
<th>King who built it</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mahendra Thadagam in Mahendravadi village, North Arcot District.</td>
<td>Mahendra Varman I. (600 – 630 A.D.)</td>
</tr>
<tr>
<td>2</td>
<td>Tiraliyneri, now called Thenneri 16 km east of Kanchipuram</td>
<td>Tirayan, Pallava king (I half of 8th century)</td>
</tr>
<tr>
<td>3</td>
<td>Kaveripaakkam Tank in Walaajaa Taluk of North Arcot District</td>
<td>Nandhi Varman III</td>
</tr>
<tr>
<td>4</td>
<td>Parameswara Thadagam in Kuram village, 15 km east of Kanchipuram</td>
<td>Parameswara Varman, Great Grandson of Mahendra Varman (2nd half of 7th century)</td>
</tr>
</tbody>
</table>


Pallava rulers and the later Chola Emperors were followed by Naick Rulers owing allegiance to the Vijayanagar Kingdom and then came the Maratha Rulers in Thanjavur area. They too must have contributed to the development of irrigation works but not much is known about the work done by them. That marks the end of Indian Rulers.

The Muslim invasion of A.D. 1310 opened up a new era in the history of the country. Malik Kafur as general of Alauddin Khalji the emperor of Delhi subdued large portions of the Deccan Peninsula, and he and his successors held the
country as viceroys for 37 years, when they were driven out by the Vijayanager rulers who gradually established their dominion over the south of India.

During the Vijaynagar-Nayaka period (1300 - 1750 A.D.), particularly in the sixteenth and seventeenth centuries, the initiative in the creation and maintenance of irrigation works came from a variety of sources - the great Nayaka chiefs, many sub-regional chiefs known as *palayakkaras* and *amaranayakas*, as well as local landowning groups of Vellalas and Brahamans organized in villages called *urs* and *brahmadeyas*. Commenting on the development of irrigation in South India from the ninth to the nineteenth centuries, Professor Stein has talked about an "unchanging" technology, especially in relation to substantial riverine construction and major expansion of tank irrigation. However, it has to be remembered that steady expansion and good maintenance of these irrigation works were in place till the late seventeenth century, after which came the decline.

About the year A.D. 1559 the Naicks, who were general of the Vijayanagar state, finally established the strong Naick dynasty of Madura, which after the fall of the Vijayanagar kingdom in A.D.1565 became practically an independent family of sovereigns, acknowledging however the expatriated princes of the Vijayanagar family as their chiefs. When the Portuguese arrived at Cauyal, they found the King of Travancore residing there. It is clear from inscriptions that the kingdom of Travancore sometimes included a portion of Tirunelvely. The power of the Portuguese along the coast lasted till the 17th century, when they were expelled by the

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Dutch, who set up a factory at Tuticorin. On the decay of the Pandyan Kingdom, Tirunelveli fell as above said under the Naicks of Madurai.