

Mnemiopsis and other Invaders into Mediterranean and Black Seas

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Accidental introduction of alien species into the Black Sea are documented since the early 19th century. Most of the invader species are small species, barnacles, hydromedusa, gastropods, mussels and small crustaceans, which spread all over the total Black Sea area and did not harm the resident fauna. But four species had an overall impact to the Black Sea ecosystem. This species are the gastropod *Rapana thomasiana* (introduced 19947; origin: Sea of Japan), the bivalves *Mya arenaria* (introduced 1967; origin: North Sea), *Cunearca cornea* (introduced 1984; origin: Philippines) and the combjelly fish *Mnemiopsis leidyi* (introduced 1982; origin: North America).

R. thomasiana became so abundant, that this species could be exploited by fishery and local souvenir industry. At present state the population of *Rapana* seems to be overfished. *Mya arenaria* out-competed the resident small bivalve *Lentidium mediterraneum*, especially at the north western shelf. End of the 1980th the stock of *M. arenaria* became greatly diminished due to hypoxia occurring during the summer in subsequent years. *C. cornea* spread over the whole Black Sea. Due to its thick shell this species can hardly become a food source for fish, but due to its ability to act as biofilter it may be stated as a valuable component of the benthic fauna.

While these above mentioned accidentally introduced species did not harm the ecosystem, the occurrence of *Mnemiopsis leidyi* was related to the dramatically changes of the Black Sea ecosystem during end of the 1980's, beginning of the 1990's. (During 1992 some hundred species of *Mnemiopsis leidyi* were observed as well in the eastern area of the Mediterranean and in the Sea of Marmara. But the intrusion to the Mediterranean was only a single event and did not repeat in the subsequent years.)

In the Black Sea however the outburst of the accidentally introduced species *Mnemiopsis leidyi* end of the 1980th (800 million tons, calculated for the overall Black Sea), the collapse of the anchovy fishery during 1989, and the harsh decline of the total zooplankton biomass combined with the dramatical changes of the zooplankton community were most the striking events. The decrease of the zooplankton biomass after 1988, and especially the collapse of the anchovy fishery, were often related to the outburst of *Mnemiopsis leidyi*.

Beside this impact, the effect of physical and meteorological changes during end of the eighties seems to have an effect to the Black Sea ecosystem as well. Comparison with long-term series of other regions of the world as Atlantic, North Sea, Baltic Sea, waters off California and fresh water lakes as Lake Windermere and the Bodensee showed similar fluctuation patterns of the zooplankton as in the Black Sea. Comparison of the anchovy catches in different upwelling systems of the world showed, that the anchovy stock of South Africa and California collapsed as well in the same period as the anchovy stock of the Black Sea during end of the eighties.

These changes in the zooplankton community and anchovy stocks are discussed in connection with changes in the climatic regime. Striking changes were observed in the NAO (North Atlantic Oscillation), SO (Southern Oscillation), ENSO (Southern Oscillation (El Niño Index), and ALPI (Aleutian Low Pressure Index) in the second half of the 1980s resulting in changes of the hydrological and meteorological regime (river run off, salinity, sea- and air temperature, atmospheric pressure, precipitation and strength of westerly winds) in the northern hemisphere. It is concluded (hypothetically), that possibly, changes in the weather regime during the 1980s could have triggered the changes in the phyto- and mesozooplankton communities of the Black Sea, which caused the conditions for the outburst of *M. leidyi* and the decline of the anchovy stock.

Literature:

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