

Muddy Waters

As mud banks along the southwest coast of India dwindle, several concerns and societal implications have been articulated regarding this unique oceanographic phenomenon

Decades back, at the Smithsonian Air and Space Museum in Washington D.C, there used to be a regular show in wide screen on 'Mud Banks of Kerala'—an awe-inspiring event which was given equal importance to the launch of a space mission or an expedition to the rain forests of the Amazon! Mud banks (locally called *Chakara*) appear in the south Indian state of Kerala in the littoral zones of the Arabian Sea during the summer southwest monsoon and remain calm with exceptional biological production and represent a unique oceanographic phenomenon.

early June, with raging seas and heavy rainstorms. This is the time when the mud banks intermittently appear as patches of calm and turbid seas with copious fish stocks. The news spreads like wildfire and immediately transforms the entire coastline to a festive mood. Makeshift townships emerge with gatherings of thousands and thousands of people, when numerous canoes and nets are transported over land to the adjacent beaches.

The hub of life and bustle is unimaginable, with huge baskets lined up to be filled to the brim with shrimps and fishes, and hundreds of refrigerated trucks to carry them to different parts of the country. A single cast of net during these days can yield a bumper harvest of mackerel, prawns, sardines and other fish species. Seafood processors and exporters queue up to buy the bumper crop and cash in on the abundance, and the whole crop is purchased in auction onshore itself.

Thus, the mud banks of Kerala have provided bountiful living resources to the needy, and helped to enhance their livelihoods for centuries. The mud banks of Kerala differ from mud banks reported from other muddy coasts worldwide, as they do not form a regular relief-forming feature. The huge abundance of the fishery makes the Kerala mud banks iconic.

God's own country

With a narrow strip of lush green land bounded on the east by high hills laced with rivers and on the west by the Arabian Sea, Kerala is hailed as 'God's own country' by admiring tourists. Kerala lies along the southwest corner of the Indian

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They are tranquil marine areas hugging the coast, which develop during the roughest monsoon period. They have a special feature of dampening high waves due to the huge quantities of mud in suspension close to the bottom.

The mud banks appear as an undisturbed sheet of water, when blustery conditions prevail along the outer periphery. Towards the end of a hot, humid summer season, every citizen in the region, perspiring and sweating, looks eagerly towards the sky for the onset of the monsoon rains. When strong winds and high waves make it impossible to go out into the sea, the entire fisherfolk pray for the appearance of mud banks. The southwest monsoon arrives in Kerala with all its fury by

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peninsula, between 8° 18' and 12° 48' N and 74° 52' and 77° 22' E. The coastline has been subjected to severe alterations over a geological timescale due to a variety of factors, including the changing weather and climate, particularly the Indian monsoon. The region receives about 300 cm of annual rainfall, as the 44 rivers and numerous creeks of Kerala remain connected with lakes, lagoons and channels. A major part of the rains flows through rivers and creeks to eventually reach the Arabian Sea.

This particular extent of 40,000 sq km of the continental shelf of Kerala is considered as the most productive zone in the Arabian Sea. Coastal upwelling enhances the biological activity, leading to high fish production in the region. Since time immemorial, fish and fisheries have played a crucial role in the economic growth of the country. Although Kerala has a coastline of only about one-tenth of the Indian coastline, the fish landing from the state has contributed more than one-fourth of the country's total marine fish production. The sustainable fish yield from the southwest coast is estimated to be between 0.8 - 1.2 mn tonnes per year, of which only about half is currently exploited. The coastal and nearshore waters are most important as they sustain a large population of traditional fishermen. The sector provides the source of income for hundreds of thousands of active fishermen and others engaged in allied activities. Therefore, a decline in the fishery potential can be a major concern to the state and the coastal community. The situation is precarious now, following a dwindling trend in the total fish landings, surprisingly due to the reduction in the appearance of mud banks along the southwest coast of India.

The mud banks and fishery are, in fact, interdependent, as when the former occurs, the latter should follow. To many residents, a good mud bank means a good fishery. Since the calmness of the sea and mud accumulation are not significant,

all mud banks need not be productive. Therefore, the success or failure of mud banks is judged from the quantity of fish caught during the season. Studies have shown that the mud banks sustain a high fishery potential, since the pelagic fishes and prawns move from deeper waters to closer to shore during the southwest monsoon, following upwelling.

The general tendency of fish being to swim against the prevailing current (which is southerly), it is possible that they move in shoals northward and some of the fish, on passing through the mud bank area, are easily caught by the numerous canoes operating in, and outside, the mud banks. If so, it is also possible that a shoal of a particular composition, after its passing, is followed by another of entirely different composition. It is, therefore, likely that the monsoon catches from the mud bank area are from the moving shoals as they are caught from this region because fishing is possible only from this region.

Another argument is that upwelling causes the development of hypoxia over the shelf, which creates stress on the fishes and prawns, as they move either shoreward or to deeper waters. Such a condition occurs throughout the coast where upwelling is intense. During this migration, these shoals may also cross the mud bank zones.

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Sheer monsoon fishery magic! Mud banks are tranquil marine areas hugging the coast, which develop during the roughest monsoon period

With the onset of the southwest monsoon, fishing activities come to a standstill, and operations are possible only at locations where calm zones prevail. The monsoon fishery enjoys legal protection from the government, which provides exclusive operational rights to traditional crafts and has banned large mechanized vessels from fishing during the season. During this time of idling and poverty, only the calm zones brought in by mud banks can support fishermen as centres of intense fishing activity. Almost the entire fish landings during the monsoon season take place at these mud bank sites.

History tells us that the ships of Vasco da Gama anchored in the open sea off Kozhikode (erstwhile Calicut) from 20 May to 26 August during the southwest monsoon of 1498. It was probably due to the mud banks prevalent in those regions, where the calm sea enabled the navigators a safe anchorage. Consequently, the big vessels could remain in the sea, and canoes and small boats were used to reach the shore during the monsoon season.

Documented records on the mud banks of Kerala are available from the 1840s. At least a dozen mud banks were known to have existed in the region for several centuries. Of these, some were sited either at, or near to, the outlets of rivers and lagoons. From the shore, the mud banks can be easily distinguished as zones with total absence of waves, while high swells break outside their periphery. In recent times, over 20 locations along the coast are found to have developed mud banks at some time or the other. Prominent mud banks documented in the 1980s have now vanished, and the remaining reported great characteristic changes in appearance and sustenance. Since 2010, mud banks have been isolated in appearance along the coast at only two or three locations, and concerns have been raised about the total disappearance.

Looking into the factors leading to the dwindling of the mud banks, we may have to consider the geographical features of the areas surrounding

them (including the lagoons and rivers emptying into them) and the transformations that have taken place there. There have been significant changes in the land-use pattern in the hinterlands. These changes have dramatically altered the fertility, soil erosion, groundwater resources and surface water flow. There are about 15 built dams in the rivers of Kerala, where a large part of water is retained. The silt and clay brought from the catchment areas of these dams are completely settled inside the dams. Once, the entire watersheds and lagoons were spread from the south end to the north end of the state, to make the region a dense cover for mangroves. However, an explosive growth in the population and urbanization have adversely affected the ecological stability of mangroves. The formation of mud banks along the coast of Kerala and the seasonal windfall fishery associated with them are interesting. A phenomenon like this has not been reported from anywhere else. Therefore, the dwindling and the worst-case scenarios of the extinction risk associated with these very specialized ecosystems in this part of the world raise serious societal concerns about the future of the lifeline of this region. Therefore, the issues associated with the dwindling of mud banks need to be pushed to the centre of debate to facilitate an ecosystem-based approach to fisheries management. Serious environmental management strategies should be initiated immediately by involving researchers, economists, community people, fisherfolk and policy-makers. 

For more

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Mud Banks of Kerala: Their Formation and Characteristics

drs.nio.org/drs/handle/2264/4940

Mud Banks of Kerala: Mystery Yet to be Unrevealed