The fluctuations in catches and catch rates of artisanal purse seiners are related to the presence of suitable conditions for fishing. Reduced fishing effort may have been a result of bad weather conditions as October is at the end of the southeast monsoon winds which are generally stronger than the northeast monsoons and result in rough sea states. Also, the northward flowing East African Coastal Current is quite strong during the southeast monsoons, which would affect the success of purse seining. However, this may not be the only reason for reduced fishing success as fishing data are available for only one month during the southeast monsoon season. The fact that November was the most successful month and that the month preceding this season, June, had the second highest landing may lead to doubts as to the basis for the above explanation. Nevertheless, the catch rates of the boats shown in Table 2 confirm that fishing appears to be more successful between November and March (during the northeast monsoons) than between June and October (during the southeast monsoons). This has also been observed from the purse seine catches in Zanzibar (Nhwani 1981, 1983).

The species composition of the monthly catches presented in Table 2 shows the dominance of clupeids (*Sardinella, Herklotsichthys* and *Amblygaster*) in every month, their contribution being as high as over 90% (e.g., in March) and averaging over 65%. Other families individually contributed less than 10% of the average monthly catches except in certain months when carangids (e.g., *D. russelli* in October) and Scombridae (*R. kanagurta* in December) were present in significant quantities. It is therefore quite clear that the artisanal purse seine fishery exploits mainly the clupeids (sardines) of the coastal waters.

Data on maturity, spawning and sex ratio were analyzed for only the first four months (January to April) of 1986. As reported elsewhere (Nhwani and Makwaia 1988) these are the months when most small pelagic fishes recruit to the purse seine fishery. It is therefore not surprising that the catches in these months consist mainly of immature fish. Because of their immature state, it is possible that the highly skewed sex ratio reported here may be biased.

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Management Issues on the Maputo Bay Fisheries, Mozambique

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The Maputo Bay Fisheries

Three different fisheries are conducted in Maputo Bay, Mozambique, (Fig. 1) which has a surface of 686 km^2, a mean depth of 8-10 m and is close to the country's capital, an important fish market. They are the gillnet fishery for kelee shad (*Hilsa kelee*, Clupeidae), the shrimp fishery and the hook and line fishery for demersal fishes.

Of these, the fishery for kelee shad gives the highest yield, while the shrimp fishery gives the highest economic returns. The kelee shad fishery gave an annual yield around 3000 tonnes of which about 90% came from the artisanal fishery. The shrimp fishery which is conducted by trawlers and by beach seining has produced a yield of about 200-800 tonnes per year for the period 1971 to 1984 (Ulltang 1980, Sousa 1986).

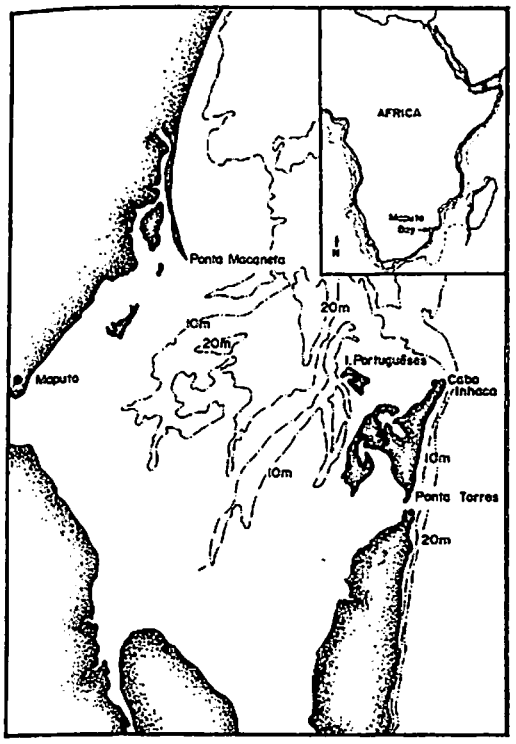

Fig. 1. Maputo Bay, Mozambique, East Africa.

Very few data are available concerning the hook and line fishery but it is likely that the annual catches of first grade fish are of the order of 500 tonnes per year. There are no data on the species composition of this fishery.

Research Findings

The two most important fisheries in Maputo Bay were analyzed in 1986 by the author and a Norwegian consultant, Dr. Jakob Gjøsaeter, using catch and effort data. For the kelee shad fishery a surplus - production model was fitted to the data. It indicated that the present fishing effort is too high and should be reduced. A preliminary assessment of yield per recruit also suggested that a bigger mesh size could increase the yield (Fig. 2).

For the shrimp fishery no model could be fitted but based on the little information available it was suggested that the fishing effort should be kept at its present level until more reliable data are obtained.

A census of artisanal fishermen was conducted in June-July/86 which led to information on number of boats, fishing gear, fishermen by landing site becoming available.

Management Measures

As a result of the recommendations from these investigations a series of meetings were held involving

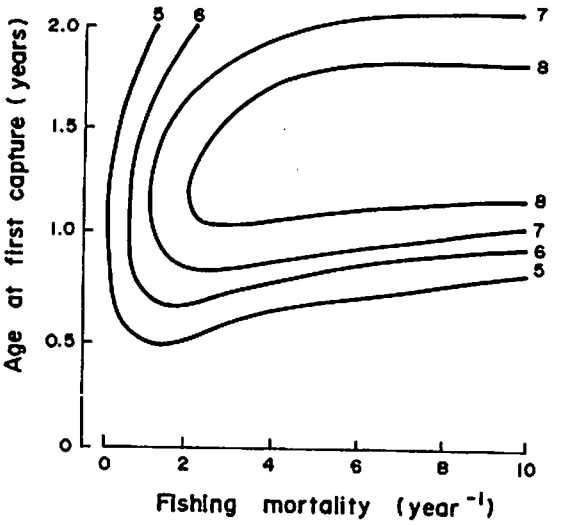

Fig. 2. Yield per recruit isopleth for *H. kelee* showing optimal age at first capture to be of 1-1.5 years.

staff of the Institute of Fisheries Research, of the Secretariat of State for Fisheries (SEP) and other fishery officials responsible for the management of Maputo Bay fisheries. New gillnets began to be produced by the national net-making factory in Maputo, CIMA, and a few other gears were imported, leading to an increase in mesh size from 2 to 2-1/4 inches. This was possible because both the net factory and the fishing materials importer and distributor are state companies, supervised by the SEP.

Within about 8 months, the mean size of *H. kelee* landed by artisanal fishermen in one major landing site increased from 14.2 cm to 16.0 cm (Fig. 3). The complete catch data for the period after the change are still being analyzed but there are indications that, if no major changes occur in the fishing pattern, substantially higher yields can be expected from the gillnet fishery.

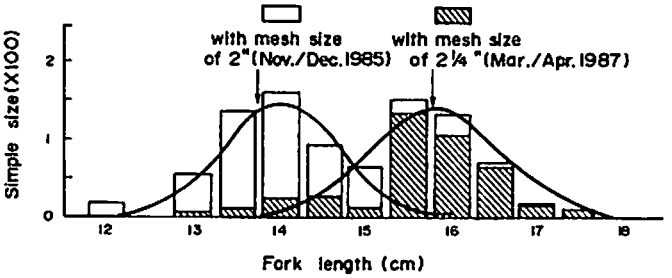

Fig. 3. Catch composition of *H. kelee* before (left) and after (right) change of mesh size.

In the near future, added emphasis will be given to the improvement of data collection from the trawl and line fisheries in the Bay. As far as the expansion of the fishery itself is concerned, this is expected to occur in the rich fishing grounds outside of Maputo Bay.