PREFACE

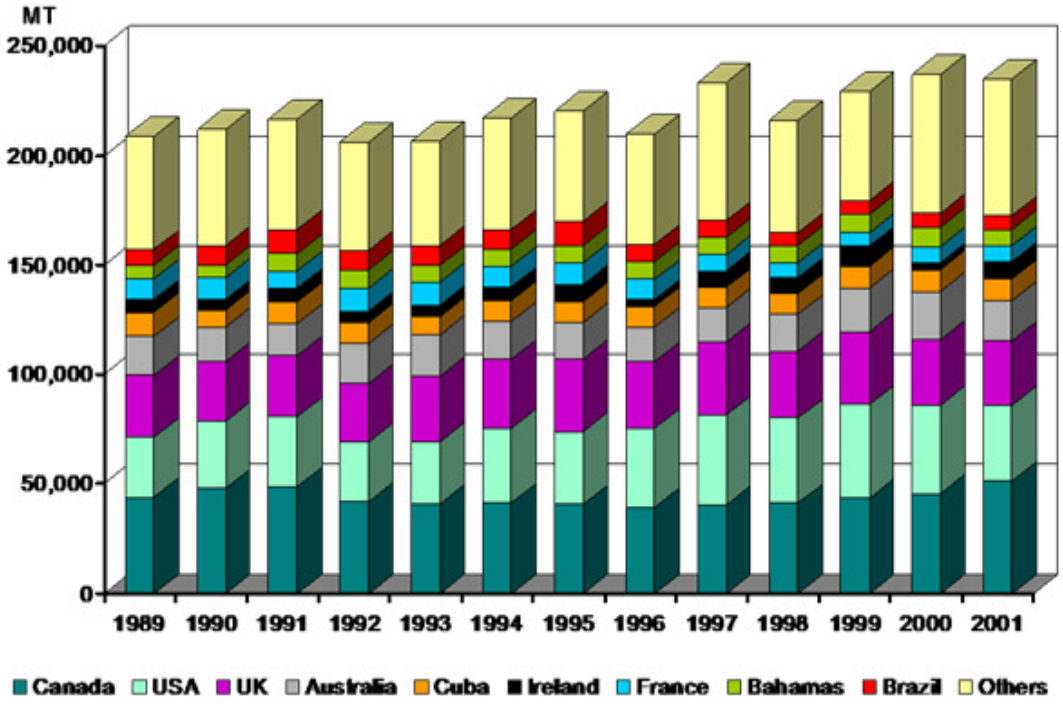
Crustaceans are highly valued in the global market as luxury protein. Lobsters are used as food throughout the world, and are therefore important in human economies. In India lobsters are widely distributed along the entire coast and major fisheries are located on the north-west, south-west, and south-east coasts (Radhakrishnan and Manisseri 2003). Lobsters are one of the most valuable and economically important crustaceans in India. Today, the frozen lobster tails from India have great demand in the world markets and as such it has become an important commodity earning valuable foreign currency for the country.

Panulirus (Decapopda: Palinuridae) constitute one of the most abundant and widespread crustaceans, distributed globally across tropical and sub-tropical regions. Of the 31 species of Panulirus presently recognized globally **(WoRMS),** India harbors more than 6 species including P.*polyphagus, P.homarus, P.ornatus* and *P. versicolor* contributing to lobster fishery. North west coast of India is predominantly rich in lobster resources and contributing major fraction of the total landing in India (Kagwade *et al*., 1991). *Panulirus polyphagus* and *Thenus orientalis* are the two species dominating in this fishery (Chhapgar and Deshmukh 1971). In the south west *Panulirus homarus* (Linnaeus) and the deep sea water *Pureulus sewelli* are the prime contributors to the fishery. Along the south east coast *Panulirus homarus* and *Panulirus ornatus* are the major contributors (Radhakrishnan *et al.,* 2005).

World lobster production increased steadily from 157,000 metric tons in 1980 to more than 233,000 metric tons in 1997, before stabilizing at 227,000 metric tons in 2001

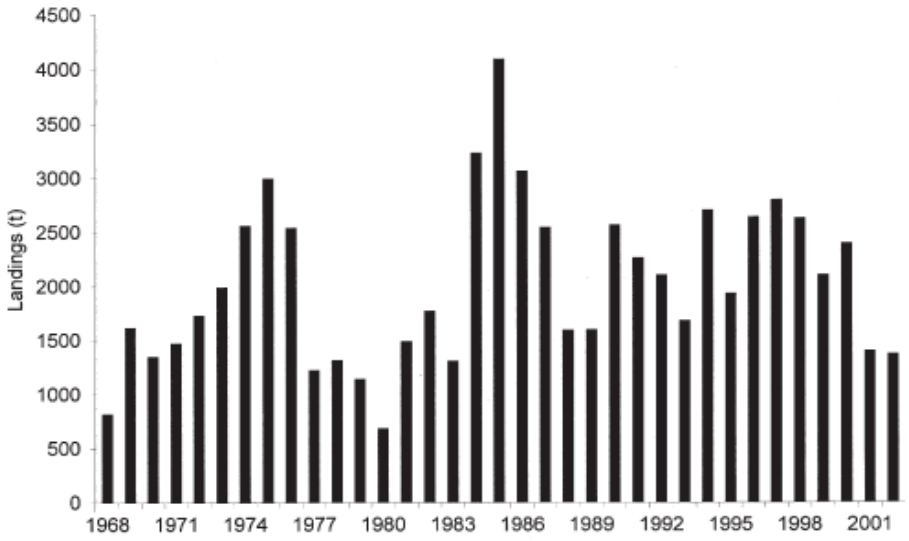
(Fig:1). Catches of American lobster (*Homarus americanus*) and spiny lobster (*Panulirus spp*.) accounted for 68 percent of the world's lobster production in 2001(FAO).

Fig: 1. World lobster production by country.



In India annual lobster landings have been declining from a peak of 4075 t in 1985 to 1364 t in 2002 (Fig:2). Major fisheries were located on the north- west, south-west, and south-east coasts of India (Radhakrishnan *et al.,* 2003). Annual landings of lobster in Colachel and Muttom gradually decreased from a peak of 301t in 1966 to 7.6t in 1996, with only 4t recorded in 2002. Among this 92% of the catch comprised of *P. homarus* (Radhakrishnan *et al.,* 2005).

Fig: 2. Total Annual lobster landing (t) in India, during 1968-2002.



Panulirus homarus is found throughout the Indo-Pacific region with centers of high concentrations in Tamil Nadu and Kerala (India), east Africa and Indonesia (Berry, 1974, Pollock, 1993). The scalloped spiny lobster *Panulirus homarus* supports most financially valuable to the fishery of India especially in Cochin, Vizhinjam, Colachel, Muttom, and Tutucorin fishing harbours (Radhakrishnan *et al.,* 2005). Major fishing gears used in the above fishing grounds are gill-net, trammel-net and traps.

Panulirus homarus inhabits shallow waters between 1 and 90 m depth, mostly between 1 and 5 m; among rocks, often in the surf zone, sometimes in somewhat turbid water (Holthuis, 1991). However, they respond to different environmental conditions that prevail in their respective areas (George, 1997). The southern edge of the Indian peninsula extends in to the Indian Ocean, with the Bay of Bengal in its eastern part and the Arabian Sea in the west. The Indian peninsula has different geographical regions, which do not typically coincide with the actual distribution areas of lobster stocks (population). Based on the current landing data and biological information on the mean

size of *P. homarus*, it could be deduced that the stocks has been over exploited (Radhakrishnan *et al.,* 2005). Although the concept of stock identification is straightforward, the life history and ecology of a species can greatly affect the ability to actually identify genetic stocks in nature.

Over exploitation, environmental pollution, fishing pressure and habitat loss have threatened *Panulirus homarus* stocks in many parts of Peninsular India, but little is currently known about the levels and patterns of genetic diversity of this species. This knowledge is vital for developing appropriate wild stocks management plans and as basic information for stock improvement programs. Generally marine species analyses revealed less spatial variation in genetic structure than populations inhabiting freshwater environments. This is due to the large population size, high potential for dispersal and the perceived lack of barriers to dispersal (Graves 1998). In this regard *P. homarus* in Peninsular India has special interest, because peninsula has different geographical regions, it restricted movements and depleted population. These reasons might restrict the gene flow in *P. homarus*. Genetic sub-structuring of a species is important knowledge for managing harvested species and can be used to predict whether a locally depleted population will be successfully repopulated by immigrants.

Information on genetic diversity is a basic requirement for any stock identification, stock enhancement and breeding program for the improvement of any aquatic species (Dinesh *et al.,* 1993; Garcia and Benzie, 1995; Tassanakajon *et al.,* 1997). To avoid reduction in diversity and elimination of distinct stocks, understanding their population dynamics, including structuring of populations and genetic diversity, is critical. (Diniz F.M *et*

al., 2005). The loss of genetic variability may possibly result in the loss of disease resistance or reduction in a population's capability to adapt a new environment.

According to "Ten Commandments for sustainable ecosystem based fishery management" (Ryman *et al.,* 1995b) understanding of genetic structure of the marine population helps not only in conservation of the population but also in upholding healthy fishery management systems. Therefore it is important to characterize the genetic structure of commercially harvested marine population. Analysis of genetic structure is especially important for species with ecological and commercial value. Molecular analyses are very important in order to conduct an adequate monitoring of captive stocks and to establish profitable genetic improvement programs (Sunden and Davis, 1991). DNA Polymorphisms have been extensively employed as a means of assessing genetic diversity in aquatic organisms. The PCR provides a simple, fast and in- expensive means for genome analysis. Under PCR, a single, short oligonucleotide primer can be used to amplify specific sequence of genomic DNA. Popular genetic markers in the marine animals include Random Amplified Polymorphic DNA (RAPD), RFLP, microsatellite, 16s RRNA and 18S rRNA gene.

In this background of information, the present study aims to assess the genetic diversity of *Panulirus homarus* from different locations by using popular genetic markers with the following objectives

1. To investigate the Geo - genetic polymorphisms of Indian peninsular *P. homarus* by using RAPD markers
2. To investigate the genetic structure of *P. homarus* by using Microsatellites.
3. To study the 18s rRNA gene polymorphisms of *P. homarus* populations from different geographic regions.