

**FORAMINIFERA AS ENVIRONMENTAL INDICATORS IN
SOME HOLOCENE BOREHOLE SAMPLES OF EL ARISH -
RAFAH DISTRICT, SINAI, EGYPT.**

M. W. EL DAKKAK AND N. A. MOHAMED

Geology Department, Faculty of Science, Alexandria University, Egypt.

ABSTRACT

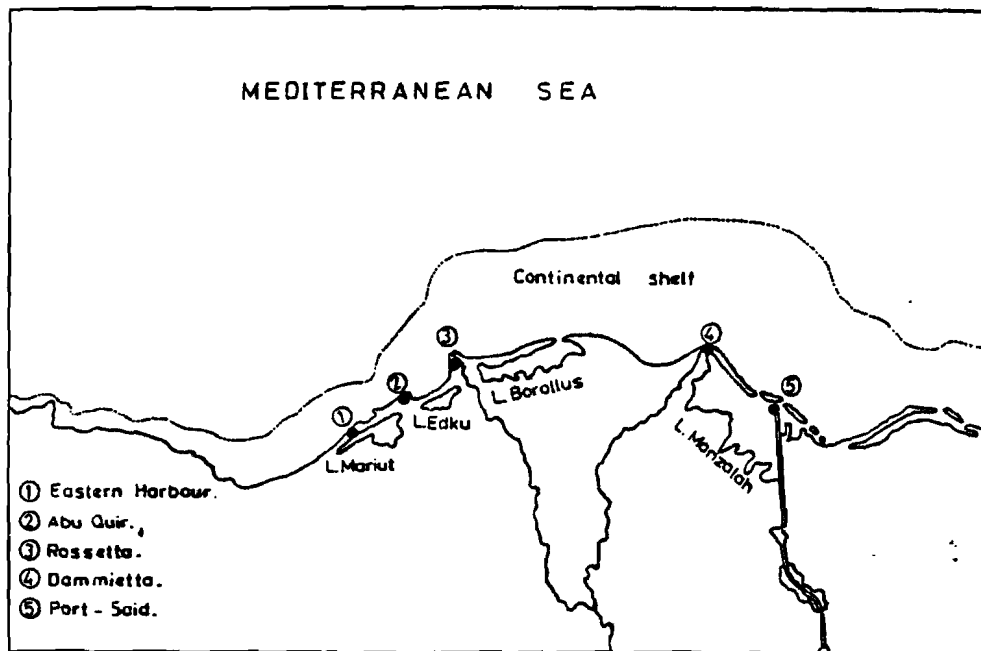
Quantitative studies of benthonic foraminiferal assemblages of nine boreholes samples provide data by which the environments that prevailed during their life history are reconstructed. The boreholes (35 - 48 m depth) are distributed in the region of El Arish - Zewied - Rafah at the northeastern coast of Sinai Peninsula, Egypt. The prevailing environments were: near shore shelf at the basal part of the succession followed by hyposaline lagoon which was restricted at El Arish - Zewied area, the succession was terminated by nonmarine environment at the extreme eastern and western parts of the area. Correlation among the different boreholes was attempted and a paleogeographic map for the area was prepared to demonstrate the vertical and lateral distributions of the different reconstructed environments.

INTRODUCTION

The use of fossils has always been one of the most important methods of identifying the depositional environment of sediments. Foraminifera have been employed as environmental indicators more than any other fossil group because of their widespread geologic and geographic occurrences. The foraminiferal occurrence is controlled by several factors including water depth, temperature, salinity, currents, ... etc. interpretation of depositional environments from foraminifera is based mainly on comparison with similar living ones.

The ecological factors as related to the distribution of living foraminifera have been studied by several authors e.g. Bandy and Arnal (1960), Phleger (1960), Walton (1964), Murray (1968, 1970, 1971 and 1973), Freichs (1970), Wright and Murray (1972), Murray and Wright (1974), Ingle et al. (1980), Lutze (1980) and El-Askary et al. (1984).

The present work deals with the study of the subsurface Holocene foraminiferal assemblages and the recognition of their environment of deposition in nine boreholes kindly provided by the authorities of Regwa



Map (1) - The Egyptian major fishing harbours in the Mediterranean Sea.

The use of purse seine nets has begun in the Egyptian waters of Mediterranean sea in 1969 (Faltas, 1983). These nets replaced sardine nets, due to their uselessness for catching sardine after stopping the Nile flood and the change in shoaling behaviour of sardine (Fig. 1).

The catch by long line is comparatively small with normal annual fluctuations (Fig. 1).

Interpretation of effort and catch per unit effort for the trawl nets, used by vessels landing in Port Said show that the trawl fishery in the eastern side of Mediterranean sea in front of Egypt was affected. Their catch per unit effort in the first period has an annual mean of 34.1 Kgm/m/24 h., decreased in the second period to an annual mean of 27.5 Kgm/m/24 h. This may be resulted from the increase in effort from an annual mean of 192.3 thousand hours in the first period to an annual mean of 426.4 thousand hours in the second period (Fig. 2).

Catch rates by long line for vessels landing in Port Said are nearly stable with slight increase in the second period (annual mean cpue were 53.4 Kgm/m/24 h and 55.0 Kgm/m/24 h for the two periods respectively). However, the mean annual effort increased from 2.5 thousand hours in the first period to 10.5 thousand hours in the second period. This may indicate existence of sustainable stock of fishes caught by long line (Fig. 2).

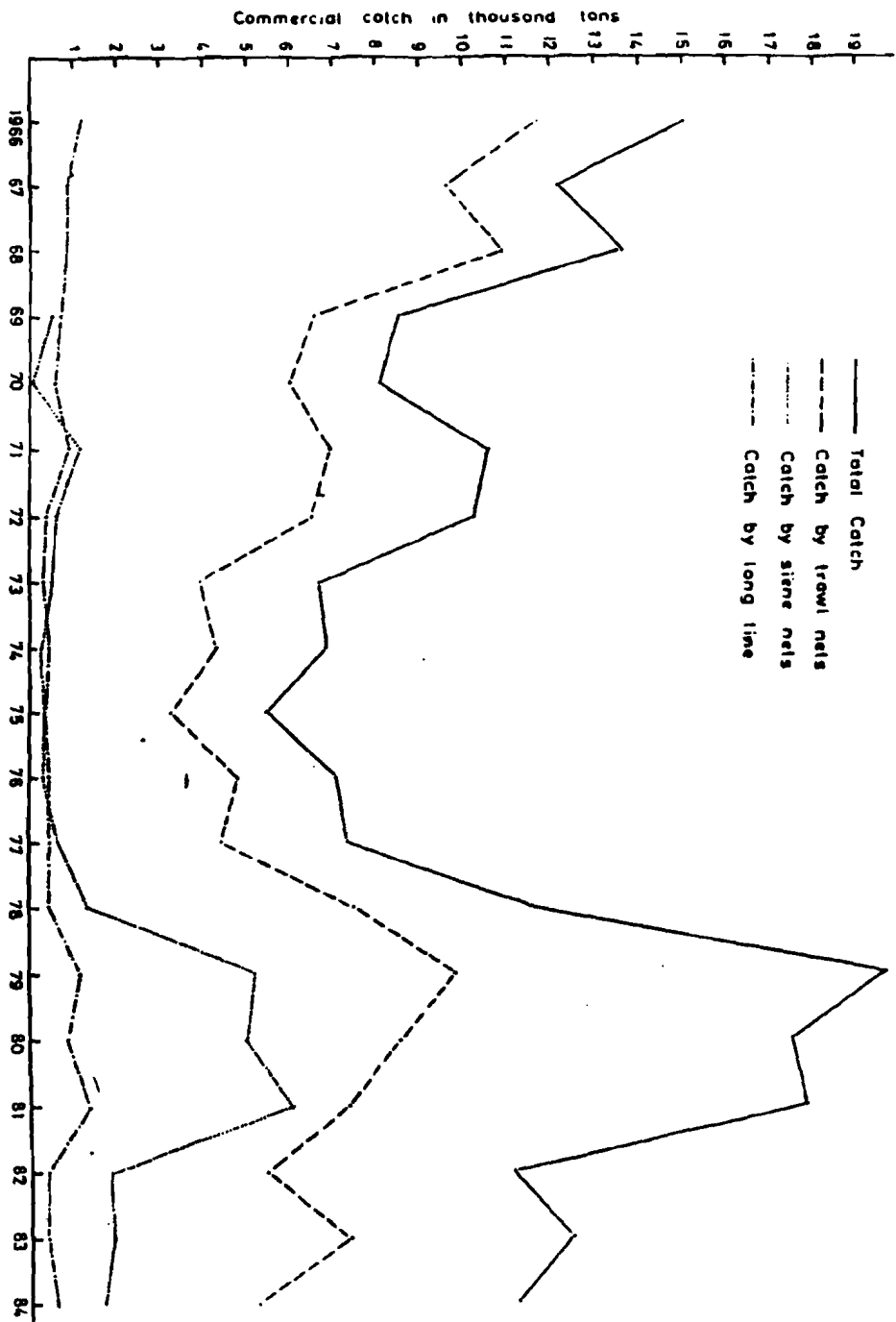


Fig. (1) - Annual variations in total catch, trawl nets catch, siene nets catch and long line catch in Mediterranean Sea in front of Egypt.

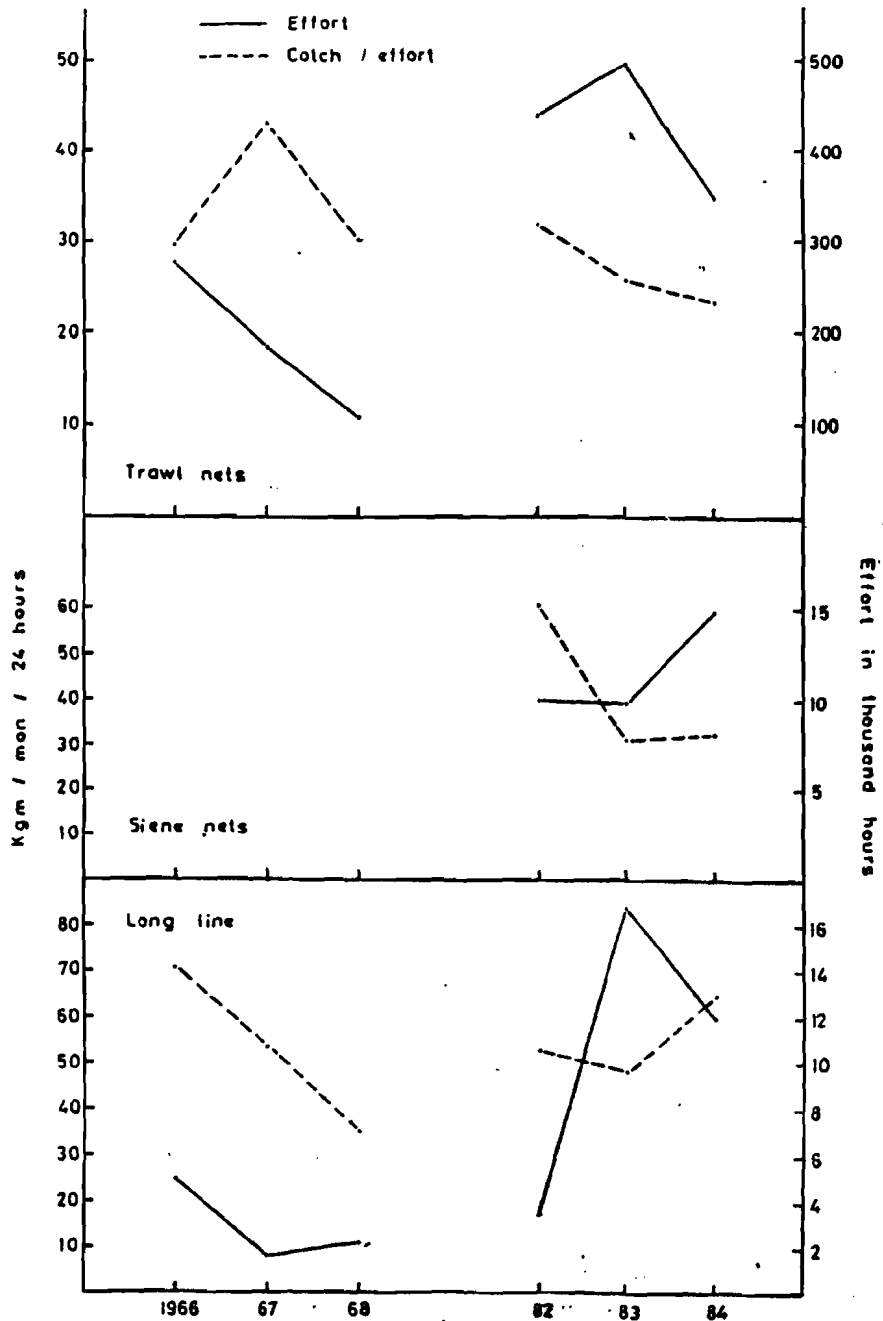


Fig. (2) - Annual variations of catch/effort for trawl nets, purse siene nets and long line in Port Said area.

Interpretation of catch per unit effort and effort for the trawl nets used by vessels landing in Abu Quir show that the catch per unit effort was high in the first period of study, with annual mean of 60.7 Kgm/m/24 h. In the second period cpue dropped to nearly half that of the first period with a mean of 31.3 Kgm/m/24 h. This drop coincides with high effort in the last period being 106.3 thousand hours annually, while it was 73.6 thousand hours in the first period (Fig. 3).

For the long line the effort exerted decreased in the second period with annual mean of 7.7 thousand hours while it was 18.9 thousand hours in the first period. This decrease resulted in high catch rates in the second period with annual mean of 70.3 Kgm/m/24 h, compared with lower rates calculated for the first period being 20 Kgm/m/24 h (Fig. 3).

Since purse seine nets were introduced in the Egyptian commercial fishery in 1969, on a small scale, data suitable for discussion was only available for the second period. Fishing effort was found to be nearly the same in the east and west areas being of annual mean of 11.6 thousand hours and 13.8 thousand hours respectively. Catch rates show natural fluctuation of mean values of 41.0 and 52.0 Kgm/m/24 h in the east and west respectively. These mean that the pelagic fish stocks present in the two areas are nearly of similar abundance, i.e., there is no effect of fishing effort on the fishery of pelagic fish till now (Fig. 2 and 3).

on the basis of Gulland curve (Gulland, 1983) about main phases of development of a typical fishery and the interpretation of catch per unit effort with the corresponding effort, the Egyptian trawl fishery in Mediterranean sea is considered within the phase of over-development a phase which Gulland called a time of crisis which require immediate reduction of effort.

The previous discussion indicates a clear decrease in cpue for the trawl nets in both east and west areas, which may be due to the high effort exerted. It could also be stated that this declination may be partially attributed to the increase of fishing by shallow water nets, mainly beach-siene (Fig. 4). Al Sayes et al (1981) mentioned that more than 80% of the catch by the beach-siene is composed of economic fishes e.g., *Sardinella* spp, *Mallus* spp, *Mugil* spp, *Pagrus* spp,....etc., and majority of the catch is composed of high ammounts of very small fishes of total length less than 5 cm. However, the rate of decrease in the west was more pronounced than in the east. Such decrease may be attributed to the spread of pollutants in the sea environment (Sindermann, 1980).

Similar results were mentioned by Saleh (1983) in his comparative study of *Mugil* fishery in lake Edku in which *Mugil* spp migrates for spawning in Abu Quir bay and *Mugil* fishery of lake manzalah in which *Mugil* spp migrates for spoawning in Tina bay near Port Said. He noticed that there are a considerable annual declination of *Mugil* fishery in lake Edku, while the *Mugil* fishery in lake Manzalah is flourishing.

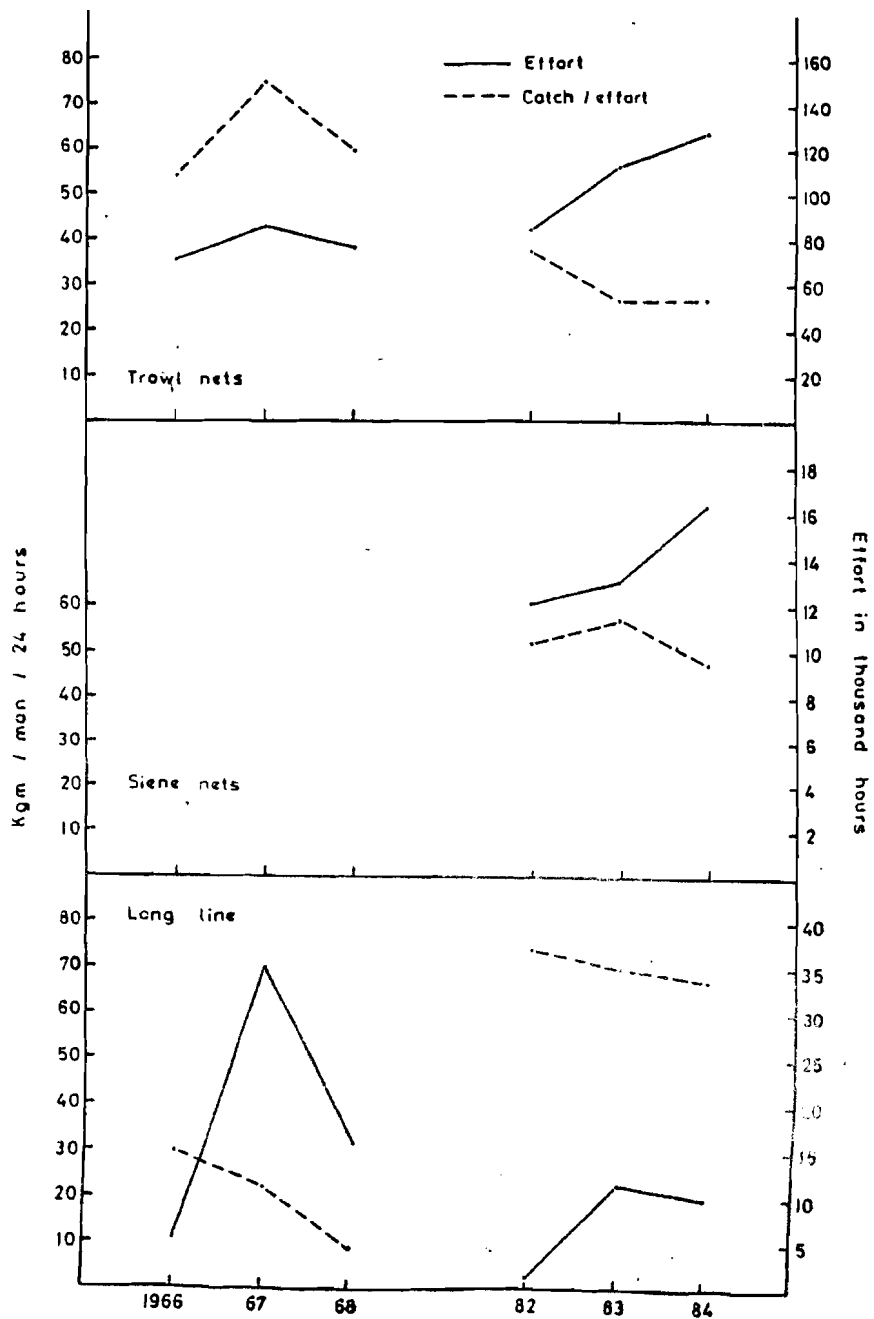


Fig. (3) - Annual variations of catch/effort for trawl nets, purse siene nets and long line in Abu-Quir area.

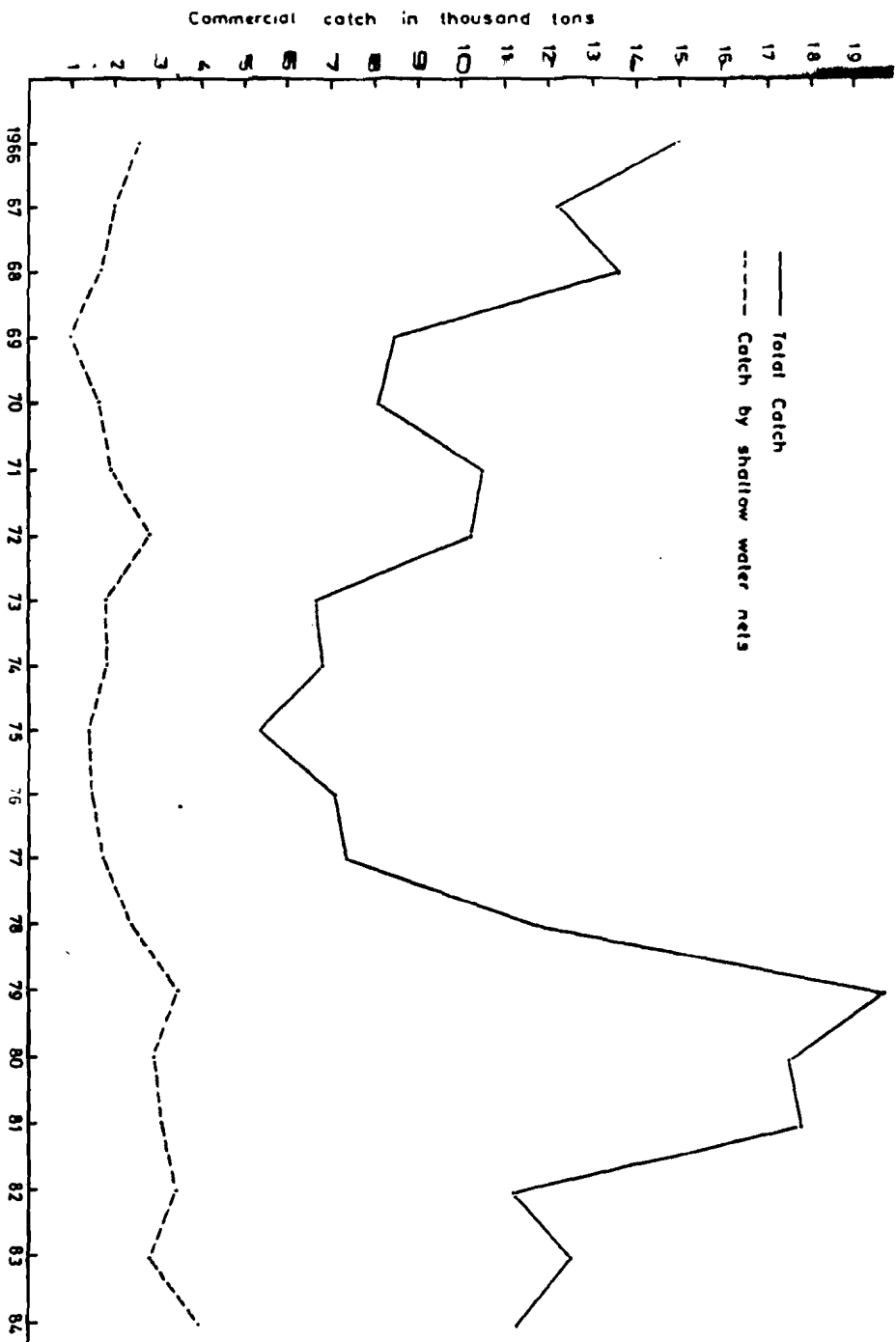


Fig. (4) - Annual variations in total catch and catch by shallow water nets in Mediterranean Sea in front of Egypt.

SUMMARY

The declination of fishery potential mainly demersal fishery in the Egyptian Mediterranean waters may be attributed to the effect of the high fishing effort and also to the effect of shallow water nets mainly beach-siene operating in the spawning area. Pollution may also has a major effect on the western demersal fishery.

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