

Nature Watch

Rice Bowl in Turmoil: The Kuttanad Wetland Ecosystem

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Once again ... 'Save Kuttanad'! This is not the first call by agricultural workers in Kuttanad, the rice bowl of Kerala and the largest wetland ecosystem on the west coast of India. The agitation has evoked mixed responses from diverse interest groups in the state. The enterprising farming community who once reaped rich harvests from these fields and who now have been deprived of a decent living from farm income, strongly hold the view that it is for them to decide what crop they should cultivate. On the other side, the farm labour lobby and the powerful trade unions strongly hold that farming is a process involving not only the land owners but also the hard work of landless labour, and hence the farmers who happen to own the land cannot alone decide how the land should be used.

Kuttanad, the deltaic formation of four major river systems, Pampa, Achencoil, Manimala and Meenachil, confluencing into the Vembanad Lake lies 0.6 to 2.2 m below mean sea level. The region extends from 9° 17' to 9° 40' N latitude and 76° 19' to 76° 33' E longitude, comprising an area of 1100 sq. km. The region encompasses vast stretches of backwaters, bordering mangrove formations, and rice fields, the latter mostly reclaimed from the shallow stretches of the lake during the recent past. The garden lands, or the reclaimed *purayidams* or homesteads with coconut groves, fringed by canals and channels make this a land of richness and beauty. Owing to persistent human intervention in the name of development, this wetland ecosystem has been a subject of endless studies, debates and controversies. Though the economy of the region is dependent on rice, the only crop that can be raised in lowland areas, it is also supported by coconut in *purayidams*, and by inland fisheries.

Box 1. Historical Background

In the geological past, the Kuttanad region was a part of the shallow coastal area of the Arabian Sea. As a result of a geological uplift, a shallow bay was formed into which several rivers discharged. The silt deposited at river mouths gave rise to the present delta and the shallow bay formed into a lake-lagoon-backwater system opening on to the Arabian Sea through the Kochi barmouth. According to another theory, the entire sea was a dense forest, the legendary *Khandava vana* which caught fire and got engulfed by the sea during the succeeding geological ages. Years later, the sea receded, exposing the land which forms a part of the midland and coastal region of Kerala. This land was known as “*Chuttanadu*” meaning burned land and hence the name Kuttanad. The entire area has a semblance of dense forest, rich in organic residues and burnt wooden logs locally called as *kari*. With reference to elevation, geological formation and soil characteristics, Kuttanad deltaic formation is locally classified as karappadam, kayal and kari lands.

The Vembanad Wetlands

Kuttanad is a landscape of innumerable water courses nestled around the Vembanad lake, and includes 304 sq. km of garden lands and 524 sq. km of low lying rice fields, the rest being water-bodies. On the eastern banks of the lake, a few stretches of mangrove forest support a rich variety of endemic and exotic species of birds. Floods are a regular phenomenon during the

Figure 1. View of a waterway in Kuttanad (Kumarakom) – with country crafts carrying passengers and cargo.

Figure 2. A typical rice field of Kuttanad with surrounding ring bunds, leaving the water courses for navigation, drainage and irrigation.

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monsoon period due to the discharge of large quantities of river water into Kuttanad. As the north-east monsoon recedes, the area is exposed to tidal incursion of saline water from the Arabian Sea through the Kochi barmouth, making the wetland ecosystem predominantly saline. The Kuttanad agrosystem, therefore, is faced with serious problems of hydrology, floods and salinity. Nevertheless, the high profit margin for rice attracted many farmers to rice cultivation despite all these problems.

Rice Cultivation in Kuttanad

Rice is cultivated in an area of 55000 ha, identified as punja lands of Kuttanad, constituting several padasekharams or contiguous fields known as polders, separated by channels and bunds. It accounts for 20 per cent of Kerala's rice production and contributes decisively to the food security in a state where domestic production meets only 30 per cent of the food grain requirement. A substantial part of the lowland rice fields in Kuttanad were reclaimed from the Vembanad lake as a result of deliberate state policies to bring more area under rice, following the second world war and Bengal famine. These state policies, coupled with private intervention, led to large scale conversion of shallow parts of Vembanad lake for rice cultivation, reducing the lake expanse by about 65 per cent. Simultaneously, the intensive agriculture for plantation crops in high ranges, and the resultant deforestation, also led to large scale silting up of the lake. The annual sedimental yield for the river basins of Vembanad lagoon is estimated to be 32 million tonnes, which is attributed to human interference in the catchments at Western Ghats. The reclamation processes virtually came to a halt during the recent past. Being located at the deltaic region of four major river systems, and being in the intertidal zone of the estuarine system, rice cultivation in Kuttanad was exposed to several threats such as regular flood submergence during monsoons and saline water intrusion during summer.

The search for a permanent solution to the problem of floods and crop loss in Kuttanad has led to the construction of a spillway at Thottapally for the speedy drainage of flood water to the Arabian

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Sea. Though the construction of the spillway has not made any perceptible improvement in the control of floods, it helped in raising an additional crop of rice in 20000 ha. In order to solve the problem of salinity in Kuttanad, a salt water regulator was constructed in the Vembanad estuary which literally divided these backwaters into a fresh water lake on the southern side and a saline lagoon in the north. Although the structure has been successful in preventing the salinity intrusion during summer, the incomplete construction of the barrage with an almost 1/3rd earthed up middle portion further slowed the flood water recedence during the monsoons and brought about catastrophical changes in the ecosystem of Kuttanad. The introduction of reinforced granite bunds instead of earthen bunds to facilitate additional crop of rice during monsoons have also done extensive damage to the environment in the upper reaches of Kuttanad.

Capture Fisheries in Kuttanad

Before the construction of the Thanneermukkom regulator, the entire backwater area used to become saline or brackish during the pre-monsoon period. The regulator has divided the backwater into a saline or brackish region downstream on northern side, and a fresh water region south of it. This tract was earlier rich in estuarine fish fauna, consisting of species originating from the sea, fresh water species and true estuarine species. The latter reproduce in the estuarine environment and find their

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Figure 3. A local fisherman engaged in fishing on the Vembanad lake.



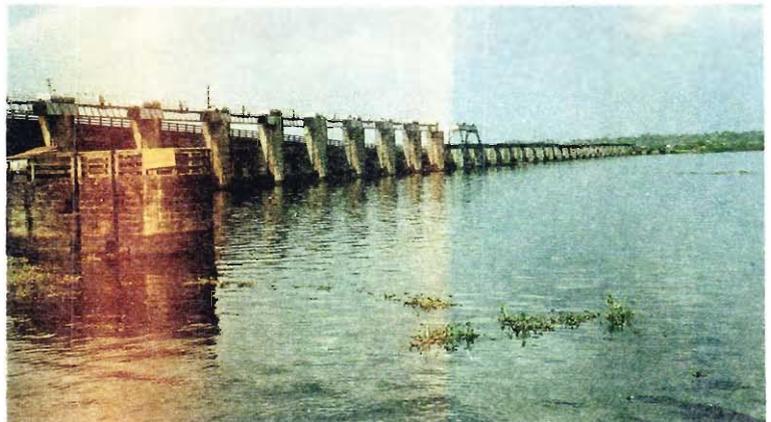
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physiological optimum in brackish water. The marine fish and prawns reproduce in the saline waters of sea and migrate to the estuary after completing their pelagic development. Some of the commercially important species of the tract were grey mullets, milk fish (*Chanos chanos*), marine cat fish (*Tachysurus*), pearl spot (*Etroplus suratensis*), penaeid prawns, *Machrobachium*, edible crab (*Scylla serrata*) and black clam (*Villorita cyprinoides*). Due to the construction of the Thanneermukkom regulator, some of these species have now vanished from the area, while others have become a rarity.

Impact of Developmental Activities

The developmental activities no doubt have helped in increasing rice cropping intensity in the region, but have led to several ecological problems. The rapid increase in the cost of production and the consequent reduction in profit margin has led the farmers to abandon rice farming for more remunerative enterprises. It has been argued that the construction of Thottapally spillway and permanent lining for earthen bunds have aggravated the flood situation in Kuttanad due to shortfalls in their design. But the construction of Thanneermukkom regulator, the major developmental intervention, has not only contributed to the flood situation, but also to environmental degradation to a large extent. The impact of closure of the regulator has been a topic of endless debate. The protagonists

Figure 4. Thanneermukkom regulator that divides the Vembanad estuary into a fresh water lake on the southern side and a saline backwater tract at north.



argued that, from 1976 onwards it has been protecting 20,000 ha of rice crop in kayal lands and North Kuttanad. The environmentalists opined that the developmental activities for the past five decades of which the major one is the closure of the regulator, have resulted in severe deterioration and transformation of this wetland ecosystem.

When the regulator is closed, there is virtually no flow of water beyond it on the southern side making the entire Kuttanad a static pool. The periodic tidal inflow which used to flush the water body is completely prevented with the result that the drained water from the rice fields with heavy load of pesticides and fertiliser residues remains stagnant in the waterbody. Added to these pollutants, the human, animal and agricultural wastes, and industrial effluents that are emptied into the Kuttanad water system virtually turn Kuttanad, the rice bowl of Kerala into a poison bowl. The continuous cultivation in rice fields with soil exhausting high yielding rice varieties along with indiscriminate use of fertilisers and pesticides is causing serious degradation of soil in Kuttanad, through the depletion of soil organic matter, increase in soil acidity, depletion of nutrients, accumulation of heavy metals etc.

The persistence of fresh water conditions on the southern side of the regulator has triggered several ecological backlashes like proliferation of weeds, deterioration of water quality, increased morbidity among the local population and destruction of subsistence fishery on which the local fishermen depended. An abrupt reduction in estuarine fish landings had been reported from the past decade. The attributed reasons are the decrease in salinity of water on the southern part of the regulator, the interruption of migration routes of marine fauna by the barrier, loss of the area south of the regulator as the nursery ground for post larval prawns which need salinities of 15 ppt for optimal growth, and pollution due to pesticides and organic residues.

It is thought that in the state of Kerala, the degradation of

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wetlands occurred at a greater pace, pitch and price, compared to the deforestation in the uphills. For example, the Vembanad lake with an area of 1,10,000 ha by the dawn of this century has shrunk to less than one fifth during the past few decades. This deterioration was further fuelled by the ecosystem alterations in the name of conversion for intensive agriculture. The lakes were first raised up to polders for rice cultivation by the middle of this century and now to the uplands or *purayidams* for perennial high valued crops. The recent agitation by the farm labour unions against the conversion of rice fields in Kuttanad has added a new dimension to this problem.

Recent Scenario

Emerging tourism: Since tourism has been identified as a major foreign exchange earner to the decelerating economy of the state, there has been an attempt to project the tourist potential of Vembanad backwaters. The entire Vembanad lake with its small islands adjoining lagoons, backwaters and reclaimed rice fields has immense tourist potential. The reclaimed wetlands are under the threat of further reclamation not only for high valued crops and construction, but also for real estate. The measures taken up by the Government for promoting tourism in Kerala, 'God's own country', and popularisation of the concept of ecotourism or green tourism taking the clues from the west have added a new dimension to land use in Kuttanad. Antagonists

Figure 5. Relics of mangroves bordering the Vembanad lake. Mangrove swamp is the most extensive potential acid sulphate environment. It stabilises the coastline and creates a diverse and productive ecosystem.



argued that the tourist potential of Kuttanad has been over projected; considering the fragile nature of these wetlands, unbridled promotion of tourism will not only pollute the environment but also the ethnic culture.

Vanishing Mangroves: Fringed on the eastern banks of the Vembanad lake, the evergreen stretches of mangroves, the last relic of this tropical vegetation which harboured a variety of endemic and exotic species of birds which make the region a hot spot for naturalists and ornithologists, are on the verge of extinction. The Vembanad mangroves, though not rich in species diversity, provide a rich habitat for migratory birds. Interestingly, all the major bird sanctuaries of Kerala are located in mangrove forests and there have been persistent demands to protect this vital ecosystem.

Dying wetlands: On one side the traditional wetlands are slowly transformed into garden lands or *purayidams* for growing coconut, spices, banana, vegetables etc. On the other side, the remaining wetlands are utilised for intensive fish farming or for making palaces in lakes. Obviously all these are remunerative enterprises. *Why is such a change taking place?* The influence of foreign money and the westernised lifestyle have kindled a natural instinct in the minds of common people to achieve material welfare irrespective of their social or educational status to become rich

A new concept of sustainable farming is taking shape in Kuttanad.



Figure 6. A rice field on the verge of metamorphosis – mounds are first prepared for planting the coconut seedlings and later the interspaces are filled with red earth and clay which will be finally transformed to a coconut plantation.

within the shortest possible time. This is reflected in the attitude of farmers and farm workers and many of them are not at all hesitant to part with their land to raise their bank balances and inflated lifestyles or to achieve pseudosocial status. The practice of deserting farm jobs for taking up jobs like taxi drivers, auto drivers, salesmen and salesgirls with much lesser income has been cited as an effect of this.

Can we find solutions to these problems? Some think that all these practices are against the concept of ecofriendly management of natural resources. According to them, the above practices can be made ecologically sound if they are resource oriented rather than product based. Thus a new concept of sustainable farming i.e., a judicious mix of integrated enterprise concept of resource based planning based on public participation is slowly developing. It assumes the relevance of timely shift from product based strategy to resource based strategy.

The country crafts carrying paddy, straw, coconut and passengers plying through the Vembanad waters was a frequent sight in the past; this has given way to whisking speed boats or strolling house boats and dashing country crafts with cargo and tourists. The degenerative metamorphosis of Kuttanad has already begun. If this trend is not revoked, the future generations may repeat the legend as – *Once Kuttanad was a prime agricultural land with lot of lakes, lagoons and backwaters which has some how...*

End Note

Several individuals, voluntary and government organizations are working hard to save this wetland ecosystem. The State Government had appointed several commissions to study the system and to find out appropriate remedial measures for its restoration. Despite all these, Kuttanad presents a bleak picture, still struggling with its agonies. Only a change in the mindset of people can reverse the trend and “Save Kuttanad”.

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