

ROLE OF THE BLACK SEA AS A DONOR AREA FOR THE CASPIAN SEA

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Abstract

The Black Sea has become an important international shipping destination during second part of twenty century. High shipping intensity has facilitated species invasions into the Black Sea. Many species have successfully established because of Black Sea disturbances in 1970s. Consequently the Black Sea serves as a hub for species that then spread further to adjacent seas: the Sea of Azov, Marmara, Mediterranean and were brought in different ways in the Caspian Sea. This process facilitated after the Volga-Don Canal construction which connected the Black, Azov and Caspian seas. As a result of invasions of the Black Sea native and non-native species greatly increased in the Caspian Sea they replaced the Caspian species and became predominant in communities and in some cases in entire ecosystem.

Keywords: *Alien species, Invasive species, Black Sea, Caspian Sea*

Introduction

The Black, Azov, and Caspian seas (Ponto-Caspian) were united as a single basin several times in the past, most recently in the Pliocene. The Black and Azov seas were reconnected again with the Caspian Sea by the Volga–Don Canal in 1952. Owing to accelerating human activities such as shipping, deliberate stocking, unintentional releases many non-native species have arrived and established in the Black Sea. From the Black Sea some of them were introduced in the adjacent seas and with the ship via the Volga–Don Canal the Black Sea native and non-native species arrived and established with the ship fouling and ballast waters in the Caspian Sea.

Results

The Caspian Sea is an inland brackish water basin with the vulnerable ecosystem to invaders because of its long isolation and high species endemism therefore appearance eurybiontic non-native species easily suppressed native species in occupied community and some affected the total ecosystem.

The appearance of non-native species may be divided into three phases in the Caspian Sea (Fig.1). The first deliberate large-scale introductions since 1930s were aimed at enlarging the resources of commercial fishes or their food organisms. However only two finfish (the mullets *Liza saliens* and *L. aurata*) from the Black Sea and two benthic species (the polychaete *Hediste diversicolor* and the bivalve *Abra segmentum*) from the Sea of Azov achieved significance. The second phase started when the Volga–Don Canal opened in 1952. First species were carried from the Black Sea by ships as fouling organisms. Among them zoobenthic animals and macrophytes dominated. The third phase began in the early 1980s when mainly phyto- and zooplanktonic species began to arrive in ballast water after ballast tank constructions on the ships from the Black Sea [1]. Among non-native phytoplankton species *Pseudo-nitzschia seriata*, *Pseudo-nitzschia pseudodelicatissima*, *Chaetoceros peruvianus*, *Tropidoneis lepidoptera* became widely distributed. Globally significant coccolithophore alga *Emiliania huxleyi* regular developed now in the Caspian Sea [2,3]. In the Middle Caspian, the cold-water community with non-native *Pseudo-nitzschia seriata*, *Cerataulina pelagica*, *Chaetoceros peruvianus* below the thermocline form by the remnants of winter–spring bloom at the end of February–March [2]. Most of these species play now important role in the Caspian ecosystem [3]. Among zooplankton species also the Black Sea species and Black Sea invaders became abundant in the Caspian Sea. The most abundant became the Black Sea Cladocera *Pleopis polyphemoides* widely distributed around the Caspian and comprised more than 50 % Cladocera abundance and the Black Sea non-native Copepoda *Acartia tonsa*, which makes up more than 90% of zooplankton in summer in the most areas of the Caspian, replacing native copepods [1]. Meroplanktonic larvae of non-native *Balanus improvisus* comprised often more than 70%. All these planktonic species although replaced native species became food items for all kilka species [1].

In 1999 the Black Sea invader *Mnemiopsis leidyi* and Black Sea medusa *Aurelia aurita* were recorded [1].

Among benthic species, the mussel *Mytilaster lineatus* was the first accidental invader; it came from the Black Sea with fouling of boats. It replaced Caspian endemic species but became a food resource for roach, bream, zander, sturgeon and stellate sturgeon. Its planktonic larvae are food for planktivorous fish [1].

Two Black Sea prawns, *Palaemon adspersus* and *P. elegans*, were released during mullets introduction, spread all over the Caspian Sea and became a food

source for benthic-feeding fishes including sturgeons and seal. In addition they have commercial value [1]. The polychaete *Hediste diversicolor* and the bivalve *Abra segmentum* have become food resources for fish stocks, first of all sturgeons [1].

The crab *Rhithropanopeus harrisi tridentata* arrived in the Caspian Sea together with fouling from the Black Sea where it was introduced from the North America. The crab became a food for sturgeons.

At present among all non-natives *M. leidyi* is the most aggressive invader that affected all levels of the Caspian ecosystem. Its abundance increases in the Middle and Northern Caspian and area of seasonal spreading increase in the Northern Caspian during last years.

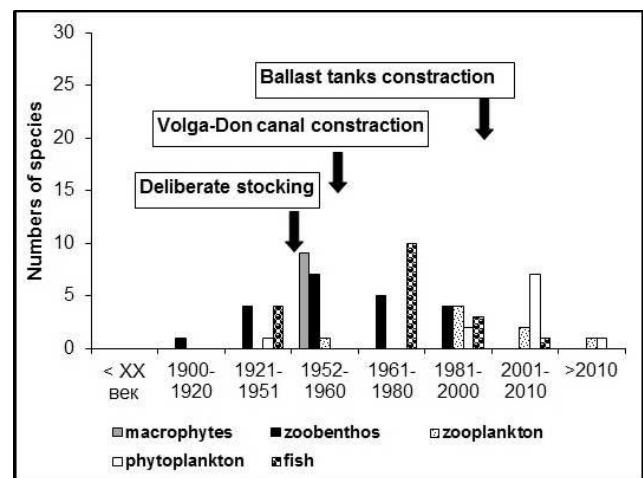


Fig. 1. Chronology of species invasions in the Caspian Sea.

Conclusion

Summarizing this review we may conclude that species invaded from the Black Sea although not numerous in numbers (about 50 species) became predominated in occupied community, replacing native species and therefore recognized as one of the leading treats to biodiversity in the Caspian Sea among them *M.leidyi* imposes enormous economic damage on biodiversity and the Caspian fisheries. Although we may conclude that some of the species became valuable food items for fish when native species almost disappeared after *M.leidyi* invasion.

References

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