

Mud banks: formation and characteristics

Mud banks are unique, clearly demarked naturally occurring calm areas which occur mainly in the inshore waters along the Kerala coast during the southwest monsoon period.

Formation of mud banks can be either just before the onset of South-West monsoon or during the monsoon. Mud banks are popularly known as “Chakara” or “Shanthakara” (meaning calm area) and fishermen consider mud banks as ‘gift of God’ since these are safe fishing areas for launching and berthing the fishing crafts when the rest of coastal belt is surf ridden, with high swells and unsuitable for small scale fishing operations. Though mud banks are known to occur in the region between Kannur and Kollam, the most popular is the Alappuzha (Alleppey) mud bank which occurs every year.

The most important and well known mud banks are at Narakkal just north of Cochin, off Alleppey and two smaller banks at or near Calicut. The bank at Narakkal is usually situated at the mouth of the Periyar river and extends about 3 miles along the shore from south to north and 4.5 miles out to the sea. The mud banks at or near Calicut as well as that at Alleppey are mobile in nature. In addition to the above four, the mud bank formation occurs at Quilandy, at Beypore, Veliyangod, Munambam, off Cochin south of the harbour entrance, near Chellanam and near Alleppey. These mud banks are often of an ephemeral nature appearing during some years and absent at other times.

During the SW monsoon, because of wave action, the fine mud particles get churned up into a thick suspension. A semicircular periphery then develops around the suspended mud in which wave energy gets consistently absorbed. This condition has been termed as the active stage of the mud bank. After the monsoon, the suspended mud settles and gets consolidated. This has been termed as the passive stage of the mud bank. Those mud banks which become active almost every year are persistent types of mud banks. When the mud gets into suspension by wave action, the southerly currents drive the entire floating mass slowly towards the south. If, however, the wave action is not strong enough, there will be no movement or when strong swells approach from the south, either the entire suspended mass or a portion of it may exhibit northern movement. These deductions have been made on the basis of observations made on a persistent mud bank near Alleppey throughout the year. Mud banks are well known for their fishery during

the monsoon months. The calm waters of the mud bank: act as a temporary fishing harbour. However, the mere existence of mud in an area is not enough to form mud banks. The mud of the right texture must get consolidated at the right depth where wave action could churn it up into a thick suspension. The presence of mud bank disturbs the shore stability of that region and induces coastal erosion in adjacent areas.

The cause for formation and dissipation formation of mud banks still remains an unsolved mystery, though several theories have been put forth by researchers. The observations on the ecology of mud banks have shown presence of upwelled water with low levels of dissolved oxygen and low temperatures. The turbidity has been found to be very high and during July August, unique 'mud cones' are formed very close to the shore.

Hypothesis of mud banks formation

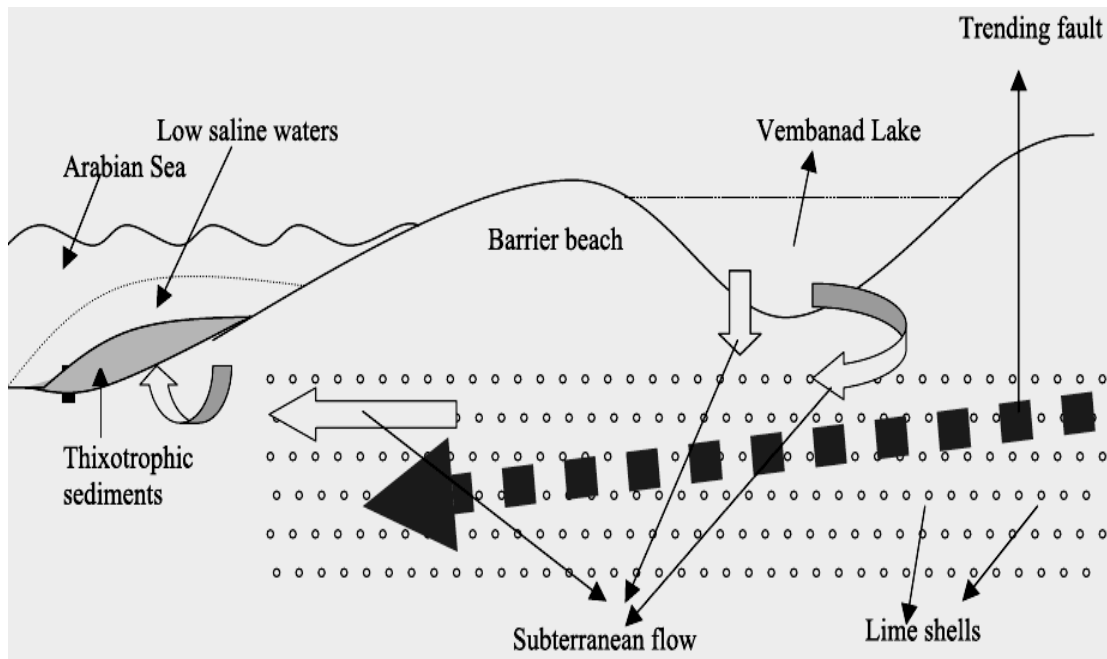
- Subterranean flow of mud from lake (Menon, 1924; CMFRI, 1984)
- River deposition hypothesis (Ducane *et al.*, 1938)
- The Upwelling hypothesis (Ramasastry and Myrland, 1959)
- Deflocculation hypothesis (Kurup, 1969; Padmanabhan and Eswaran Pillai, 1971)
- Littoral currents and rip currents (Varma and Kurup, 1969; Kurup, 1977)
- Wave convergence (Gopinathan and Qasim, 1974)
- Sediment input through rivers (Mallik *et al.*, 1988)
- Wave and mud interactions (Mathew *et al.*, 1995)
- Subterranean flow through lime shell beds initiating formation of mud banks (Balachandran, K. K, 2003)

Formation of mud banks

[1] Mud bank formed by subterranean (underground) mud

- ▶ Seen along the Alleppy Purakkad coast
- ▶ Mud supplied to form mud bank has its origin from the subterranean source which is present in the form of deep underground channels originating from western Ghats and passing underneath the Vembanad lake

- ▶ When hydrostatic pressure at the foot of the hills of western Ghats increases due to floods during southwest monsoon, together with water load in Vembanad Lake, the loose sediments in channel is pushed up at weaker areas in shallow water regions
- ▶ Mud bank is formed at such areas.
- ▶ Mud bank in this case would be restricted and highly calm



[2] Formed by aggregation of coastal mud.

- ▶ By southwest monsoon, the coastal mud is churned up
- ▶ Brought very close to the shore and a mud bank is formed
- ▶ Example: Parappanangadi-Tanur mud bank

[3] Formed by sediments discharged from rivers and estuaries

- ▶ Such mud banks formed at mouth of rivers and estuaries between Cochin and Ullal (at Netravati river mouth)
- ▶ Sediments brought by the flood water are aggregate always on the southern side of the mouth
- ▶ Held up there for a while by southerly flow of the local current

[4] Formed by accumulation of mud resulting from dredging operation

- ▶ Mud bank formed along the vypin-Narakkal coast Cochin

Characteristics of Mud Banks

- One characteristic feature of the mud banks is that the water in their environs remains extremely calm even when the roughest weather prevails and sea is very rough in the surrounding areas.
- During the monsoon period when upwelling takes place the oxygen poor waters of the bottom layers are brought up and the fishes migrate to the near shore regions where they can get more oxygen. Due to the extreme calmness prevailing in the region of the mud banks the fishes can find an easy shelter here.
- The areas where such mud banks are formed provide safe anchorage for ships and facilitate fishing operations also and are therefore welcomed by the coastal people who depend on the sea for their livelihood. As the richest prawn fishing grounds in the country are located within the same region, the mud banks are of great interest from the economic as well as scientific points of view.
- In the region of the mud banks the water surface has been found to be oily and this was believed to effect the calm conditions. However, this effect is supposed to be due to the suspension of fine matter increasing the viscosity of the water which helps to break up the force of the waves.
- The analysis of the offshore mud as well as the inshore mud shows that both have a common nature and origin. The mud itself which is peculiar and is not found elsewhere along the coast is dark green in colour, fine in texture and oily to touch.
- Mud banks are known to shift from place to place.

Crafts and gears

During SW monsoon, fishing by mechanized sector comes to standstill primarily due to the ban on trawling implemented by the Government of Kerala for a period of 47 days from June 15th to July 31st every year. Rough weather also hinders fishing to a large extent. However, in the mud bank area seines, gill nets and cast nets are operated. Among these, mini ring seines with 10 to 15m OAL fitted with outboard engine of 25 to 50 hp operate gears which are popularly known as chooda /disco vala which are small meshed (8-10mm). Large crafts of 20 to 24m OAL with inboard engines also operate ring seines with 20mm mesh size. Each craft is manned by several

fishers, ranging from 12 to 15 in ring seines without board engine while almost double (30 to 35) the number in inboards ring seine operations.

Gill netters in 7 to 9m OAL without board engine use slightly larger mesh net (28 to 32mm chala vala) and in a single craft 5 to 6 fishers will be involved in fishing. In addition to this, small (2-3m OAL) thermocol non mechanized gill netter (28-32mm chala vala) commonly known as Ponthu vallam operate in the mud bank area. These operate in very shallow areas within 2 to 20m depth. Fishing in the shallower areas is mainly by the thermocol crafts which are manned by one or two fishers.

Fishery Resources

The Indian oil sardine, *Sardinella longiceps*, *Stolephorus spp* and shrimps mainly *Fenneropenaeus indicus* and *Metapenaeus dobsoni*, form the main fishery resources of the mud bank area. Shoals of sardine and anchovies are sighted very near to the coast and these two resources together contribute more than 50 to 60% of the catch. *Penaeus monodon*, *Metapenaeus affinis*, *Parapenaeopsis styliifera*, *Rastrelliger kanagurta*, *Secutor insidiator*, *Thryssa mystax*, *Esculosa thoracata*, *Otolithes ruber*, *Anodontostoma chacunda*, *Dussumieria acuta*, *Opisthopterus tardoore*, *Leiognathus spp*, *Pellona sp* and *Johniops spp* are other main resources which occur in the fishery during the mud bank season.

Wide fluctuations have been observed in the mud bank fishery. The dominant fishery resource on each day of the mud bank has shown wide variation in the past and the same trend continues now also. If sardine shoals are observed one day, the following day it may be anchovy shoal or there may not be any shoal at all. Very high variability has been observed indicating that these are shoals are moving and they accidentally reach the mud bank area.