

BENTHIC FAUNA OF MANGROVE ENVIRONMENT

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INTRODUCTION

Benthos accounts for those biotic entities which dwell in/on/above the substratum. Ecologically, the mangrove environment, bordering tropical and sub-tropical estuaries and open seafront, represents a transitional area between the marine and terrestrial biotopes and thus forms an integral part of the Intertidal or littoral zone. However, depending upon the natural gradient coupled with tidal amplitude, the horizontal expanse may extend either upshore to the infraterrestrial region or downshore to the sublittoral regions.

A general belief that animals are of minor significance in the mangrove environment does exist. It is only recently that the distribution, abundance and importance of the benthic fauna in a mangrove environment has been recognised. The benthic communities of the mangrove ecosystem find themselves in a stressful situation of widely fluctuating ecological parameters. Here the tidal influence is appreciably strong which determines the distribution and zonation of the biota. Due to the lack of vigorous water motion, the fine sediments settling on the bottom give rise to soft substratum, where poor interstitial circulation, high organic content and high microbial populations lead to anoxic conditions.

The effect of thermal gradient in a mangrove benthic environment is three-dimensional. Air temperatures have a telling effect during low tide when mud-flats are exposed whereas soils, due to soft but compact nature of sediments display a temperature range of higher magnitude than the air and water temperatures. Salinity of the interstitial water remains higher than that of the overlying water, by an order of magnitude. Due to the large amount of suspended matter causing oxidation reactions, the oxygen content of both the overlying and the interstitial water is generally low in a mangrove environment.

Typical sediments of mangroves are peaty, soft, sandy (towards land) and clayey mud (seaward). However, the particle size is of great importance, as it controls the ability to retain and circulate water. If the particle size becomes fine, the circulation practically ceases and the result is the formation of anaerobic conditions within the substratum. As a combined effect of weak circulation and high organic inputs mainly from decaying foliage and debris, there is a large amount of organic matter in the sediments. However, the rich organic matter content being highly oxidative in nature, ends up creating difficult living conditions for the benthic communities of the mangrove environment.

TYPES OF BENTHIC FAUNA

The benthic biota in the mangrove environment is a composite of terrestrial, estuarine and marine organisms. As such, the mangrove fauna with its low species diversity but relatively large number of individuals, is highly characteristic and non-specific in nature. It comprises elements from muddy shores as well as the general brackishwater biota. The species that occur in the mangroves

do not occur in other habitats, though some species may occur in various mangrove ecosystems within the same faunistic region. Following types of benthic fauna are found in the mangrove environment :

Type	Distribution
Terrestrial Species	Upper Littoral and Infraterrestrial Fringe
Aquatic Species	Mid and Lower Littoral; Estuarine
Marsh and Mud-flat Species	Planktonic in Larval Stages; Mangrove Inhabitant throughout the Life

All these types occur in most of the mangroves. However, the distribution characteristics are subjected to variations in the overlapping, which are locality specific. As far as the distribution and abundance are concerned, the benthic fauna of a mangrove ecosystem can broadly be divided into :

1. Those inhabiting the hard substrate offered by mangrove vegetation (trunk, stilt roots, pneumatophores, etc.) :
 - a. Wandering or mobile forms, and
 - b. Fixed or sessile forms ;
2. The ones inhabiting the muddy substrate :
 - a. Infauna or burrowing into substratum, and
 - b. Epifauna or forms errant on the substratum.

Qualitative and quantitative distribution of benthic communities in mangrove environment is governed by tidal amplitude, light penetration, nature of substratum and distance from the sea, and accordingly it can best be studied in relation to (a) tidal amplitude, i.e., vertical distribution, and (b) the expanse, i.e., horizontal distribution.

Broadly, the following five zones have been delineated for studying the benthic communities of mangrove ecosystem :

LITTORAL ZONE

Extends upwards of highest high water of spring tide and is comparable with the littoral zone in rocky Intertidal region. Dominant organism is the periwinkle gastropod.

NERITA ZONE

Bounded by mean sea level on lower extent and highest high water of spring tide towards its upper extent. Dominant organism is *Nerita* sp., a gastropod, which varies in extent as per the tidal range.

BARNACLE—OYSTER ZONE

Extends between mean sea level and mean lower low water of spring tide and is populated mainly by *Balanus* and *Crassostrea* species.

UCA ZONE

Lies below mean lower low water of spring tide and extends below lower low water of spring tide. Dominant species are fiddler crabs (*Uca* spp.) and important faunal associates are *Cerithidea* spp. and hermit crabs.

POLYCHAETA ZONE

Narrow vertical delineation but maximum horizontal expanse. Populated by a variety of crabs, mud lobsters, gobiid worms, distributed up to 10 cm within the soft substratum.

Commonest epifaunal species are gastropod molluscs, represented by snails, whelks and top shells; bivalve molluscs like oysters and blood clams; crustaceans represented by crabs, mud lobsters, shrimps and barnacles; fishes, the commonest form being the mud-skipper. In contrast, the infaunal species are few and mainly represented by the polychaete worms. Migrant forms are many, but commercially important ones are the young stages of shrimps and fishes like milk fish, pearl spot and mullets, which use the mangrove ecosystem as shelter and nursery grounds. Quantitative studies on benthic fauna of mangrove environment are rather few, probably because organisms like crabs and those living on mangrove bark or burrowing among pneumatophores are difficult to trap and enumerate. Comparatively, the infauna is slightly better known.

In a comparative study of the benthic fauna in three estuarine mangrove biotopes of Goa, the population density and biomass of infauna was found to vary from 9–1700 m⁻² and 0.03–33.30 gm⁻² respectively. The epifauna forming the main bulk was dominated by detritivores as against the infauna which was composed of either omnivores and/or deposit feeders. Suspension of filter/cirral feeders were represented only by oysters and barnacles. Thus, the predominance of detritus-based food web is clearly reflected by the dominance of detritus feeders in the energetics of mangrove environment.

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