# environment related issues of kanjikuzhi and aryad block panchayats of alappuzha district

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## Introduction

The Kanjikuzhi and Aryad Block Panchayats are part of the Lagoon-barrier complex, which covers about 170.59 sq.km in the Alapuzha District with eight Grama Panchayats (GP).[Aryad Block panchayat – Aryad GP, Mararikulam GP and Mannancherry GP. Kanjikuzhi Block Panchayat – Muhamma GP, Kanjikuzhi GP, Mararikulam North GP, Thanneermukkam GP, Cherthala South GP]. The western and eastern boundaries of this area are the Lakshadweep Sea and the south part of Vembanad Lake respectively. This Lagoon -barrier complex form the coastal environment of Alapuzha District, which may be further sub-divided into a shore zone, land zone and land-kayal zone. There are many major environment related problems in all the three zones cited above, which needs special attention. It is important to examine the role of decentralized planning for finding location specific solutions. Some of the issues in this context are examined below.

## Shoreline and Coastal Erosion:

The Kerala coast is of recent geological origin made up of recent sediments. The age of this land from Kollam to Quilandy is estimated to be less than 3000 years. An examination of geological factors of the eastern banks of the existing backwaters suggest that the Lakshadweep sea washed these banks till 3000 years ago and the barrier strip of land now separating the Lakshadweep sea from the backwaters has come into existence only since then. Borings at Kochi show that there are deposits of alluvial materials for 100 to 126 m, overlying the bedrock. It is also noticeable that the portion of the coast from Thottapally to Quilandy is more or less coincident with the presence of an alluvial belt, backed up by laterite deposits close to the coast. It is interesting to note that the erosion of shoreline is most severe on this recently formed and unconsolidated strip of land of permeable in nature. Records reveal that the Kochi outlet in its present position was formed in 1341 A.D. The coastal belt is comparatively plain. Extensive paddy fields, thick grooves of coconut trees and a large number of backwaters interconnected with canals and river are the uniqueness of this region. In the southern and northern parts of the state, the coastal belt also has some hills and valleys.

**Coastal setup of Aryad and Kanjikuzhi Block Panchayats:** The 18 km stretch of shoreline of Aryad and Kanjikuzhi Block Panchayats situated in the coastal plain of Alappuzha, is under severe threat for erosion during monsoons, when the sea becomes rough due to consistent attack of waves. The beach sediments composed mostly of medium to fine sand. Little importance has been so far given to the 9 creeks observed in this coastal stretch between Alapuzha and Mararikulam North. This part of the shoreline is sometimes subjected to tidal overflow when adjoining low-lying lands get submerged. During the worst monsoon period, the highest waves average 3.2 m and wave periods range from 5 to 7 sec and most from west. The near shore sea can be very calm occasionally amidst the rough monsoon wave climate due to the presence of mud banks extending 2 to 3 km alongshore and 1.5 to 2 km offshore. It has also been found that these mud banks provides good fishing ground for two to three weeks or so. The normal tidal range varies from 0.9 m to 1.1 m. Storm tides occur all along the coast during the monsoon season. During the monsoon, the high wave coupled with tide elevated and storm surges, cause overflow and flooding of the low lying backshore lands all along the

coat, resulting in considerable loss of property, destruction of buildings and communication net works, dislocation of life of lakhs of coastal population and disruption of other activities affecting the state's economy. The influx of saline waters during dune breaching also affects coastal wells, agriculture and industry. The coastal protection and related measures in this region is looked after by the Irrigation Department of the Government of Kerala whose details are listed in the table.1.

The present area of interest is in the Sherthalai section between Ottamaserry VI and Alapuzha XV covering a total number of 90 BLS. Some stretches of the coasts are protected by sea walls. The fishermen in this area are affected badly from periodical loss of land, belongings and sometimes life. Very little effort is being taken for protecting shoreline with alternate and sustainable methods. Planimetric changes of beaches forms one of the very important methods from which the changing behavior of the beach surface (profiles) can be monitored and the area under threat to beaches may be delineated. The beach morphology, sand volume changes and associated processes in different periods are some of the important inferences, which could be drawn. It has been found that seasonal fluctuations are reasonably pronounced in the beach morphology of this Coast. The Coastal Erosion Studies of the PWD had been collecting data for the last several years of this part of the coast. Possibilities for rehabilitation measures to suitable near by places, utilization of natural creeks available in this area for setting up one or two fishing landing centers with specific facilities like berthing of boats, lockers, ice plant, freshwater etc. may be examined. CRZ rules may be obeyed. [Secondary data is available at CESS, Thiruvananthapuram, CES (Coastal Erosion Studies), Trichur, KERI (Kerala Engineering Research Institute), Peechi and Irrigation Department, Government of Kerala.]

**Coastal erosion and Sea Level Rise**: The coastal erosion in this stretch is one of the recurring natural hazards occurring as part of an erosion-accretion cycle at the land-sea interface. The natural causes are mainly due to storm waves, waves and surge over wash, deflation, alongshore sediment transport, etc., whereas the anthropogenic disturbances are mainly the interruption of material in transport and reduction of sediment supply to the coastal zone. However, Global climate change due to the greenhouse warming is predicted to cause Sea Level Rise (SLR) of about one metre in this century.

**Coastal Protection Measures:** Now, the coastal erosion process in Kerala could be due to natural or man-made phenomenon, but it is the responsibility of the governments to protect the people and property from this threat. Hence it is important to examine the requited preventive measures in the most scientific and economic way so that the government and the people can join hand in hand to decide and implement which is good for both the parties. Engineering solutions of huge investments which have been undertaken in the state for the last five decades failed to extend needed relief for the people, need to be re examined. Possibility for soft solutions like beach nourishment, dune stabilization by vegetation, sand bypassing, etc. has to be though of.

**IPCC approach to coastal protection**: The Intergovernmental Panel on Climate Change (IPCC 1990) established by WMO and UNEP in 1988 has proposed different strategies for adaptation of SLR wherein coastal erosion is an important factor. The response required to protect human life and property fall broadly into three categories: retreat, accommodation and protection. The **retreat** involves no effort to protect the land from the sea. The coastal zone may be left alone for the interplay of the sea. Here the ecosystem will shift landward in course of time. Here it involves less economic and environmental impacts of protection. It is equally important to provide coastal buffer zones in the coastal stretches so that coastal erosion impact will be least on us. **Accommodation** implies that people continue to use the land at risk and do not attempt to prevent the coast from being flooded. This option includes erecting emergency flood shelter, elevating buildings on piles, converting agriculture to fish farms or growing flood or salt tolerant crops, etc. **Protection** suggests

planned interventions in the natural system with either hard structural stabilization methods like sea walls, groins, etc. or soft options such as dunes and vegetation for coastal protection.

**Coastal Land use Regulation and Coastal Regulation Zone Act:** Only by creating buffer zones and their continuous maintenance, we can effectively introduce proper Coastal Land use Regulation. Control over the type and intensity of development along erosion prone coastlines can be achieved through land use zoning, setback line fixing, acquisition and relocation programs, building codes, beach-dune preservation rules, etc. The Coastal Regulation Zone (CRZ) Act notified by the Ministry of Environment and Forests, Government of India, in 1991, has either prohibited or regulated several activities along the coast with a view to providing sufficient buffer zone to accommodate coastal erosion, future problems related to SLR, etc. The Act can be implemented only with the co-operation of the Coastal States and Union Territories to prepare detailed Coastal Zone Management Plans taking into account of the intricacies of the problems within their respective areas.

Hence it is proposed that a detailed Coastal Zone Management Plan for the 18 km stretch of this area may be formulated with the complete support of the two Block Panchayats and implemented in the tenth plan period.

Table 1.
IRRIGATION DIVISION III
**ALAPUZHA - SHERTHALAI SECTION**

| SECTOR | SUB SECTION NAME | BLS |
|---|---|---|
| VI | OTTAMASSERY | 177 - 174 |
| VII | THAICKAL | 173 - 169 |
| | | BLS 168 TO 163 MISSING |
| VIII | ARTHUNGAL | 162 - 153 |
| IX | CHENNAVELI | 152, 150, 148 & 147 |
| | | BLS 151 & 149 MISSING |
| X | CHETHY | 146 - 142 |
| XI | MARARIKULAM | 141 - 132 |
| XII | POLLATHAI | 131 - 127 |
| XIII | KATTOR | 126 - 122 |
| XIV | THUMBOLI | 121 - 97 |
| XV | ALAPUZHA | 96 - 87 |

**White Sands of Shertallai:**

White Sand with high content of Silica (ranging between 96 and 98%) occur as beach deposits between Alapuzha and Shertallai extending up to Panavalli over a rectilinear stretch of 35 km. This is an important and expensive mineral, which is also known as Silica Sand and Glass Sand. Presently this sand is being mined mostly illegally, which causes environmental hazards in this area. The possibilities of regulated legal mining of this valuable resource with a sound environment friendly view is to be examined.

These deposits are centered mainly at three areas; (i) Alapuzha-Shertallai; (ii) Kothamanagalam and (iii) Pallipuram-Panavalli, and these are confined to a narrow strip of land sandwiched on either side by Vembanad lake and Lakshadweep Sea. This narrow strip of land stretches from Shertallai to

Arookutti. The sand body occurs in two morphologic categories in the form of dunes and inter-dune sheets. The sand sheet occurring in the inter- dune are, generally, is of uniform thickness (about 5 to 9 meters). The vertical sequence in the inter-dune area in general can be seen as (i) the upper part mostly sand mixed with soil (surface to 1 meter in thickness); a middle part mostly pure sand (1 to 2.5 meters in thickness) and (iii) the lower part mostly brownish sand underlained by carbonaceous clay (below 2.5 meters in thickness). The original sequence of the dune sand is found to be mixed up at present. The sand dunes are mainly seen in and around the Pallipuram area.

**Reserves and Production:** According to the Geological Survey of India (1972) the estimated probable reserves of white sand in the Alapuzha-Shertallai region is about 42 million tones of which only 13 million tones may constitute the workable reserve. Mining and Geology of State Department has estimated a total reserve of 70 million tonnes in localities near Pallipuram, Panavalli, Varnad, Maruthumattom, Perunurmangala, Cheramangala and Kanjikuzhi. The annual prduction and sales is gradually increasing. The production in 1974-75 was 21,000 to 26,000 tonnes whereas the production in 1981-82 has gone up to 81,000 tonnes. As per the IBM Mineral Year Book 1980, the production of glass sand in Kerala is only 7% of the National production.

**Present Utilization of Glass Sand**: Presently the silica sand is utilized in Kerala for the manufacture of glass bottles (Excell Glass Ltd. at Alapuzha; Ogale Glass Ltd. at Aluva, etc.) sand lime bricks (at Pallipuram), sodium silicate, silica gel, etc. Small quantities are also exported to neighboring states for similar use.

**Potentialities of some mineral based industry in Alapuzha:** This ambition is repeatedly discussed since long time but no fruitful action has reached so far. However, once again, the following possibility may be examined with the co-operation of Local self Government Institutions (LSGIs).

***1. Beneficiation Plant:*** A white sand beneficiation plant which can be used to separate sand into different grades suitable for various industrial applications like foundry, glass making, foam glass, etc.

***2. Silicon Metal:*** This metal is produced by heating quartz with coke in electric furnace. Thus the manufacture of metallic silicon is a power intensive industry. Normally quartz used as a raw material to feed the furnace should be in the form of lumps. Thus, it may not be possible to use silica sand in place of quartz. However, the possibility of transforming the sand in to pellets of 1" to 4" diameter should be examined. This metal is most extensively used as deoxidiser in the working of most grades of carbon and alloy steels. It also finds use in the manufacture of aluminium alloys, electrical steels, silicons, organosilicone chemicals, electrical contact materials, etc.

***3. High purity silicon for electrical/electronic applications***: Semi conductor materials, principally single crystal ingots of high-purity silicon of ploy crystalline silicon can be produced by specialized techniques like zone refining through silicon tetrachloride production. High purity silicon is of great importance in the electronic industry. Doped with elements such as boron, gallium, phosphorous and arsenic, it is used in making transistors, silicon based semi-conductors.

***4. Silicones:*** Basic silicones find extensive use in water repellent and heat resisting grease, lubricants (ethyl silicate) resins, rubber, enamels, etc.

***5. Elemental Phosphorus:*** Elemental Phosphorus is made by treating rock phosphate with silica and coke in electric furnace. Silica sand required per tonne of product is 3.3 to 3.8 tonnes. Phosphorus is used for the manufacture of chemicals and pharmaceutical and in match industry.

***6. Fibre glass unit:*** Fibre glass reinforced plastics are used in vehicle panels, railway compartments and seats, aircraft components, yacht h8ulls, oil wagons, petrol tanks, crash helmets, battery boxes, furniture, suit cases, interior decorating articles, models, etc. When combined with electrical phenolic, silicone, polyster, resins, etc. the alkali free grade is claimed to give increased mechanical strength, temperature resistance and dimensional stability. Different types of glass fibres are produced for different uses. The most common one is the Alumina-boro-silicate, called 'E'glass.

In Kerala where silica sand, the primary raw material of glass are available in plenty there is ample scope for setting up a fibre glass factory.

***7. Sand-lime bricks***: Sand-lime brick in view of its greater strength and superior outwash finish is finding increasing use in the building industry. One advantage about these bricks is that there is no need of plastering the walls thus reducing the use of cement. Fine quality quartz sand and lime-shell are the two raw materials required. The Pallathra Brick & Tiles Ltd., at Shertallai is the only one factory functioning and the need for more could be examined.

***8. Silicon carbide***: This finds extensive use as an abrasive for the production of grinding, cutting and polishing materials. Silicon carbide is also used as refractory materials in large quantities for the production of furnace linings and graphite crucibles. Bonded silicon carbide products are used in the form of bricks, pyrometer tubes, muffles and furnace heaters required in industries like ceramic, petroleum, etc.

**Rejuvenation of Alappuzha – Shertallai canal (AS Canal):**

The AS canal is a 20 km long water way running in the North-South direction designed to connect the southern arm of Vembanadu Lake at Shertallai (Cherthala) to the Vadai Canal at the south end at Alappuzha. It can be seen from the records that a small canal system existed between Alappuzha and Cherthala during early 1900-s itself, which was used for transportation by country boats. But as this small and fragmented canal system was insufficient for the growing transportation need between the flourishing markets of Alappuzha and Cherthala, the idea of constructing a new canal system was taken up. The actual construction work of the AS canal was taken up by the middle of 50s under the "food for work scheme". The AS canal was also envisaged to provide water for irrigation to the adjacent areas in summer, apart from functioning as a major water transportation route.

However, the canal was completed in 1957 except for a length of 20 m near SL Puram junction where it intersects NH 47. The construction of overbridge at that spot never materialized and so the idea of connecting Vembanad Lake to Vadai Canal never realized. Since the main source of water in the canal was either from rain or from connecting canals from adjacent land, it never had sufficient water to support agricultural needs of summer as well.

Later inorder to ensure enough water for agriculture in summer, the local people of Thiruvizha, constructed a bund across the canal. As the bund of Thiruvizha proved to be successful in conserving water for irrigation in summer and also provided surface transportation facility, many more bunds came up across AS canal in subsequent years. This compartmentalized the AS canal into 22 segments.

Presently, the canal in almost all segments, is filled with sand, silt and aquatic weeds. The water quality has become very bad due to stagnation and decaying biological waste. The siltation has caused considerable reduction in the depth of the canal, which results in the increased flood conditions every year.

The frequent floods causing loss of property and unhygienic conditions giving way to health hazards has become the major social problems connected to the present condition of the canal. This warrants immediate interventions to rejuvenate the AS canal. The water way may be dredged and adequate cross drainage works may be provided so as to make the canal suitable for multipurpose activities including local transportation, tourism and fisheries development. The programmes and assistances of surface transport, water transport, tourism and agriculture may be utilized for this purpose.

**Drinking Water (DW):**

This area is affected by serious shortage of drinking water. Salinity intrusion, pollution and presence of fluoride and iron are the major reasons for drinking water shortage. The acidic water

thrown out from the small coir factories (after coir fiber bleaching) aggravates the water contamination status at many locations.

Traditionally the floodwater infiltrating into the soil used to wash out the excessive salinity and it also removed some of the pollutants. Land reclamation and floodwater diversion has adversely affected this cycle. The "Chellanam model" rainwater harvesting, which allows increased infiltration of rainwater into the soil could be an effective solution for this problems at least to some extent. However, this may not be a solution for drinking water shortage.

A complete solution for the drinking water shortage requires a multi pronged approach of utilizing all available local sources, rejuvenation of traditional sources, utilization of non-conventional sources like rainwater harvesting and provision of protected water supply. The studies conducted by CESS/ Ground water department have suggested the possibility of locating certain areas of fresh water lenses, which could be utilized by drilling community wells. The State Ground Water Department may be urged to explore the area to find these deeper aquifers. Planned, systematic approach is required to rejuvenate the traditional water sources like ponds and streams. Suitable control measures to prevent water pollution from factories are to be designed and implemented. Excessive use of pesticides and chemical fertilizers in the agricultural land also may require regulation. Rainwater harvesting technique in which water collection is done in tanks may be encouraged. Construction of ferro cement water tanks will be an effective option for reducing the initial expenditure of the rainwater harvesting structures. With proper and periodical disinfections methods the rainwater collected in tanks from the roofs could be made suitable for drinking purpose. All the techniques detailed above may be helpful to increase the fresh water availability of the area, but most of the area might require properly designed Protected water supply scheme from the Moovattupuzha river.

**Sanitation (SN)**

The western part of the Vembanad Lake falling within this area is highly polluted by fecal discharge from the large number of latrines opening into the Lake. Studies conducted in the area have revealed that many of the households do not own a latrine and many of the latrines presently under use are not sanitarily safe in design. Many of these latrines simply discharge the fecal matter into the nearby stream or lake, thus aggravating the water pollution. A properly planned sewage system is to be established, by connecting the toilets of few houses and a pilot Bio gas plant may be set up. The gas thus generated may be used for lighting a bulb each in the BPL houses in that area and the fertilizer could be used for agricultural development. A land drainage mapping programme may be taken up for this area with active participation of local people. Such a programme may create large public awareness against land and water pollution.

Solid waste accumulation is also pointed out as a major problem in the water sheds adjacent to Alappuzha Town. Awareness creation and properly planned waste disposal programme is required in these areas. More over action programmes like production and popularization of environment friendly paper bags instead of plastic carry bags could be thought of. Such programmes could be an environment conservation campaign as well as an income generation activity of the Self Help Groups.

**Value added products from Water Hyacinth**

The Water Hyacinth weed that flourishes in the lake and adjoined water bodies largely affects this area. RRL, Thiruvananthapuram has suggested the extraction of resins from this weed. Hence, the possibility for establishing a pilot plant in the action area is to be examined in association with RRL. International and national agencies could be approached for funding.

**Thanneermukkom Regulator (TR):**

The Thanneermukkom Regulator and Thottapally spillway are the two major human interventions in the natural ecosystem of Alappuzha. These structures were the result of the Kuttanad Development Scheme of 1954 intended to increase rice production. Traditionally this area was suitable for only one crop of paddy as the paddy fields will be flooded in rainy season and may be affected by salinity during summer. So it was envisaged to divert the flood water to sea directly through a spillway and check the salinity intrusion of summer by way of a barrage; thus make the area suitable for two crops of paddy per year. Accordingly the Thottappally spillway was designed to divert the flood water in monsoon and Thanneermukkom Regulator was to check the advancing salinity in summer.

However the fate of these structures are well known where the design shortcomings of Thottappally spillway prevented its effective functioning and the ecological back lash of Thanneermukkom regulator began to manifest in the form of proliferation of weeds, deterioration of water quality, destruction of fisheries and shell life and increased morbidity due to stomach and skin diseases. Some studies revealed that though these interventions benefited the paddy cultivation to some extent, the local fisheries sector was affected much adversely. This has resulted in the negative economic impact on the area, as fisheries sector was an equally important occupation of people in these wetlands. Unfortunately the "rice – centric development strategy" never gave room for an integrated development discussion.

Large number of research studies has already been taken up on these issues. It is suggested that the opening and closing of Thanneermukkon Regulator has to be studied in relation with the discharge at Thottappally spillway, so as to arrive at an optimum regulation sequence. Very little serious studies have been attempted on the most appropriate operation of the regulator, though there are many reports available. Hence it is important to examine all the secondary data available for reaching a suitable solution.

**Conclusion**

The environmental problems of Mararikulam area are diverse, complex and are directly affecting the life and occupation of the local people. Most of them are the manifestations of improper interventions in the ecological balance happened in the past. But there are possibilities to control the damages and look for new options. But the will to light a small lamp instead of blaming the darkness is most essential. And that is why this seminar becomes important to all of us.