PRE-WAR FLUCTUATIONS IN THE FISHERIES OF SCORPIONFISH, RED MULLET AND STRIPED MULLET IN GREEK WATERS

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ABSTRACT

Long-term changes in the abundance of red mullet (Mullus barbatus), striped mullet (Mullus surmelatus) and scorpionfish (Scorpaena scrofa , S. notata) during 1928-1939 agree well with those of the air temperature at Thessaloniki, northern Greece. Catches and air temperature increased from a low in the late 1920's to a peak in the 1930's.

INTRODUCTION

Fluctuations in the abundance of marine fish have been recorded in various marine regions, linked to hydrometeorological fluctuations (Hjort, 1914; Jensen, 1939; Taylor et al , 1957; Cushing and Dickson, 1976; Stergiou, 1984). No such information is available for the eastern Mediterranean Sea.

MATERIAL AND METHODS

Pre-war Greek catches of red mullet/striped mullet and scorpionfish, as well as the total number of trawlers and seiners have been recorded on a monthly basis for 1928-1939 (Greek Fisheries Statistics, 1934-1940). Annual yield was expressed as kg /boat. There are no data concerning the pre-war sea temperature changes in Greek waters. Nevertheless, it has been shown that there is a good agreement between the air and sea-surface temperature fluctuations (e.g. Taylor et al , 1957; Dunbar, 1982; Stergiou, 1984). Thus, the air temperature at Thessaloniki, northern Greece, indicated for 1892-1973 by Flocas and Papadimitriou (1974), will be used to describe long-term trends in Greek waters.

TABLE 1
Annual catches, in metric tns, of red mullet+striped mullet (1), scorpionfish (2) and total number of trawlers and seiners (3) in Greek waters, 1928-1939.

Year	1	2	3
1928	333.4	30.2	449
1929	461.3	74.5	696
1930	739.5	80.9	555
1931	773.5	128.3	638
1932	728.5	104.6	665
1933	623.8	75.3	543
1934	774.3	109.2	518
1935	757.7	132.9	500
1936	839.2	140.7	627
1937	1,003.0	113.0	611
1938	1,339.5	124.5	665
1939	1,081.6	127.1	582
Total	9,455.0	1,241.0	
Mean	788.0	103.4	579

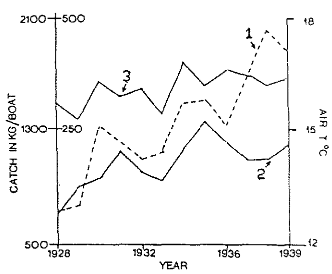

Fig.1. Annual Greek catches, in kg /boat, of red mullet + striped mullet (1) and scorpionfish (2), and air T (3) at Thessaloniki, 1928-1939.

RESULTS

The catches of the red mullet/striped mullet and scorpionfish and the number of trawlers in 1928-1939 are shown in Table 1. Mean annual catches were 788 and 103 tons of red mullet+striped mullet and scorpionfish accordingly.

Long-term changes in the abundance, expressed as kg /boat, of red mullet/striped mullet and scorpionfish parallel the air temperature variations at Thessaloniki (Fig. 1). There is an increase to a peak around 1930-1931, followed by a decline to a trough in the mid 1930's and an upward trend to a maximum in the late 1930's. The curve for red mullet+striped mullet shows opposite trends for the last four years with those of air temperature and scorpionfish. The similarity is even more pronounced when the 5-year moving averages are taken and hence the short-term effect is masked. The long-term increase in the catches from the late 1920's to a peak in the mid 1930's parallels the upturn trend of the air temperature.

The annual and the 5-year running means of the red mullet-striped mullet and scorpionfish catches were significantly correlated with the annual ($r=0.66$, $p<0.01$ and $r=0.64$, $p<0.05$) and the 5-year running means ($r=0.95$, $p<0.001$ and $r=0.92$, $p<0.05$) of the air temperature at Thessaloniki.

DISCUSSION

As it was shown, a rise in the red mullet/striped mullet and scorpionfish catches is associated with warm waters, as is inferred from the air temperature record. Annual sea temperature variations are considered to be a primary factor leading to oscillations in demersal and pelagic fisheries (e.g. Hjort, 1914; Jensen, 1939; Taylor et al , 1957; Cushing and Dickson, 1976; Stergiou, 1984). An increase of water temperature hastens growth and egg and larval development, intensifies the process of protein metabolism and influences the amount of the available food for fish. Sea temperature change, however, is only one consequence of marine climatic fluctuations, which involve changes in the salinity, intensity and direction of currents, nutrients, and depth of mixed layer as well, and are closely associated with atmospheric changes. The biological responses to climatic fluctuations involve changes in the amplitude, spread and timing of production, as well as changes in the distribution, abundance and reproduction of the various planktonic, benthic and nektonic organisms.

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Various aspects of climatic change, that may affect the abundance of these fish, may be questioned. For instance, does the overlap between the distribution of the larvae of these fish and of their food ("match-mismatch" hypothesis) (Cushing and Dickson, 1976), change along with a change in the climate;does the amount of nutrients, plankton and benthos biomass in the eastern Mediterranean Sea change along with a change in the Meditterenean climate, and how? Yet, does the extent of the nursery area of these species change along with a change in the current intensity and direction, if any, and how? In any case, the pieces of evidence hitherto presented do, however, provide cumulative support that climatic change holds a key to the abundance of these fish in Greek waters.

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EFFECT OF THE CHANGES IN BIOLOGICAL AND OCEANOGRAPHIC CONDITIONS ON THE SARDINE° FISHERIES IN THE SOUTH-EASTERN OF THE MEDITERRANEAN SEA

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ABSTRACT :

Before damming, the Nile discharge was the main reason for the high biological productivity of the shelf waters of the South-eastern part of the Mediterranean Sea. This was due to the great amounts of organic substances and mineral particles brought to the shelf waters of the sea by the river Nile discharge through its two tributaries (Damietta and Rosetta). After the erection of the High Dam, the Nile water started to decrease in 1965. From 1968 on the annual total discharge averages only one-tenth of the average value for the period prior to 1964. The discharge usually occurred from July-August until December. January, and the maximum discharge observed in September-October. At present, the discharge is only trough the Rosetta branch and the maximum amount is registered in winter (Gerges, 1976). Before damming, about 57 x 10^6 tons of suspended solid particles entered the Mediterranean each year. The solid and organic discharge of the Nile is the main source of sediments of silt of organic origin in the south-eastern part of the Mediterranean. Since the construction of the High Dam, over half of the yearly solid discharge from the Nile settles in lake Nasser. Consequently, the concentration of suspended solid particles in the Nile has been greatly reduced, and at the present time the sea receives less that 10% of the volume of silt material which entered it before damming. As a result of this, the phosphate content noa falls within the low eastern Mediterranean range (0,4-0,10 $\mu g\ l^{-1}$), and consequently, the whole food chain is affected.

As early as 1965, the September phytoplankton bloom had dropped to about 10% of its 1964 value (Halim, 1976). This sharp reduction in the plankton production affects the Sardine° catch along the Egyptian Mediterranean coast.

In this area, Sardinella aurita (Cuv. & Val.) constitutes about 75% of the total catch of the Sardines.°

In 1962, the maximum average monthly discharge of the River Nile was in September and the biggest sardine catches were observed in October. For three months (September-November,1962) the river discharge contributed about 73 % of the annual value, within this period, 95 % of the annual sardine catch was produced in the shelf.

From 1966 till 1978, a clear progressive reduction in sardine landings has occurred. The catch decreased from 18166 ton representing about 48 % of the total catch from the south-eastern part of the Mediterranean Sea to 463 ton in 1968 representing 3.4 % of the total catch.

The study carried out in the area comprising Damietta and Rosetta (highly affected by the Nile discharge) revealed that in the period from 1962 to 1965, the sardine catch reached 16321 ton in 1962, 9946 ton in 1963, 6639 ton in 1964 and 7061 ton in 1965, starting from 1966 as a result of the construction of the High Dam. The sardine catch in the above mentioned area decreased to 989 ton in 1966; 133 ton in 1968 and a minimum of only 20 ton in 1970 (Bishara, 1985).

From 1977 an increase in sardine production is observed where the average annual production contributes to about 3652 ton compared with 829 ton in the period from 1967 to 1976. This increase in the sardine in the last few years can be attributed to two reasons, the first is the general decline in the catch from the south-eastern part of the Mediterranean Sea, and the second is the introduction of purse-seine which usually operates at depths varying from 12 to 35 Fathoms, while the sardine gill nets are carried out at depths not than 10 fathoms (Faltas, 1983).

So, the introduction of purse-seine depending on light attraction in the last few years proves its high effeciency in obtaining the largest possible quantities of pelagic fish specially sardine and hence to compensate the drastic fall in sardine production after damming.

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° Genus Sardinella