Studies on the bivalve diversity of the Chahbahar Bay
(north eastern Sea of Oman)

A R Nikouyan, A Savary & G Attaran Fariman
Iranian Fisheries Research and Training Organization (I.F.R.T.O.), P.O. Box 14155 - 6116, Tehran, Iran
Received 24 June 1997, revised 27 October 1997

Population density and the diversity of bivalve mollusc in Chahbahar Bay were studied at 12 stations through two cruises during May (premonsoon) and July (monsoon) 1995. Eight families of bivalve were identified in the area, surveyed. The indices of richness, evenness and diversity were estimated in samples of each cruises and the results compared with the physico-chemical changes in water, such as salinity, temperature, pH and dissolved oxygen at different depths. Diversity of bivalves was found to be higher in July than in May. It seems that the population density and diversity of bivalves in the Bay of Chahbahar are influenced by environmental changes caused by the southwest monsoon.

The benthic organisms of the sublittoral zone and coastal waters, in addition to their importance as the major source of food for variety of fishes and other bottom species, can also be used as the biological indicators for identifying impacts of industrial and domestic pollution on aquatic environment. Besides information on the population density, distribution and diversity, the study of benthic organisms will greatly enhance our knowledge on marine ecosystem and potential of demersal fishery of the coastal zone.

Chahbahar Bay with an area of 320 km² is located in the northeast of the Sea of Oman, along the Sistan and Baluchestan provinces. The average depth of the bay is 6 m while the deepest part at the entrance is about 19 m. The towns of Chahbahar and Konarak are located at the eastern and western extremes of the bay. Having a peculiar ecological position in the coastal waters of Sistan and Baluchestan provinces, Chahbahar Bay has attracted a considerable attention as the main fishing ground for lobsters in the region. However no adequate studies relevant to understanding the ecosystem of this water body has yet been undertaken, although some investigations on the intertidal benthic fauna of this area have been conducted. The present paper forms part of a comprehensive study on the distribution, diversity and biomass determination of macrobenthos of Chahbahar Bay conducted in 1995. This part of the study deals with the distribution and diversity of bivalves in two sampling periods during May (premonsoon) and July (summer monsoon).

The study area is geographically located within 60° 37' to 60° 24' E and 25° 27' to 25° 17' N (Fig.1). Samples were collected from depths of 5 to 19 m at 12 selected stations. Sediment samples were collected using a Peterson grab with a sampling area of 0.1 m². Three bottom samples from each site were collected, fixed and analysed according to methods proposed by Holme & McIntyre. Separation of bivalves from sediments

Fig.1—Location of sampling stations in the Chahbahar Bay.
was carried by using of 1mm mesh sieve. The number of bivalve samples were then recorded and identified up to family using the available literature and keys. The Shannon-Weaver information index was calculated for all the sampling sites. The indices of richness (N₀, R₁, R₂), evenness (E) and diversity including Simpson’s index (I’), Hill’s Index (N₁, N₂) and Shannon Index (H’) were also applied for both sampling period and the results were compared. Water samples were collected by Ruther water sampler. Temperature was measured with 0.5°C thermometer, pH with Beckman pH meter, dissolved oxygen by means of Winkler method and salinity by Harvery method.

Average values for environmental parameters of the bottom water are given in Table 1. Salinity shows some decrease in July (monsoon season) while temperature and dissolved oxygen were higher during monsoon period. About eight families of bivalves were identified during both sampling periods, some of which were identified up to genera or species. Since identification of all samples up to species was not possible, for assessing different diversity indices, identified samples are represented at family level. The population density of each family at different sites is given in Table 2. The family Nuculidae (pointed shells) were found to be dominant in both sampling periods constituting 78 and 41 percent of the total individuals in May and July respectively. For description of diversity indices within the sampling sites, Shannon-Weaver information content was used. The indices values are given in Table 3. The results indicate variation in index of H’ from zero to 1.12 in May, with the least value for stations 2, 7, 12 and the highest values for station 6. In July, the variation was from zero to 1.38 and the highest value was obtained for the station 11 and the lowest for stations 2, 3, 5, 6, 7, 8 and 10. Values for the richness index, diversity indices (λ, N₁, N₂, H’) and index of evenness (E) for both sampling period are compared in Table 4. Variation in diversity indices of bivalves in the
Bay of Chabahar seems to be associated with the changes of some physicochemical parameters in bottom waters. This is probably related to the monsoon conditions which result in mixing of water masses leading to an increase in nutrients and dissolved oxygen in the water column. Benthic communities show different reaction to environmental changes. These changes in coastal waters include a wide range of parameters as salinity, wave action, tidal currents, water depth, and bottom topography. Under such circumstances, the benthic organisms show adaptability to these changes. An increase in the degree of evenness and diversity indices in the samples collected in July is indicative of favourable environmental conditions for a larger number of bivalves in this period. Despite higher degree of evenness and diversity indices for the July samples, the total number of individuals in May (premonsoon) was much higher than those for July, although the monsoon data is not given here. This could probably be attributed to mortality or migration as a result of changes in the environmental parameters particularly reduction in salinity. Earlier investigation on the bivalve species, *Gaffrarium pectinatum* from the west coast of India provided similar results which indicate reduction in density of this species during the monsoon. Diversity index can therefore be used as an important factor in determining the effect of environmental changes on the structure of benthic communities.

Pollution of various types in coastal waters should be regarded among the other factors that can cause effective changes in benthic communities. Although there are instances of pollution agents threatening Chabahar Bay but the projected development of Chabahar area as a free trade zone may increase such threats. Therefore proper consideration on environmental impact assessment as a result of development should be emphasised. From this study it can be concluded that changes in the population and diversity structure of bivalves are probably influenced by the environmental circumstances caused by the summer monsoon.

The authors are thankful to Dr. G. Amini, Head of IFRTO for financial support, to Mr. B. Saeedpour, Director of Chabahar Fisheries Research Centre and his colleagues for encouragement and facilities. They are also thankful to the master and crew of *R.V.Tajaly* for help on board during sampling operations.

References