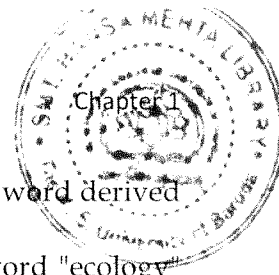


Chapter 1

Introduction



Ecology is a sub-discipline of Biology, the study of life. Ecology word derived from the Greek word, οἶκος, "house"; -λογία, "study of". The word "ecology" ("Ökologie") was first used by German scientist Earnst Haeckel in 1869. According to him ecology can be described as scientific study of the interaction between organism and their environment.

Krebs (1972) suggest ecology definition as "The scientific study of the interactions that determines the distribution and abundance of organisms"

The term ecosystem was first coined by British ecologist Arthur Tansley in 1935. Scientifically ecology is the study of the relationship of organism with their environment. Ecology thus becomes science of ecosystem. Ecology is not means of environment, environmentalism or environment science but its related to physiology and ethology. It's an understanding how living organism affects by environmental parameters, ecological functions. In broad view ecosystem can be divided into two groups: Terrestrial ecosystem and aquatic ecosystem assessing the prevailing condition for future application may be termed as ecological assessment.

Plankton word is derived from the Greek word "Planktos" means "to wonder". The term plankton refers to those entire tiny organism which moves with the help of tides and currents of water rather than by their own swimming ability. According to trophic level it can be divided into phytoplankton, zooplankton, and bacterioplankton.

According to size it can be divided into mega plankton, macro plankton, meso-plankton, micro plankton, nanoplankton, pico-plankton and femeto-plankton. According to life cycle it can be classified into holoplankton and meroplankton. Holoplankton includes all those planktonic forms of organism who spent their entire life as a planktonic forms while meroplankton includes group of organisms whose larval stages are living as plankton while adults live as nekton, benthos or swimmers.

Phytoplankton study is very important and useful for assessing any marine ecosystem. Phytoplankton can be used as environmental indicators since they reflect even the slight changes taking place in their immediate environment by changing their species composition, biomass, community structure, Chlorophyll pigment and productivity (Tilman 1982; Huisman and Weissing 1995; Diehl *et al.* 2002; Hessen *et al.* 2002 Willén 2007, Villegas 1973, Arrigo, 2003). Similarly phytoplankton of Indian coast is studied by various authors. Quantitative and qualitative fluctuation of the total phytoplankton crop, the zooplankton crop and their interrelationship was studied by Subrahmanyam (1958).

Phytoplankton is affecting by several factors such as, the commencement of the south-west monsoon results in a drastic change in hydrographic conditions which are instrumental in the transformation of the phytoplankton population size and structure (Devassy, 1988). Contribution on

phytoplankton species inventory along with other coastal marine fauna and flora has been made recently in the Gulf of Kachchh waters by Nair (2002), Singh *et al.*, (2006) and Sarvankumar (2008). Phytoplankton blooms, discolouration of coastal and estuarine waters along the west coast of India is also studied. It is concomitant with changes in the chemical properties of coastal waters. The chlorophyll content of the phytoplankton is studied by the Bhattathiri (1996).

Zooplankton is the primary consumer hence very important in the ecological studies of any aquatic ecosystem. It is an important link between primary production and planktivorous fish and other aquatic fauna (Ekwu *et al.*, 2006, Robin *et al.*, 2009). In the western Irish Sea, the correlation of abundance of larval fish and newly metamorphosed pelagic juveniles were studied by Dickey-Collas (1996). The effect of hydro chemical characters and season on phytoplankton and zooplankton is well documented by Jean Jose *et al* (2011), Damotharan (2010), Araujo (2008), Saravankumar (2009) and Gaonkar (2010). Zooplankton standing crop and production rate is also useful for estimating of the standing crop of the fish (Tiwari and Nair 1991). The relationship between zooplankton and pelagic fishery is documented by Ramamurthy (1965) for north Kanara coast.

The interaction of physical and biological processes is important in the structuring the biological communities in all marine ecosystems (Fig. 1.1). In

the oceans physical influences are particularly importance. All marine organisms are affected to some extent by the movement of water and thermal properties of water but planktonic organisms are closely coupled to the physical environment (Kendra 1993).

Among nutrients, Nitrate, Nitrite and Phosphorus commonly referred as limited nutrients (Neill, 2005) support the growth of phytoplankton to establish a suitable pelagic food web (Hilmer and Bate, 1990; Adams and Bate, 1999). Besides the availability of nutrients, the physical variables such as flushing rate, salinity and turbidity also largely influence the distribution and abundance of plankton communities (Mclusky, 1971; Cleorn, 1987; Ferreira *et al.*, 2005). The present study was carried out on northern Gulf of Kachchh at three stations, namely Mundra, Mandavi and Sanghi along a coastal stretch of about 125 km was selected due to their varied environmental settings. The detailed introduction, review of literature, methodology pertaining to major components is incorporated in the respective chapters.

Lacuna:

The essential step in marine biodiversity conservation in India is assessment of its status, identification of hotspots and threats to them. Despite a huge knowledge base on the biodiversity of Indian coast, still some lacuna persists. There are pockets of coastal stretches in India which are still unexplored or under explored on several aspects of biodiversity. Kachchh coast is one such

coastal region where a huge gap exists in the knowledge on coastal biodiversity. In Kachchh coastal waters, many short term studies on different biotic and water quality components are being carried out for the purpose of specific industrial impact assessments. Results of these studies are mostly inaccessible to ecologists and ecosystems managers and they are mainly concentrated on a small coastal stretch where an impact of any specific industries is likely to happen. Other than these studies some significant contributions have been made in recent year which throw glimpses of the extents of the marine biodiversity in this coastal stretch (Nair, 2002; ICMAM, 2002; Singh et. al., 2006; Dave, 2011). However, these reports mostly deal with the biodiversity of the southern coast of GoK with only passing reference to the northern shore of GoK the entire coastal belt of Kachchh district.

Aims and Objectives:

1. To evaluate ecological status and identification of niches,
2. To assess the hydro-biological and physico-chemical characteristics of the selected niches of the study area on a monthly and seasonal bases,
3. To document the planktonic diversity from various niches, and
4. To document of epibenthic fauna from various niches.

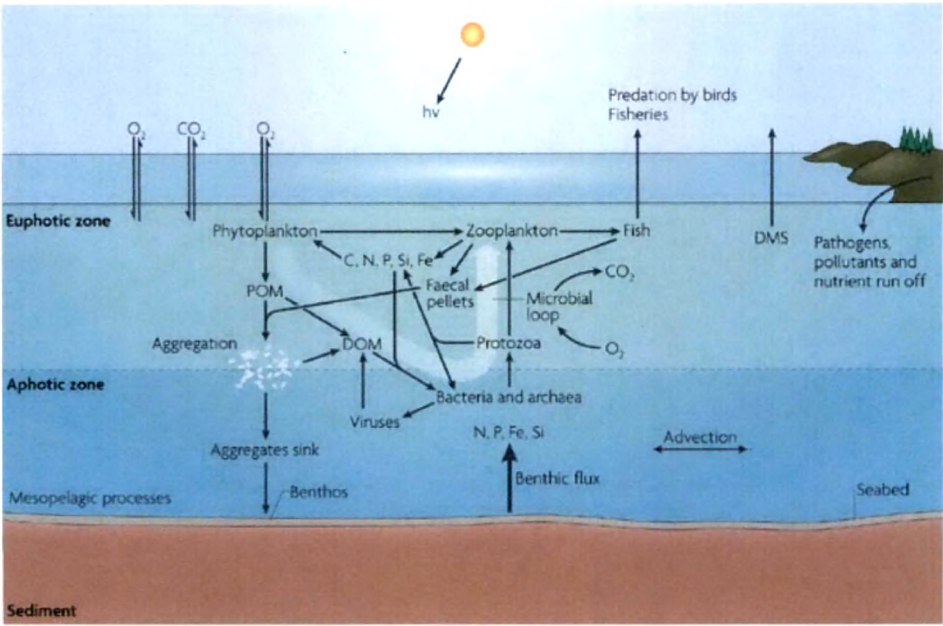


Fig: 1.1 Marine food web