Rivers, Irrigation and Society: The Dams of Thrissur

Project submitted to the University of Calicut

in partial fulfilment for the award of the degree

of

Bachelor of Arts in English & History

By

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March 2021

Declaration

I, Romini S Vadakkan, hereby declare that the project entitled **Rivers, Irrigation and Society: The Dams of Thrissur,** submitted to the University of Calicut in partial fulfillment of the requirements for the award of the Degree of **Bachelor of Arts in English & History, i**s a bonafide record of original research work carried out by me under the supervision and guidance of Dr. George Alex, Coordinator, Department of B.A. English & History (Double Main) Christ College (Autonomous), Irinjalakuda.

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Certificate

This is to certify that the project entitled **Rivers, Irrigation and Society: The Dams of Thrissur** is a bonafide research work carried out by Ms**. Romini S Vadakkan** under my supervision and guidance in partial fulfillment of the requirements for the award of the degree of **Bachelor of Arts in English & History** submitted to the University of Calicut.

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Contents

Chapter Number	Contents	Page No.
	Introduction	1 -4
Chapter 1	History of Dams, Types of Dams and their Uses	5 - 16
Chapter 2	Dams in Thrissur	17- 20
Chapter 3	Advantages and Disadvantages of Dams	21- 30
	Conclusion	31 - 32
	Works Cited	33

Introduction

A dam is a barrier that stops or restricts the flow of water or underground streams. Reservoirs created by dams not only suppress floods but also provide water for activities such as irrigation, human consumption, industrial use, aquaculture, and for navigation. Hydropower is used in conjunction with dams to generate electricity. They are used to reduce peak discharge of flood water created by large storms or heavy snow melt, or to increase the depth of water in a river to improve navigation and allow barges and ships to travel easily.

A dam can also be used to collect water or for storage of water which can be distributed between locations. Dams generally serve the primary purpose of retaining water, while other structures such as floodgates or levees are used to manage or prevent water flow into specific land regions. Dams can also provide a lake for recreational activities such as swimming, boating, and fishing. Many dams are built for more than one purpose that is water in a single reservoir can be used for fishing, to generate hydroelectric power and to support an irrigation system.

Auxiliary works that can help a dam function properly include spillways, movable gates, and valves that control the release of surplus water downstream from the dam. Dam can also include intake structure that deliver water to a power station or to canals, tunnels or pipelines designed to convey the water stored by the dam to far distant places.Other auxiliary works are system for evacuating or flushing out slit that accumulates in the reservoir, locks for permitting the passage of ships through or around the dam, and fish ladders and other devices to assist fish seeking to swim past or around a dam. A dam can be a central structure in a multipurpose scheme designed to conserve water resources on a regional basis.

Multipurpose dams can hold special importance in developing countries, where a single dam may bring significant benefits related to hydroelectric power production, agricultural development, and industrial growth. However, dams have become a focus of environmental concern because of their impact on migrating fish and riparian ecosystems. In terms of engineering, dams fall into several distinct classes defined by structural type and by building material. The decision as to which type of dam to build largely depends on the foundation conditions in the valley, the construction materials available, the accessibility of the site to transportation networks, and the experiences of the engineers, financiers, and promoters responsible for the project.

In modern dam engineering, the choice of materials is usually between concrete, earthfill, and rockfill. Although in the past a number of dams were built of jointed masonry, this practice is now largely obsolete and has been supplanted by concrete.Concrete is used to build massive gravity dams, thin arch dams, and buttress dams. The development of roller-compacted concrete allowed high-quality concrete to be placed with the type of equipment originally developed to move, distribute, and consolidate earthfill. Earthfill and rockfill dams are usually grouped together as embankment dams because they constitute huge mounds of earth and rock that are assembled into imposing man-made embankments.

Review of Literature

There is only limited number of authentic works about dams in Thrissur. The available source of dams in Thrissur is in the form of news reports and souvenirs.

Objective of the study

To understand the historical background of dams in Thrissur

To examine the relevance and importance of dams in Thrissur

To explore the geographical condition of the place

Scope

The study of dams in Thrissur includes its all aspects of the locality. The economical and geographical aspects are discussed in this project. The project seeks to examine the relevance of dams in Thrissur. The scope of the project is to give an up-to-date account on the general features of dams.

Sources

The sources for this study are newspaper reports, books, articles, sites and documents. Another method used for the collection of data is interviews with the local people and environmentalists who are working for the conservation and preservation of dams of the place.

Methodology

Historical methodology is used in this study. It is based on historical analysis of data. The work is based on the primary and secondary sources.

Chapterisation

The study is divided into five chapters including Introduction and Conclusion. The Introduction includes the aim, importance of study, the scope of subject matter, sources and the overview of this project. The first chapter denotes the history of dams, types of dams and their uses. The second chapter comprises the historicaland geographical background of dams. The third chapter is about the advantages and disadvantages of dams.

Chapter 1

History Of Dams, Types of Dams And their Uses

Dams and reservoirs are essential structures that are critical for providing us with some of our basic needs. Dams are structures built to retain water by forming a reservoir behind the structure. These are usually built across, or near, naturally flowing water to manage the water for human use. The word dam can be traced back to Middle English, and before that, from Middle Dutch, as seen in the names of many old cities. The first known appearance of *dam* occurs in 1165, but there is one village, Obdam, that was mentioned in 1120. The word seems to be related to the Greek word taphos, meaning 'grave' or 'grave mound'. So the word should be understood as "dike from dug out earth".

Early dam building took place in Mesopotamia and the Middle East. Dams were used to control water levels, for Mesopotamia's weather affected the Tigris and Euphrates Rivers.The earliest known dam is the Jawa Dam in Jordan, 100 kilometres northeast of the capital Amman. This gravity dam featured an originally 9-metre-high and 1 metre-wide stone wall, supported by a 50 metre wide earthen rampart. The structure is dated to 3000 BC.The Ancient Egyptian Sadd-el-Kafara Dam at Wadi Al-Garawi, about 25 km south of Cairo, was 102 m long at its base and 87 m wide. The structure was built around 2800 or 2600 BC as a diversion dam for flood control, but was destroyed by heavy rain during construction or immediately afterwards.

In the 19th century BC, the Pharaohs Senosert III, Amenemhat III, and Amenemhat IV dug a canal 16 km long that linked the Fayum Depression to the Nile in Middle Egypt. Two dams called Ha-Uar running east-west were built to retain water during the annual flood and then release it to surrounding lands. The lake called *Mer-wer* or Lake Moeris covered 1,700 km^2 and is known today as Birket Qarun.By the mid-late third millennium BC, an intricate water-management system in Dholavira was built. The system included 16 reservoirs, dams and various channels for collecting water and storing it. One of the engineering wonders of ancient world was the Great Dam of Marib in Yemen. It was Initiatedbetween 1750 and 1700 BC, it was made of packed earth that is triangular in cross section, 580 m in length and4 m high. It was running between two groups of rocks on either side, to which it was linked by substantial stonework. Repairs were carried out during various periods, most importantly around 750 BC, and 250 years later the dam height was increased to 7 m.After the end of the Kingdom of Saba, the dam fell under the control of the Ḥimyarites who undertook further improvements, creating a structure 14 m high, with five spillways, two masonry-reinforced sluices, a settling pond, and a 1,000 m canal to a distribution tank. These works were not finished until 325 AD, when the dam permitted the irrigation of 25,000 acres.

Eflatun Pınar is a Hittite dam and spring temple near Konya, Turkey. It is to date from the Hittite empire between the 15th and 13th centuries BC.The Kallanai is constructed of unhewn stone, over 300 m long, 4.5 m high and 20 m wide, across the main stream of the Kaveri River in Tamil Nadu, South India. The basic structure dates to the 2nd century AD is considered as the oldestwater regulating structures still in use. The purpose of the dam was to divert the waters of the Kaveri across the fertile Delta regions for irrigation. Du Jiang Yan is the oldest surviving irrigation system in China that included a dam that directed water flow. It was finished in 251 BC.

Roman dam construction was characterized by "the Romans' ability to plan and organize engineering construction on a grand scale. Roman planners introduced the then-novel concept of large reservoir dams to secure a permanent water supply for urban settlements over the dry season. Theiruse of water-proof hydraulic mortar and Roman concrete allowed for larger dam structures than previously built such as the Lake Homs Dam, the largest water barrier to that date, and the Harbaqa Dam, both in Roman Syria. The highest Roman dam was the Subiaco Dam near Rome; its record height of 50 m remained unsurpassed until its accidental destruction in 1305.Roman engineers made use of ancient standard designs like embankment dams and masonry gravity dams. Apart from these, they displayed a high degree of inventiveness, introducing most of the other basic dam designs which had been unknown until then. These include arch-gravity dams, arch dams, buttress dams and multiple arch buttress dams, all of which were known and employed by the 2nd century AD. Roman workforces also were the first to build dam bridges, such as the Bridge of Valerian in Iran.

In Iran, bridge dams such as the Band-e Kaisar were used to provide hydropower through water wheels, whichpowered water-raising mechanisms. The first Roman bulit dam bridge was Dezful, which could raise water 50 cubits to supply in town. Milling dams were introduced by the Muslim engineers called the Pul-i-Bulaiti. The first was built at Shustar on the River Karun, Iran, and many of these were later built in other parts of the Islamic world. Water was conducted from the back of the dam through a large pipe to drive a water wheel and watermill. In the 10th century, Al-Muqaddasi described about several dams in Persia. He reported that one in Ahwaz was more than 910 metrelong, and it had many water-wheels raising the water into aqueducts through which it flowed into reservoirs of the city. Another one, the Band-i-Amir Dam, provided irrigation for 300 villages.

During the middle ages, dam construction came to a near halt, resuming around the 15th century AD. During this time, no major contributions to dam engineering were made, and the majority of the dams constructed in Europe, where rainfall is plentiful and regular, were modest structures. It was in1850s, when civil engineering professor William John Macquorn Rankine at Glasgow University demonstrated a better understanding of earth stability and structural performance, which improved dam engineering. Rankine's work was so innovative, it contributed to the acceptance of civil engineering as a valid university subject and improved the status of civil engineers. Since Rankine, geological, hydrological, and structural scientific contributions have been extensive, and the understanding of dam engineering has improved significantly as a result.

In the Netherlands, a low-lying country, dams were built to block rivers to regulate the water level and to prevent the sea from entering the marsh lands. Such dams marked the beginning of a town or city because it was easy to cross the river at such a place.Thepresent Dutch capital, Amsterdam started with a dam on the river Amstel in the late 12th century, and Rotterdam began with a dam on the river Rotte, a minor tributary of the Nieuwe Maas. The central square of Amsterdam, covering the original site of the 800-year-old dam, still carries the name 'Dam square' or 'the Dam'.

The Romans were the first to build arch dams, but it was only in the 19th century that the engineering skills and construction materials available were capable of building the first large-scale arch dams.Three pioneering arch dams were built around the British

Empire in the early 19th century. Henry Russel of the Royal Engineers started the construction of the Mir Alam dam in 1804 to supply water to the city of Hyderabad. It had a height of 12 m and consisted of 21 arches of variable span. In the 1820s and 30s, Lieutenant-Colonel John By supervised the construction of the Rideau Canal in Canada near Ottawa and built a series of curved masonry dams as part of the waterway system.

The Jones Falls Dam which was built by John Redpath was completed in 1832 as the largest dam in North America and an engineering marvel. In order to keep the water in control during construction, two sluices, artificial channels for conducting water, were kept open in the dam. The first was near the base of the dam on its east side. A second sluice was put in on the west side of the dam, of 6.1 metreabove the base. To make the switch from the lower to upper sluice, the outlet of Sand Lake was blocked off.Hunts Creek near the city of Parramatta, Australia, was dammed in the 1850s, to supply the demand for water from the growing population of the city. The masonry arch dam wall was designed by Lieutenant Percy Simpson who was influenced by the advances in dam engineering techniques made by the Royal Engineers in India. The dam cost £17,000 and was completed in 1856 as the first engineered dam built in Australia, and the second arch dam in the world built to mathematical specifications.The first such dam was opened two years earlier in France. It was the first French arch dam of the industrial era, and it was built by François Zola in the municipality of Aix-en-Provence to improve the supply of water after the 1832 cholera outbreak devastated the area. After royal approval was granted in 1844, the dam was constructed over the following decade. Its construction was carried out on the basis of the mathematical results of scientific stress analysis.The 75-

miles dam near Warwick, Australia, was possibly the world's first concrete arch dam. It was designed by Henry Charles Stanley in 1880 with an overflow spillway and a special water outlets, it was heightened to 10 metre.

In the latter half of the nineteenth century, significant advances in the scientific theory of masonry dam design were made. This transformed dam design from an art based on empirical methodology to a profession based on a scientific theoretical framework. This new emphasis was around the engineering faculties of universities in France and in the United Kingdom. William John Macquorn Rankine at the University of Glasgow pioneered the theoretical understanding of dam structures in his 1857 paper *On the Stability of Loose Earth*. Rankine theory provided a good understanding of the principles behind dam design. In France, J. Augustin Tortene de Sazilly explained the mechanics of vertically faced masonry gravity dams, and Zola's dam was the first to be built on the basis of these principles.

The era of large dams was started with the construction of the Aswan Low Dam in Egypt in 1902, a gravity masonry buttress dam on the Nile River. By invasion and occupation of Egyptin 1882 the British began their construction in 1898. The project was designed by Sir William Willcocks and involved several eminent engineers of the time, including Sir Benjamin Baker and Sir Aird. Capital and financing were furnished by Ernest Cassel. On completion, it was the largest masonry dam in the world.

The Hoover dam is a massive concrete arch-gravity dam, constructed in the Black Canyon of the Colorado River, on the border between the US states of Arizona and Nevada between 1931 and 1936 during the Great Depression. In 1928, Congress authorized the project to build a dam that would control floods, provide irrigation water and produce hydroelectric power. The winning bid to build the dam was submitted by a consortium called Six Companies, Inc. Large concrete structure had never been built before, and some of the techniques were unproven. The torrid summer weather and the lack of facilities near the site also presented difficulties.Six Companies turned over the dam to the federal government on 1 March 1936.By 1997, there were an estimated 800,000 dams worldwide, some 40,000 of them over 15 metre high.

Based on structure and material used, dams are classified as easily created without materials, arch-gravity dams, embankment dams or masonry dams, with several subtypes. In the arch dam, stability is obtained by a combination of arch and gravity action. If the upstream face is vertical the entire weight of the dam must be carried to the foundation by gravity, while the distribution of the normal hydrostatic pressure between vertical cantilever and arch action will depend upon the stiffness of the dam in a vertical and horizontal direction. The most desirable place for an arch dam is a narrow canyon with steep side walls composed of sound rock. The safety of an arch dam is dependent on the strength of the side wall abutments, hence not only should the arch be well seated on the side walls but also the character of the rock should be carefully inspected.

Two types of single-arch dams are constant-angle and the constant-radius dam. The constant-radius type employs the same face radius at all elevations of the dam, which means that as the channel grows narrower towards the bottom of the dam the central angle subtended by the face of the dam becomes smaller. Jones Falls Dam, in Canada, is a constant radius dam. In a constant-angle dam, also known as a variable radius dam, this subtended angle is kept a constant and the variation in distance between the abutments at various levels is taken care of by varying the radii. Constant-radius dams are much less common than constant-angle dams. Parker Dam on the Colorado River is a constant-angle arch dam.

In a gravity dam, the force that holds the dam in place against the push from the water is Earth's gravity pulling down on the mass of the dam.A gravity dam is a dam constructed from concrete or stone masonry and designed to hold back water by using only the weight of the material and its resistance against the foundation to oppose the horizontal pressure of water pushing against it. Gravity dams are designed so that each section of the dam is stable and independent of any other dam section. Gravity dams provide some advantages over embankment dams, the main advantage being that they can tolerate minor over-topping flows without damage, as the concrete is resistant to scouring.Gravity dams are classified as "solid" or "hollow" and are generally made of either concrete or masonry. The solid form is the more widely used of the two, though the hollow dam is frequently more economical to construct. GrandCoulee Dam is a solid gravity dam and Braddock Locks Dam is a hollow gravity dam.

A gravity dam can be combined with an arch dam into an arch-gravity dam for areas with massive amounts of water flow but less material available for a pure gravity dam. The inward compression of the dam by the water reduces the lateral force acting on the dam. Thus, the gravitational force required by the dam is lessened. This enables thinner dams and saves resources. A diversion dam is used to divert water. They provide pressure to push water into ditches, canals, or other areas used for conveyance. Diversion dams are typically lower in height and have a small water storage area in it’s upstream. Buttress dams are made from concrete or masonry. They have a watertight upstream side supported by triangular shaped walls, called buttresses. The buttresses are spaced at intervals on the downstream side. They resist the force of the reservoir water trying to push the dam over. The buttress dam was developed from the idea of the gravity dam, except that it uses a less materials due to the clear spaces between the buttresses. Like gravity dams, they are suited to both narrow and wide valleys, and they must be constructed on sound rock.

An embankment dam is a large, artificial dam that is constructed with natural excavated materials or industrial waste materials, such as compacted plastics, and various compositions of soil, sand, rock, and clay. Embankment dams are made of compacted earth, and are of two main types: "rock-fill" and "earth-fill". Like concrete gravity dams, embankment dams rely on their weight to hold back the force of water. Storage dams are not mean to divert or keep water out, but to keep water in. Storage dams are constructed to store water during the rainy seasons, supply water to the local wildlife, and store water for hydroelectric power generation, and irrigation. Storage dams are the most common types of dams.

Detention dams are specifically constructed for flood control by retarding flow downstream, helping reduce flash flood. The water is retained in a reservoir to be later gradually released.A gravity dam is a massive, man-made concrete dam designed to hold large volumes of water. Because of the heavy concrete used, it is able to resist the horizontal thrust of the water, and gravity essentially holds the dam to the ground. They are used to block rivers in wide valleys and must be built on a strong foundation of bedrock. A cofferdam is a barrier, usually temporary, constructed to exclude water from an area that is normally submerged. Made commonly of wood, concrete, or steel sheet piling, cofferdams are used to allow construction on the foundation of permanent dams, bridges, and similar structures. When the project is completed, the cofferdam will usually be demolished or removed unless the area requires continuous maintenance. Common uses for cofferdams include construction and repair of offshore oil platforms. In such cases the cofferdam is fabricated from sheet steel and welded into place under water. Air is pumped into the space, displacing the water and allowing a dry work environment below the surface.

A saddle dam is an auxiliary dam constructed to confine the reservoir created by a primary dam. It permit a higher water elevation and storage or to limit the extent of a reservoir for increased efficiency. An auxiliary dam is constructed in a low spot or "saddle" through which the reservoir would escape. A reservoir is contained by a similar structure called a dike to prevent inundation of nearby land. Dikes are commonly used for reclamation of arable land from a shallow lake, which is a wall or embankment built along a river or stream to protect adjacent land from flooding.

A weir is a small dam that is often used in a river channel to create an impoundment lake for water abstraction purposes and which can also be used for flow measurement or retardationA check dam is a small dam designed to reduce flow velocity and control soil .A dry dam, also known as a flood retarding structure, is designed to control flooding. It normally holds back no water and allows the channel to flow freely, except during periods of intense flow that would otherwise cause flooding downstream.

Underground dams are used to trap groundwater and store all or below the surface for extended use in a localized area. In some cases they are also built to prevent saltwater from intruding into a freshwater aquifer. Underground dams are typically constructed in areas where water resources are minimal and need to be efficiently stored, such as in deserts and on islands like the Fukuzato Dam in Okinawa, Japan. They are most common in north-eastern Africa and the arid areas of Brazil while also being used in the south-western United States, Mexico, India, Germany, Italy, Greece, France and Japan. There are two types of underground dams: "sub-surface" and a "sand-storage". A sub-surface dam is built across an aquifer or drainage route from an impervious layer up to just below the surface. They can be constructed of a variety of materials to include bricks, stones, concrete, steel or PVC. A sand-storage dam is a weir built in stages across a stream. It must be strong, as floods will wash over its crest. Sand accumulates in layers behind the dam, which helps store water and, prevents evaporation. The stored water can be extracted with a well, through the dam body, or by means of a drain pipe. A tailings dam is typically an earth-fill embankment dam used to store tailings, which are produced during mining operations after separating the valuable fraction from the uneconomic fraction of an ore. Conventional water retention dams can serve this purpose, but due to cost, a tailings dam is more viable. Material used to raise the dam can include the tailings (depending on their size) along with soil. There are three raised tailings dam designs, the "upstream", "downstream", and "centreline", named according to the movement of the crest during rising. The specific design used is dependent upon topography, geology, climate, the type of tailings, and cost.

The International Commission on Large Dams (ICOLD) defines a "large dam" as "A dam with a height of 15 m or greater from lowest foundation to crest or a dam between 5 metres and 15 metres impounding more than 3 million cubic metres. "Major dams" are over 150 m in height. The *Report of the World Commission on Dams* also includes in the "large" category, dams which are between 5 and 15 m high with a reservoir capacity of more than 3 million cubic metres. Hydropower dams can be classified as either "high-head" or "low-head”. As of 2021, ICOLD's World Register of Dams contains 58,700 large dam records. The tallest dam in the world is the 305 m-high Jinping-I Dam in China.

As with large dams, small dams have multiple uses, such as, hydropower production, flood protection, and water storage. Small dams can be particularly useful on farms to capture runoff for later use, during the dry season. Small scale dams have the potential to generate benefits without displacing people as well, and small, decentralised hydroelectric dams can aid rural development in developing countries. In the United States alone, there are approximately 2,000,000 or more "small" dams that are not included in the Army Corps of Engineers National Inventory of dams. Records of small dams are kept by state regulatory agencies and therefore information about small dams is dispersed and uneven in geographic coverage.

Chapter 2

Dams in Thrissur

Thrissur is known for its archaeological wealth, rich culture and heritage. It is called the cultural capital of Kerala. Thrissur is also very famous for its temples, mosques and churches out of which well recognized are St Thomas Church, Guruvayoor Temple and Vadakkunnathan Temple. Apart from these places, the dams in these areas are also tourist attractions and at the same time are the sources for power and electricity supply in the area. The district of Thrissur has major 5 dams that are popularly known among its visitors. The five dams are Chimmony Dam, Peechi Dam, Peringalkuthu Dam, Poomala Dam and Vazhani Dam. Each and every dam has its own tale and significance in this particular region. These dams serve the basic need of the people and state at large.

Chimmini Dam is situated in Echippara in Chalakudy taluk of Thrissur District in Kerala. The dam was completed in 1996. It is constructed across Kurumali River, a tributary of the Karuvannur river.Chimmini is the largest dam in Thrissur district.The reservoir along with the Chimmony Wildlife Sanctuary is surrounded by hills of the South Western Ghats thereby making the area appear natural and scenic. The construction of the dam was started in 1984 but was made fully functional and dedicated to the nation in 1996. The dam is also a very famous tourist spot apart from providing the water for irrigation. People visit this region to enjoy a relaxing picnic since the place offers recreational activities including trekking and boating through the Chimmony Wildlife Sanctuary.

Dam is surrounded by three wildlife Sanctuaries, hills and greeneries, the place is enjoyed by the locals as well as the foreigners. The sanctuary is an important bird area with 192 recorded avian species. Five Western Ghats endemic bird species occur here, including the grey-headed bulbul (Pycnonotus priocephalus), Indian rufous babbler (Turdoides subrufus) and white-bellied blue-flycatche (Cryonics pallipes). Other interesting species found here include-Ceylon frogmouth (Batrachostomus moniliger), Indian edible-nest swiftlet (Collocalia unicolor), Malabar trogon (Harpactes fasciatus), Malabar whistling-thrush (Myiophonus horsfieldii) and Loten's sunbird (Nectarinia lotenia) (Islam and Rahmani 2004). A recent survey recorded the presence of the lesser fish eagle (Ichthyophaga humilis), which until recently was only known from the foothills of the Himalayas.

Other significant sightings during the survey included those of the large hawk cuckoo (Cuculus sparverioides), broad-billed roller (Eurystomusorientalis) and ashy minivet (Pericrocotus divaricatus). About half of the large mammals found in Kerala are reported from Chimmini Wildlife Sanctuary, especially some of the globally threatened species such as tiger (Panthera tigris), Asian elephant (Elephas maximus) and wild dog (Cuon alpinus). Other red-listed species found here include the Indian giant squirrel (Ratufa indica) and the endemic primates-lion-tailed macaque (Macaca silenus), Nilgiri langur (Trachypithecus johnii) and slender loris (Loris lydekkerianus). There are 39 species of mammals, 160 species of birds, 25 species of reptiles, 14 species of amphibians, and 31 species of fishes are reported from the sanctuary.

Poomala Dam is an irrigation purpose dam and a tourist spot situated in Mulankunnathukavu Panchayath under Puzhakkal block in Thrissur, Kerala State of India. In 1939 a division weir was constructed in the Poomala Valley and in 1968 a Poomala reservoir was commissioned. The dam is managed by the Kerala Minor Irrigation Department and is constructed with mud and stone. Poomala Dam was officially designated as a tourist centre by the Home Minister of State, Kodiyeri Balakrishnan, on 21 March 2010. The dam is situated 94.50 meters above mean sea level. To its north lies another dam, Pathazhakundu, which presently is oriented only forirrigation. Other facilities include boating in the reservoir, horse riding, a walkway of 600 metres; a community hall that can accommodate 300 persons; a cafeteria and latrine facilities. The main tourist attractions in and around Poomala are Cheppara caves Pathazhazhakund dam and Pamboorampara rock Poomala Fest, a program conducted annually attracts tourists from in and around the district. The program lasts for about a week with food, entertainment and lot more.

Peechi Dam is situated 22 km outside Thrissur city in Kerala, India. The dam was started as an irrigation project for the surrounding villages in Thrissur. At the same time, it catered the drinking water needs of the population of Thrissur City. It serves as an irrigation dam, reaching out to the paddy fields in and around Thrissur city. Built across the Manali River, the dam has a catchment area of nearly 3,200 acres. Elephants may be seen on the bank of Peechi-Vazhani Wildlife Sanctuary, established in 1958 covering 125 square kilometres. E.Ikkanda Warrier (1890–1977), the first Prime Minister of the then independent state of Kochi, India, was the architect of Peechi Dam. Majority of the people opposed the dam cutting across the party line. He brought a retired Chief Engineer from Andhra Pradesh to build the dam as engineers from Kerala opposed the project. The dam was completed in 1959. Burgula Ramakrishna Rao, first Kerala Governor on 4

October 1957 inaugurated the dam. The Peechi Dam is one of the best tourist spots of Kerala, situated at a distance of 23 Kilometres from Thrissur. It is the best picnic destination and the best picturesque spot. The dam has a spectacular look and also offers a well maintained park for children to play.

Peringalkuthu Dam is a concrete dam build across Chalakudy River, in Thrissur district, Kerala state of India. It also contains Peringalkuthu Hydroelectric Power project of Kerala State Electricity Board who owns the dam. This is the first hydro electric power project to build on the Chalakudi River. The dam is situated in deep forest and special permission is needed to visit the dam.

Special permission is required to visit this dam which is located in the deeper forest. The view of the river which is fringed with forests and lush greenery is mind-blowing. The main attraction of this place is the scenic beauty of nature and journey in the water One can enjoy a nice and secenic view of the Dam and the nearby areas. The Speed Boat journey also gives fantastic thrill.

Vazhani Dam is a clay dam built across the Wadakkancherry in Thrissur district of Kerala. The water is used for irrigation and drinking purposes. The dam has a four-acre garden and the construction was completed in 1962. Vazhani dam is built with mud and it is an earth dam like Banasura Sagar DamThe dam was completed in 1962 and spreads across 792.48 meters the botanical garden is well maintained and serves as a picnic spot for tourists. Splendid view of nature scenery from this dam enthralls the tourists.

Chapter 3

Advantages and Disadvantages of Dams

Water plays an exceptional significant role in the economy and in the life of all countries. It is of vital importance for the existence of people, animals and vegetation. The settling of people in different regions of earth has always been closely dependant on the possibilities for water supply parallel to those providing with food, shelter and heat. The increase in the population, development and enrichment of mankind in number of places has reached a level at which the water supply needed for the population, industry, irrigation and production of electric power has been brought to a critical point. Only one-fifth of the fresh water which is available is suitable for human consumption.

There is uneven distribution of water regarding space, time and quality. That is why artificial redistribution of water is needed by undertaking expensive engineering in order to obtain water for given place in a defined quantity and qualityDams are necessary for the survival of a country. Whether developing or developed no one can ignore its importance and existence. Dams are built loudacross the river for various needs of human beings. In India monsoon is the main source of water. Rivers mainly receive water during monsoon season only. So it is essential to store this water in reservoirs to regulate water discharge among different places.

When the natural flow of water is not sufficient to meet the public's demand this reserve water of reservoir is released to meet the growing demands.Growing population also puts pressure on the demand of more resources. Therefore there is always a need to build more and more dams. The dams are built under several multi-purpose river valley projects. The motto of these projects is to store water for irrigation, generating electricity, prevent floods and enhancing afforestation in the reservoir area.Till 2000, the number of dams reached to 4000 in India and it is gradually increasing.

Dams are said to be an important source of water supply .They supply the water for the various means including domestic use, irrigation purposes and also for the industrial uses.Dams are also involved in the hydroelectric power generation and in the river navigation. The application of dams is much more important in daily activities including cooking, cleaning, bathing, washing, drinking water, for the gardening and for the cultivation purposes. The big dams and the reservoirs also provide recreational areas for the purpose of fishing and also boating. They also cater the insecurity needs of humans by reducing or by preventing the floods. During the times of excess flow of water, the dams store the water in the reservoir and release that water during the time of low flow, also when the natural flows of water are inadequate to meet the demand.

Dams offer an array of economic, social and environmental benefits and are useful for most problems pertaining to water conservation and its energy management.Due to large variations in hydrological cycle, dams and reservoirs are required to be constructed to store water during periods of surplus water availability and conserve the same for utilization during lean periods when the water availability is scarce.Properly designed and well-constructed dams play a great role in meeting the drinking water requirements of the people.

Water stored in reservoirs is also used for meeting industrial needs.Regulated flow of water from reservoirs help in diluting harmful dissolved substances in river waters during lean periods by supplementing low inflows and thus in maintaining and preserving quality of waterwithin safe limits. Dams and reservoirs are constructed to store surplus waters during wet periods, which can be used for irrigating arid lands.One of the major benefits of dams and reservoirs is that water flows can be regulated as per agricultural requirements of the various regions over the year.Dams and reservoirs render unforgettable services to the mankind for meeting irrigation requirements on a gigantic scale.

It is estimated that 80% of additional food production by the year 2025 would be available from the irrigation made possible by dams and reservoirs. Dams and reservoirs are most needed for meeting irrigation requirements of developing countries, large parts of which are arid zones.There is a need for construction of more reservoir based projects and widespread measures should be developed to conserve water through other improvements in irrigation technology.

The primary function of many dams is to provide water for farming. Some dams divert rivers into canals or pipelines to irrigate land many miles away. Dams are used also when a river flows at a lower elevation than the land to be irrigated. Some rivers have great seasonal changes in the amount of their flow, flooding during part of the year and slowing nearly to a trickle at other times. Irrigation dams built on such rivers store water to equalize the supply for crops throughout the year. The dam also has allowed farmers to cultivate hundreds of thousands of acres of formerly barren desert land.

Some rivers have great seasonal changes in the amount of their flow, flooding during part of the year and slowing nearly to a trickle at other times. Irrigation dams built on such rivers store water to equalize the supply of floods in the rivers have been playing havoc with the life and property of the people. Dams and reservoirs can be used to control floods by regulating river water flows downstream the dam. The dams are designed, constructed and operated as per a specific plan for routing floods through the basin without any damage to life and property of the people.The water conserved by means of dams and reservoirs at the time of floods can be utilized for meeting irrigation and drinking water requirements and hydro power generation. Energy plays a key role for socio-economic development of a country. Hydro Power provides a cheap, clean and renewable source of energy. Hydro Power is the most advanced and economically viable resource of renewable energy. Reservoir based hydroelectric projects provide peaking power to the grid.

Unlike thermal power stations, Hydro Power stations have fewer technical constraints and the hydro machines are capable of quick start and taking instantaneous load variations.While large hydro potentials can be exploited through mega hydroelectric projects for meeting power needs on regional or national basis, small hydro potentials can be exploited through mini/micro hydel projects for meeting local power needs of small areas. Besides hydro power generation, multi purpose hydroelectric projects have the benefit of meeting irrigation and drinking water requirements and controlling floods etc.The reservoir made possible by constructing a dam presents a beautiful view of a lake.

In the areas where natural surface water is scarce or non-existent, the reservoirs are a great source of recreation. Along with other objectives, recreational benefits such as boating, swimming and fishing linked with lakes are also given consideration at the planning stage to achieve all the benefits of an ideal multipurpose project. Electricity is produced at the constant rate with the help of hydroelectricity or hydroelectric power. If there is no need for electricity, then the sluice gates can also be closed or stopping the generation of electricity. Water can also be saved for the use of another time as and when the demand for electricity is high hence the usage of water remains judicious.Dams are so designed by well-qualified engineers to span many of the decades and also can contribute to the generation of electricity about many years or even decades to come.

The lake or reservoir which forms behind the dam can also be used for the irrigation purpose, water sports or even as other forms of pleasurable activities.Few large dams such as the Bhakra Nangal dam present in India is the tourist attractions. Dam has been a premier tourist destination in Kerala for decades. As the heavy rains that had been lashing the state, hundreds of tourists are thronging the dam in Thrissur district to see the majestic beauty of the reservoir which is filled with water almost to the brim. The tourists arriving at the dam are eager to visit the nearby place. The small waterfalls along the road attract lot of tourists, especially families, who even love to take a dip in these falls. Water tourism involves traveling to locations specifically to take part in water-based activities. Some people who do not wish to partake in water related activities embark on water tourism trips so that they can visit tourist sites that sit close to bodies of water such as lakes, seas or even dams. Water tourists are often independent travellers, although some travel firms do organize group trips.The build up of water inside lake means that the energy can also be stored when needed and also when water is released for producing the electricity.When used, the produced electricity by the dams does not even produce the greenhouse gases and also hence they do not pollute the atmosphere. The environment consequence of huge dams varies from time to time and from place to place and includes direct impact to the biological, chemical and physical properties of rivers and bank environments. Dams, particularly the giant ones, may cause a lot of problems for the surrounding areas, and the zone behind the dam where the water flows towards the blockage.

There are many negative impacts on aquatic life. Since dams block up flowing bodies of water, such as rivers, any animals that depend on the flow to reproduce or as a part of their life cycle are put to danger. Migratory fish that mate in a very completely different location that they live the rest of their lives are unable to mate and many decline in population. The bulid-up of water is dangerous for flowers that grow on the natural boundary of water. The plant life may get submerged and dies.

The beneficial sediment that normally is washed down the river is blocked, which decrease the fertility of the soil downriver from the dam. The alteration of a river's flow and sediment transport downstream of a dam causes the greatest sustained environment impacts. When a watercourse is devoid of water then its sediment load increased, it tends to recollect it by eroding the downstream river bed. Riverbeds downstream of dams are eroded by several meters within the decade of first closing a dam; the damage can extend for tens or even hundreds of kilometres below a dam.

Another significant and obvious impact is the transformation upstream of dam from a free-flowing river ecosystem to an artificial slack-water reservoir habitat. Changes in temperature, chemical composition, dissolved element levels and therefore the physical properties of a reservoir are not appropriate to the aquatic plants and animals that evolved with a given river system. Large dams have junction rectifier to the extinction of the many fish and alternative aquatic species, huge losses of forest, the disappearance of birds in floodplains, erosion of deltas, wetland, and farmland, and many other irreversible impacts.

Dams have also great impact on the Groundwater Table. Riverbeds deepening will alsolower groundwater tables along a river, lowering the water table accessible to plant roots and to human communities drawing water from wells. The building of the Dyke in Egypt has altered the amount of formation. This is slowly resulting in harm of the many of its ancient monuments as salts and damaging minerals area unit deposited within the stonework from rising damp caused by the changing water table level. Dammed rivers have also impacted processes in the broader biosphere. Most reservoirs, particularly those within the tropical zones, contribute tons to gas emission. A recent study pegged world gas emissions from reservoirs on par therewith of the aviation, trade, about 4 percent of human caused GHG emissions. Recent studies on the Congo drive biological processes badly into the Atlantic, that include serving as a carbon sink for atmospheric greenhouse gases. With the development of the many dams, erosion of the surrounding land has been noticed. The large reservoir at China's Three Gorges Dam has worn near the boundary, which has led to landslides along the side of the reservoir. The Nile Delta has older erosion to the reduction of sediment with the development of the Urban Centres. Much of the sediment has fallen into the reservoir, which implies there is less land around to farm and work on.

The price of building a dam usually reaches a level that may become difficult to recover. The engineering and technical aspects, alongside the particular construction, could be a time intensive. Moreover, the heavy method used in the construction should be through with absolute exactness and precision. China's Three Gorges Dam was built in an area with seismic activity, and small cracks have already been found in the infrastructure. A dam collapse or break would be an absolute catastrophe, especially from one the size of the Three Gorges Dam.

Dams can displace a significant number of people.An estimated 500 million people have been displaced by dams in the last two centuries because of the reservoirs that form behind each structure. As the surrounding dry areas get flooded, people no longer have the option to use land that was previously accessible for a variety of purposes. That means local agricultural activities go through a disruption process, even though the eventual increase in available water supports more irrigation.Reservoirs behind a dam can lead to higher greenhouse gas emissions. When vegetation gets engulfed in water, then the plants will eventually die. With this outcome, the dead organic material releases methane that makes its way into the atmosphere. The increase in the production of greenhouse gases is significant because methane is up to 20 times more potent as a reflector than carbon dioxide.

The use of a dam in certain areas can also contribute to the loss of forests. When we lose a significant number of trees simultaneously, then there is a corresponding uptake of carbon dioxide that occurs because there are fewer photosynthesis processes happening each day.Dams create a flooding risk if they experience a failure.Dams provide us with a form of flood control, but the failure of this structure can have devastating consequences for downstream communities. The Vajont Dam Failed in 1963, only 4 years after its construction was finalized just outside of Venice, Italy. A landslide during the initial filling triggered a tsunami in the reservoir, causing over 50,000,000 cubic meters of floodwater that impacted nearby towns and villages. Some reports say that the wave was over 820 feet high.

Almost 2,000 people died in this disaster, and it was all because the dam was located in a geologically unstable area. When the Banqiao Reservoir Dam failed in 1975 in China, it caused an estimated 171,000 deaths.Dams can block water progression to different states, province and countries.When a dam gets built at or near a border between two states, provinces, or countries, then it might also block the progress of the water in one of those areas. That means the supply from the same river in the neighbouring country is no longer under their direct control. This disadvantage can result in severe issues between neighbours, creating a constant source of conflict that can sometimes even lead to war.

When drought is a significant issue for a community, then a reservoir that's behind a dam can be a vital resource. Maintaining this new body of water comes with a set of its own challenges because evaporation can happen during dry times and result in an increase in environmental problems. There also tends to be a significant build-up of organic matter in the sediment with this disadvantage, resulting in potentially carcinogenic trihalomethanes when the water gets chlorinated for drinking purposes. Relocation is another big concern for the people living in villages and cities that are within the natural depression zone that might be flooded should move out. Therefore, they lose their farm and business.

Dams build on or near the border between two countries may block the progress of a river in one country. This means water supply from the same river in neighbouring country is not under their control anymore. This can result in serious issues between the countries. It may be difficult to imagine what civilization would be like if there was no presence of dams to regulate waterways and build reservoirs of water.

Conclusion

This is the study about dams in Thrissur. This project helps to study and write the history of dams in Thrissur as a history student. This study also helps to discuss the subject with the natives of the place and also for the construction of this study. These chapters will help to understand about the dams while reading the project. Many books, reports and articles were referred for the purpose of the study.This chapters help us to understand about the history of dams, the dams in Thrissur and their uses and also the advantages and disadvantages of dams. There is an important fact that through this project we can see the dams had undergone changes and improved in all aspects than the old.

This project focuses on the importance of dams. Dams are some of the most impressive and well-noticed aspects of modern infrastructure. Throughout history, dams have played an important role in the growth and expansion of civilization. Many ancient city planners relied on dams to funnel water through their cities even if it was far away, while military leaders used dams to alter the terrain that they planned to fight on. However, their existence is contentious.

A dam is a barrier that restricts the flow of water or underground streams. Reservoirs created by dams suppress floods and also provide water for activities such as irrigation, human consumption, industrial use, and aquaculture and also for navigation. A dam can also be used to collect water or for storage of water distributed between locations. Dams serve the primary purpose of retaining water. Dams also provide a lake for recreational activities such as swimming, boating, and fishing. Dams are the important source of water supply. They supply the waterfor various means including domestic use, irrigation purposes and also for industrial uses. The application of dams is much more important in daily activities including cooking, cleaning, bathing, washing, drinking water, for gardening and also for cultivation purposes.

Dams are important because they provide water for domestic, industry and irrigation purpose. Dams also provide hydroelectric power production and river navigation. The presence of a dam creates a reservoir that can be used as a great source of water, specifically for farm and industrial activities. Dams have been used for centuries for irrigation.

This is the study of local history of the dams in Thrissur, and history and uses of dams. The project covered almost of the historical aspects of dams and knowledge about dams in Thrissur. This study will be useful for understanding the historical of dams.

Works cited

"7 different kinds of dams & their uses" www.hydrologicalsolutions.com. Accessed on 23 December 2020

"advantages and disadvantages of dams" https://greengarageblog.org/17-biggest-advantages-and-disadvantages-of-dams accessed on 3 January 2021

"Advantages of dams" https://www.vedantu.com/biology/advantages-of-dam accessed on 29 December 2020

"Benefits of large dams "

"Chimmini Wildlife Sanctuary-Wikipedia" https://en.m.wikipedia.org/wiki/Chimmini_Wildlife_Sanctuary. Accessed on 27 December 2020

"Dam – Wikipedia" https://en.m.wikipedia.org/wiki/Dam . Accessed 20 December 2020

"dam| Definition, Types & Uses|Brittanica https://www.britannica.com/technology/dam-engineering . Accessed 23 December 2020

"Importance of dams to water quality environmental sciences essay" https://www.ukessays.com/essays/environmental-sciences/the-importance-of-dams-to-water-quality-environmental-sciences-essay. Accessed on30 December 2020

"Peechi Dam-wikipedia" https://en.m.wikipedia.org/wiki/Peechi_Dam. Accessed on 28 December

"Poomala Dam-Wikipedia " https://en.m.wikipedia.org/wiki/Poomala_Dam. Accessed on 27 December 2020

"Types of dams" http://britishdams.org/about-dam .Accessed on 23 December 2020

Chimmini Dam-wikipedia https://en.m.wikipedia.org/ .Accessed on 26 December 2020

https://bbmb.gov.in/benefits-of-large-dam-.htm Accessed on 2 January 2021