CORAL REEFS

Coral reefs have long been known for their rich diversity of fish and invertebrates, but examining the diversity of highly mobile fish in the open ocean has been elusive. Fish are the most prominent mobile animals on coral reefs, and achieve a level of local diversity that is rarely found among terrestrial vertebrates. The high fish diversity is unusual in that it occurs along with high total densities of individuals and high total biomass. Another unusual feature of the high fish diversity is the large number of closely related species found on most reefs.

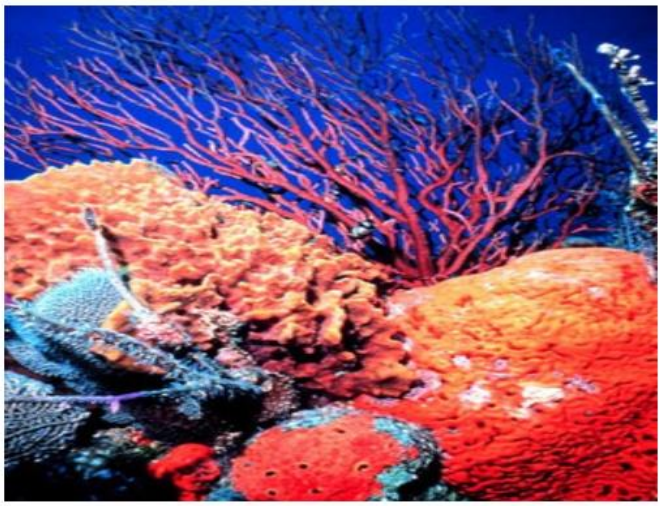

Fig – 3.2

For example, in the Capricon group of reefs at the southern end of Australia's Great Barrier Reef, there are around 850 species of fish, representing 84 families and 297 genera. A number of genera have over a dozen species, including *Chaetodon*, *Scarus*, *Apogon*, *Pomacentrus*, *Acanthurus* and *Halichoeres*. Fifty or more species commonly coexist on patch reefs only three meters in diameter, and even more species can be found coexisting within a similarly sized area at the northern end of the Great Barrier Reef, where fish diversity is even higher (Sale, 1978). equilibrium from occuring. A similar phenomenon is found in the great rift lakes of Africa (Malawi, Tanganyika, Victoria) (Lowe-McConnell, 1987).

Coral reefs are the most complex ecosystems in the seas. Fish communities reach their highest degree of diversity in these ecosystems, and differ enormously within and between reefs in the same area (William, 1991; Ormond and Roberts, 1997) and between geographic regions (Briggs, 1974, 1996). The relative roles of local and regional processes in explaining community diversity in marine systems, as well as in terrestrial systems, have been hotly debated and several, most often contradictory, explanations have been proposed (Strong *et.al*., 1984; Ricklefs, 1987).

The high level of diversity supported by coral reefs may be best explained as the result of various processes operating on different scales in space and time (Jackson, 1991; Kohn, 1997). At the local scale (e.g., within reef zones), the diversity observed in local fish assemblages is explained by both deterministic (interspecific competition for food and shelter; predation pressure) and stochastic (recruitments; perturbation) ecological processes (Scale, 1977, 1991; Harmelin-Vivien, 1989).

On the regional scale (e.g., Pacific vs. Atlantic, West Pacific vs. Central Pacific), the diversity of extant faunas of reef fishes is explained mainly by interactions of historical hydrodynamic and geological processes with each species' life cycle characteristics, particularly larval dispersal ability (Victor, 1991). On the global scale (e.g., tropical vs. temperate), explaining why tropical regions contain so many species has been one of problems of community ecology since the nineteenth century (Pianka, 1966; MacArthur, 1972; Stevens, 1989; Crame and Clarke, 1997), despite intensive studies in both aquatic and terrestrial environments. Until now, no convincing explanation in terms of physiology, ecology, or evolutionary processes has been offered (A. Clarke, 1996). Some arguments state that the high diversity of fishes observed on present day coral reefs is partly related to the sustained higher temperatures in the tropics over geological time, and to the more efficient use and transfer of energy permitted by long-term temperature stability. High temperature and environmental stability have influenced evolutionary processes form the molecular level to the community level of organization.

Erosion of fish diversity

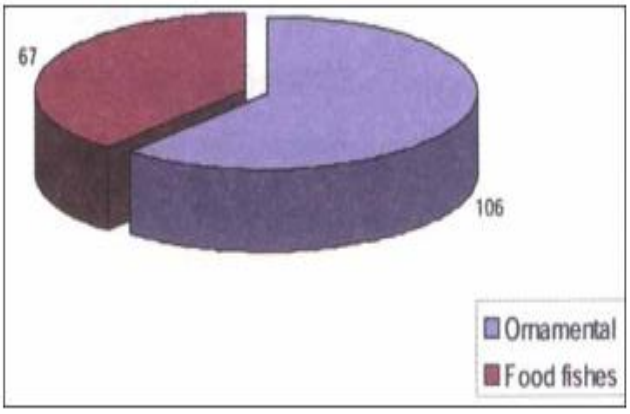

Fig – 3.3

The freshwaters of India have been viewed from a single perspective: that of economic production. They are to be sources of irrigation or urban-industrial water supply or of hydel power; they are to receive sewage and industrial waste; they may produce edible fish. In this strictly utilitarian framework, there is no space to conserve the rich heritage of freshwater fish diversity of the country. All over India, freshwater fish diversity is on a decline. Many of them have been lost forever Few studies have been carried out so far regarding this aspect. They mainly identified three major forces driving extinction which are; over –harvesting, competition by newly introduced exotic fishes and pollution.

According to a workshop estimate hosted out by National Bureau Fish Genetic Resources a total of 227 Indian freshwater fishes are threatened based on the IUCN Red list Categories of 1994. The species that suffered much are Indian long fin eel (*Anguilla bengalensis*), the redfinned Mahseer, the catfish (*Rita pervimentata*), Chitala (*Notoptrus chitala*), smaller fishes like Indian Hatchet fish (*Chela laubuca*), Scarletbanded Barb (*Puntis amphibious*), Indian Tiger Barb (*Puntis filamentous)* to name a few.

Some other factors are also contributing towards this biodiversity erosion. In the irrigation canal when water is stopped in the canals, they are trapped near the gate and fished out. The nets used for the fishing often have very small mesh and so everything is caught. The shallow streams and pools, such as those at the base of waterfalls, fall victim to the easy availability of dynamite ever since quarrying and road construction began on a grand scale in the country. The shock waves of the blast destroy all fish in the vicinity. Sewage, industrial effluents, chemical fertilizers and pesticides are polluting India's freshwaters. Several carps and barbs as well as fresh water prawns are being susceptible to pollution. The drastic modification of freshwater habitats by damming streams and rivers siltation leading to reduction in their depth has also profoundly affected many fish species like the Indian shad (*Hilsa ilisha*), the carps (*Labeo calbasu*), the catfish (*Bagarius bagarius*) etc. Due to changed habitat, the life cycles of these species have been seriously disrupted. Moreover exotic species like Tilapia, the silver carps, the grass carps, the African catfishes proved catastrophic for native species. Its prolific breeding nature simply crowd out its native competitors. The overall deterioration of habitat has rendered many fishes susceptible to diseases. One of the most serious is epizootic ulcerative syndrome disease that brought mass mortalities and extinction of some species in Indian freshwater fishes.

Fishes-most diverse, yet most neglected

Fishes are the most numerous vertebrates living on this earth and worldwide there are over 25000 species of fishes. Of this about 48% live in freshwaters that constitute just 0.01% of the earth's water. Freshwater fish diversity is unevenly distributed on this planet. The species richness is high in tropical region compared to other parts of the earth. Usually these regions are characterized by high levels of endemism. The world's major rivers like Amazon, Congo, Nile, etc. are some of the pristine rivers of the world with respect to freshwater fish diversity. I t has been estimated that the river Amazon and its tributaries may together harbour 3000 or more species of fishes. Such species-rich areas are called 'hotspots' and dominate other patterns or trends. Probably the climatic conditions of the tropical region are more stable compared to the

temperate regions of the world. This could be one of the favourable conditions for the growth, survival and evolution for the species in tropical regions.

While a great deal of attention has been given to the loss of biodiversity in tropical rain forests, or in coastal areas, the diversity of and within freshwaters has been widely neglected. There is little doubt that freshwater fishes represent the most threatened set of vertebrates (Leveque, 1997). In classifying the worlds' top 25 biodiversity hotspots, vertebrate group was considered excluding fish. This is mainly because of the poorly available data wherein the author (Myer *et al* 2000) predicts that there could be at least 5,000 species waiting to be discovered among fish, which is more than all mammals.