



JANAL Digital Archives

# The Bund on Lake Vembanad

JANAL Team

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**Summary** - Describing the unique ecosystem of below sea level agriculture in the reclaimed farmlands of Kuttanad.

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The Vembanad Lake is a large shallow lake, the second largest Ramsar wetland site in India after the Sundarbans. The six major rivers coming into this lake bring a lot of silt, and this has made the lake quite shallow, with a depth of 3 to 4 metres.



Figure 1. Thaneermukkom Bund with fishing boat seen from the central island. Image: JANAL Archives 2023.

*“The main reason we are forced to make a livelihood from collecting kakka (clams) is because there aren’t enough fish left to catch in the Vembanad Lake. The few fish just meet our daily needs, but it is not enough to sustain a living by fishing.” - Fisherman Ratheesh<sup>1</sup>*

In earlier times, reclamation was carried out mainly from the shallow part of the Vembanad Lake or from the periphery of the Pamba River, by the deposit of river-borne sediments. These reclamations formed small paddy growing areas. Around 150 years ago, artificial land reclamation (*kayal nilam*) for paddy cultivation began in the southern part of Vembanad Lake. During the annual monsoon, fresh rainwater overpowers the tidal saltwater flows, making the reclaimed *kayal* ideal for cultivating a crop of paddy a year.

<sup>1</sup> Interview with Ratheesh, a fisherman from Muhamma by the JANAL Team.

Fisherfolk have been living off the lake for centuries, with a catch including fish species like Karimeen (pearl spot fish) that migrate between the freshwater and saltwater ends of this coastal wetland. Rotating between agriculture and aquaculture, the people of Vembanad have lived in harmony with the seasonal mixing of fresh and saline water.

However, to improve the farming capacity of the *kayals*, it was necessary to keep the saltwater away from them for a longer time. The construction of the Thanneermukkom Barrage made in stages from 1976, divided the lake into a freshwater-dominant southern zone and a saltwater-dominant northern zone. The cultivation of two or more harvests in a year is at the cost of obstructed fish movement, affecting fisheries and marine life.

The process of backwater reclamation in the Kuttanad wetland is called **Kayal Kuthu**. The earliest bunds called *padashekaram*, to hold the silt and soil, were formed naturally during the dry season, as much sediment is deposited here by the rivers discharging into the Vembanad backwaters.



Figure 2. Repairing the bunds or kayal. Image: illustration from the magazine *The Graphic*, April 1877.

Today, some estimate that as much as two-thirds of the lake and its marshes have been reclaimed for growing rice, each mega-paddy field named after the local king who approved the British plan for its creation. From above, the *kayalnilam* looks like angular pieces of

land intersected by water, all straight lines and sharp corners. This rearrangement of the natural landscape has drastically altered the ecosystem, in ways often unpredictable for the marine life of Lake Vembanad.

### **View from the Shore: A Timeline of the Vembanad Kayal Kuthu (Backwater Reclamation)**

- **1865:** The Pattom Proclamation grants ownership rights to tenant-cultivators of State lands, ending State landlordism in Travancore and expanding ownership of the kayals for housing and cultivation across many communities engaged in agriculture, except the lowest castes.
- **1880:** Large-scale kayal reclamation in Vembanad – Kuttanad wetland was introduced to overcome the food scarcity during the colonial period in the princely state of Travancore.
- **1886:** The state of Travancore encourages projects to support reclamation activity from deep backwaters using kerosene-powered engines, sometimes more than 9 metres below sea level. The land-owning castes adopted the kayal reclamation methods of the Pulayas and Parayas on a large scale to create kayalnilam.
- **1903:** Kayal reclamation was stopped because the colonial authorities of Madras Presidency were unsure of the impact of kayal reclamation on the development of Cochin port. Around 5500 acres of Kayal lands had been reclaimed by this time.
- **1912:** Madras Government approved a proposal from the Travancore State for further

reclamations in blocks each named by English letters A to G, H to N and R. Out of the total area of 19,500 acres of Kayal land 12,000 acres were reclaimed between 1913 to 1920.

- **1920:** Reclamation activity comes to a halt because of a steep drop in the price of rice.
- **1943:** The attached labour system or slavery as practised in the Travancore Kingdom was abolished and a wage labour system was introduced. The landlords now had to pay wages to the low caste labour force, which made reclamation expensive, and the reclamation of kayals became insignificant after this.
- **1974:** The Thanneermukkom Barrage construction begins, converting the southern part of brackish Vembanad Lake into a freshwater reservoir to augment paddy production.
- **2017:** The completion of the barrage makes it possible to grow up to three paddy crops a year at times, while other Vembanad Lake livelihoods remain stagnant or decrease.

### **Below Sea Level Land Reclamation by Bunding**

Kuttanad, a low-lying wetland is the only place in the country where paddy farming has been practised below sea level for more than two centuries. In this system, the artificially created landforms are called *kayalnilams*, where *kayal* means backwaters and *nilam* means ground, implying that they were lifted out of water.

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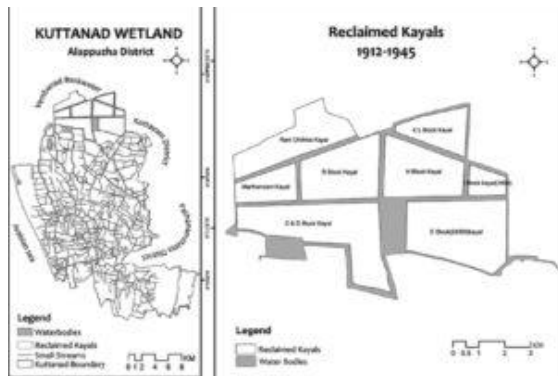


Figure 3. Pictorial representation of layout of reclaimed kayals

### Drainage for reclaimed land maintained by regular repair of Kayalnilam bunds.

The kayalnilam system of earthen dykes, canals, and ponds that rise and fall above the backwaters accommodates seasonal flooding and salinity intrusion, allowing the residents to grow rice, coconut, and other fruit trees through local technology and water management practices associated with the kayalnilams.

### Keeping Paddy Away from Seawater

A framework for the bio bund is erected using coconut poles fenced with bamboo mats along the periphery of the shallow parts of the lake bed. The channels of the bund are filled with high-quality clay dredged from deeper parts of the lake, along with sand and organic material like twigs and certain plants. Vegetation cover is used to stabilise the bund. The bunds separate the canals which hold water used for irrigation.

The water enters the paddy fields through a flexible opening in the bund called a

*thoomba*. However, to avoid excess water entering the paddy fields, dewatering technologies called *pettiyum parayum* are placed at strategic junctures between the bunds and the canals.

Before 1970, wooden water wheels with four to eighteen leaves were pedalled manually to drain the water from the reclaimed land. Since then, they have been replaced by locally crafted ingenious machines that run on electric power.

To block the seasonal entry of salt, temporary barriers called *orumuttu*, made of sandbags and twigs are built above the saltwater level, allowing only fresh water to enter the paddy fields. The entire system is lined with an exterior bund which acts as a sea defence barrier against fluctuating tidal levels.



Figure 4. Harvesting paddy. Image: JANAL Archives 2023.

### What is happening to Karimeen in Vembanad?

Acclaimed as the 'inland fish basket' of Kerala for centuries, the southern stretches of Vembanad were contributing forty to fifty per cent of the total catch before the construction of the barrage. By 2001, the southern stretches of the lake provided a mere seven per cent of the total catch for the entire Vembanad lake.

Since the operation of the Thanneermukkom Barrage, the annual landings of Karimeen, the State Fish of Kerala, from Vembanad Lake have gone down 90% from 1969 to 2013. Local fishermen also note that the average size of Karimeen in their catch has reduced substantially in the last five decades.

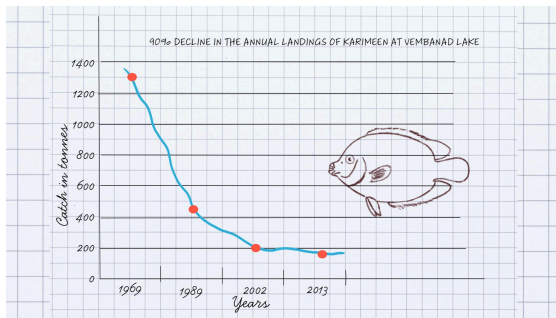


Figure 5. The declining catch of Karimeen from Vembanad Lake during different years Image: IBC proceedings 2017<sup>2</sup>.

### Three easy steps to kill a lake?

The Thanneermukkom Barrage was designed to keep half the lake filled with freshwater long enough to allow for one rice harvest.

However, the pressure to increase paddy production by growing two rice harvests on the reclaimed land has restricted the time that brackish seawater can cross the Thanneermukkom Barrage barrier.

This has three main impact on aquatic life on the lake.

The fishes in backwaters require a small amount of saline water for their breeding.

<sup>2</sup> Roshni K., et al. .THE DOWNTURN OF THE STATE FISH, ETROPLUS SURATENSIS IN VEMBANAD LAKE- A RAMSAR SITE, KERALA, INDIA. School of Industrial Fisheries, Cochin University of Science and Technology, Kerala, India roshni.phd@gmail.com

Fish breeding is affected by the presence of bund, which restricts the movement of fish and saltwater.

Earlier, the saltwater tended to cleanse the backwaters, but this does not happen anymore. This restriction has interfered with the natural cycle and enabled aquatic weeds like water hyacinths to spread at an alarming rate.

Many thousands of tonnes of fertilisers and highly toxic pesticides are used in the paddy fields. A considerable portion of this enters the water bodies when the water drains from the fields. Tissue samples of fish, shrimp, and clams from Vembanad Lake contain pesticides that were as much as ten times the acceptable toxic levels for the respective species. Some of these chemicals are well-known carcinogens.

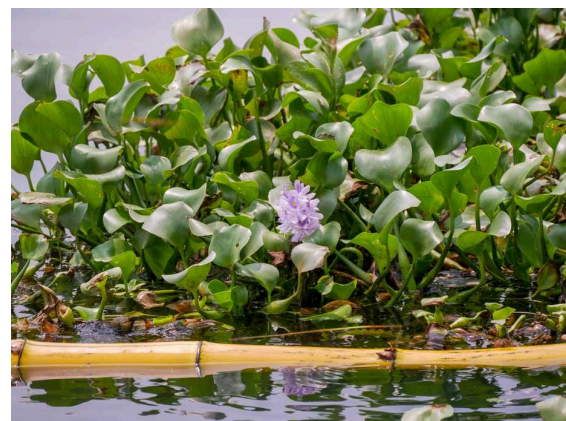


Figure 6. The virulent growth of water hyacinth across Vembanad lake. Image : JANAL Archives 2023.

### Conclusion

*The only way to revive this system is to let the salinity come as it used to, by keeping the gates open longer. Keep it natural, that's it. - Jojo ATREE Coordinator, Alappuzha<sup>3</sup>*

<sup>3</sup> Interview with ATREE coordinator T D Jojo by the JANAL Team

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