SECTION 1

Introduction
INTRODUCTION

When organisms live in, on or associate with aquatic sediments, their mode of life is referred to as benthic and they form 'Benthos'. The benthic organisms constitute roughly twenty per cent of the total marine species (Thorson, 1957) covering bacteria, plants and animals from almost all phyla. They are generally recognised on the basis of their position in the sediment. 'Infauna' are the animals living within the interstitial spaces or burrows. 'Epifauna' occupy the sediment surface. There is yet another scheme to separate the benthos. Being suggested by Mare (1942), this method of separating benthos on the basis of their size is operationally useful. Accordingly, the benthic fauna are divided into 'microfauna' (1-100 μm) comprising bacteria, protophytes and protozoans other than foraminifera, 'meiofauna' (100-1000 μm) including foraminifera and small metazoans and the macro or 'megafauna' (> 1000 μm) exemplified by many macro invertebrates. The size separations are arbitrary and usually the metazoans passing through 500 μm sieve are considered as meiofauna and are collected either on a 44 μm or 62 μm mesh.

The history of quantitative estimation of bottom fauna is very recent. Despite the works of Schultze (1853), Bastian (1865) and Claus (1866) in the last century, the first report of quantification of benthos was from Moore (1931).

Benthic organisms are very significant in the trophic net-work. They utilise all forms of food material available in the sea bed and form an important link in the transfer of energy. Their three types of feeding are filter feeding, browsing or rasping and deposit feeding. Filter feeders remove the suspended material from water at the sediment-water interface, browsers scrape material from surfaces and deposit feeders ingest various sediment particles. Therefore, a major part of the energy distributed in the bottom is made available to demersal fish through benthos. Steele (1965, 1974) used this approach to summarise the production of the
North sea. Richards & Riley (1967), Peer (1970), Damodaran (1973), Mac Kinnon (1973), Levings (1975), Mills (1975) and Harkantra et al. (1980) have worked on the links between benthos and demersal fish. Some more researches, evaluating the benthic fauna as food for higher trophic levels are from Smidt (1951), Bregnalle (1961), Teal (1962), Muus (1967), Mauchline (1971), Odum & Heald (1972), Braber & DeGroot (1973), Walter (1973), Feller & Kaczynski (1975), Sibert et al. (1977), Sikora (1977) and Bell & Coull (1978). In fact, it is this factor of trophic and environmental importance that has made the benthic faunal ecology, an interesting topic of research. As the number of workers in the field increased in the last two decades, an approach of study into almost every relationship of benthos to understand their pattern of abundance, substrate affinity, dominance and diversity has been made.

One outstanding feature of benthos is the substrate relationship. The taxonic abundance is very much based on the sediment type. Sediments where median particle diameter is below 125 μm are dominated by burrowers while the interstitial groups are excluded from muddy substrates (Coull & Bell, 1979). Vertically, the fauna are concentrated in the upper oxygenated levels of sediment although some taxa remain at depth as true anaerobes (Fenchel & Riedl,

In India, the first notable work on benthos was on the south west coast by Kurian (1953). Later, Ganapathi & Rao (1962) and Kurian (1967, 1969) reported the distribution of benthos on the Waltair and Travancore coasts respectively. Damodaran (1973) has described in detail the distribution,

There have been only two preliminary studies of benthos of Karwar region. They were carried out by Harkantra (1975) and Ansari (1978). While the former investigation was restricted to the study of clams of Kali estuary which opens into Karwar bay, the latter gives a very brief account of meiofauna sampled once in four stations around Karwar. Therefore, until the present investigation was undertaken, the benthos of Karwar region had remained almost undescribed. Not only that the environment was less studied, but also that the Karwar bay presented itself as an operational area for different ecological factor-combinations in space and time, for being a topic of interest. Although this region supports a very good demersal fishery, the fundamental aspects of benthic production and community distribution had not been explained. Hence, this investigation intends to explain the ecological factors, benthic taxonic abundance,
substrate and inter-taxonic relationships of macro and meio-
benthos, distribution and demersal production of Karwar bay.

The thesis contains six sections apart from the
Material and Methods.

HABITAT

This section deals with the texture and structure
of the substratum. The depths, mean grain size,
skewness and percentage of silt, sand and clay are
discussed. It also details the interstitial water
levels of the sediment, organic carbon and bottom
hydrographical features like salinity, dissolved
oxygen, suspension load, silicate, phosphate,
nitrite and temperature as parameters characterising
the different stations in Karwar bay.

FAUNAL COMPOSITION, DISTRIBUTION, BIOMASS AND
VARIATIONS.

Fifteen meiofaunal and thirteen macrofaunal taxa
were studied. This section gives the description
of population density and biomass of benthos at
taxonic level. The absolute densities and bio-
masses, relativity among taxa, distribution in
time and space & consistency in occurrence are
discussed.
ENVIRONMENTAL RELATIONSHIPS OF BENTHOS

Stepwise multiple regression analysis has been carried out to find out the factors that contribute maximum to the variations of benthic density. The factors that are statistically insignificant are considered to be those which do not have any control over the benthos. It has been attempted in this chapter to assess which factors in the combination of both sedimentological and hydrographical parameters influence the different benthic taxa- and to what extent.

INTER-TAXONIC RELATIONSHIPS

Statistical correlations on all possible combinations of benthic taxa and seasonal variation in the inter-taxonomic ratios are built up in this section.

DISPERSION AND DOMINANCE PATTERN

This section includes a discussion on the spatial similarity and temporal dispersion of benthic taxa. It also briefly sketches the pattern of dominance.
DEMERSAL PRODUCTION

An attempt has been made in this section to recognise any similarity that would exist between the benthic metabolic index and the variations of prawn fishery.

Further, a summary at the end gives a brief explanation of results obtained during the investigation on benthos in Karwar bay.