Macrozoobenthos of the Coastal Waters of the Azerbaijani Sector of the South Caspian

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Abstract. The article provides information on the macrozoobenthos of the coastal waters of the Azerbaijani sector of the South Caspian in 2021-2022. During the study, 22 species of macrozoobenthic organisms belonging to 5 systematic groups were found in the coastal waters of the South Caspian. Among macrozoobenthic organisms, the dominant group in terms of the number of species was semi-swimming crustaceans (12 species), and 54.5% of the total species belong to this group. By seasons of the year, the maximum number of species of organisms in the coastal waters of the South Caspian was found in the spring-summer seasons (20-22 species), and the minimum number of species was found in the autumn season (13-16 species). The maximum quantitative development of macrozoobenthic organisms varied between 68.91-85.15 g/m2 in the summer season, and the number varied between 331-425 individuals/m². The maximum development of macrozoobenthic organisms was recorded in the summer season at 90.39-109 g/m2, and the minimum development was recorded in the autumn season at 46.38-65.27 g/m2.

Keywords: Caspian Sea, macrozoobenthos, biomass, number, distribution.

1 Introduction

In recent times, changes in the level of the Caspian Sea and the simultaneous intensification of oil extraction have had a negative impact on the ecological state of the Caspian. Macrozoobenthic organisms found in the Caspian Sea in the newly created ecological conditions are of both theoretical and practical importance. Because macrozoobenthic organisms living in the sea are not only the food of important fish, but also these organisms are considered one of the important links in the food chain that has historically existed in the Caspian ecosystem. Taking into account these things, the goal of studying the species composition and quantitative distribution of the coastal waters of the South Caspian in the newly created ecological conditions was set.

The methodology adopted in hydrobiological studies was used to collect and process samples of macrozoobenthic organisms. Qualitative samples of macrozoobenthic organisms were taken with a scoop, scraper and a sigsby comb, and quantitative samples were taken using a Petrsen bottom-draining device with an area of 0.025 m2. The samples collected from the stations were fixed with 4% formalin with the addition of “Bengal-Rose” dye, and the species composition and biomass of the organisms were determined

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in laboratory conditions. The number and biomass indicators of macrozoobenthic organisms were studied by the general methods adopted in hydrobiological studies.

In determining the species composition of macrozoobenthic organisms, reference books were used. (Atlas of invertebrates of the Caspian Sea, 1968, Determinant of the fauna of the Black and Azov Seas, 1969).

It is known that the Caspian Sea is the largest closed water basin in the world, and is of great importance both economically and biologically. The Caspian Sea is distinguished not only by its natural resources, but also by its rare species of living creatures.

However, recently, anthropogenic impacts on the Caspian Sea have increased, which has led to a disruption of its ecological balance. These impacts include oil production and transportation, industrial and domestic waste, river pollution, climate change, and illegal fishing.

Currently, the intensive development of the oil industry has had a serious negative impact on the chemical composition and biological life of the Caspian coastal zones, especially the Absheron Peninsula and its coastal parts.

As you know, since the Caspian Sea is a closed water basin, pollutants entering the sea can accumulate here and remain for a long time. As a result, the amount of oil products, phosphates, heavy metals, and organic waste continues to increase from year to year. This situation worsens the lifestyle of marine creatures, destroys the spawning grounds of sturgeon fish, and leads to a decrease in biodiversity.

On the other hand, changes in the level of the Caspian Sea - that is, the rise and fall of sea level - cause soil erosion, salinization and damage to coastal infrastructure in coastal zones. It is precisely the climate change that is accelerating these processes, disrupting the heat balance of water, which ultimately negatively affects the stability of the ecosystem.

All these factors show that the ecological situation of the Caspian Sea is a global problem that is not the responsibility of just one country, but of all Caspian littoral states. International cooperation, strengthening scientific research and improving environmental policy are extremely important for its protection and ecological restoration.

2 Materials and Methods

Information on the species composition and quantitative distribution of macrozoobenthic organisms in the coastal waters of the Caspian Sea, including the South Caspian, has been provided in the works of a number of researchers. (Алиев А.Д. 1968, Mirzoev G.S., 2019, Mirzoyev G.S., 2014, Mirzoyev G.S. 2017, Taheri, M. Etal., 2011, Aliakbarian A. Etal. 2020).

These authors note that a total of 48 species of macrozoobenthic organisms are found in the fauna of the South Caspian. However, it should be noted that in recent times, no new data have been found on the species composition and quantitative distribution of macrozoobenthos in the coastal waters of the South Caspian. During the study conducted for this purpose, 22 species of macrozoobenthic organisms belonging to 5 systematic groups were not recorded in the coastal waters of the Azerbaijani sector of the South Caspian. Among the noted macrozoobenthic organisms, the group that was the most numerous in terms of the number of species was semi-floating crustaceans. Thus, during the study conducted, it was found that 54.5% of the total species belong to this group, and the following places are mollusks (4 species) and centipedes (3 species).

3 Results and Discussion

In 2021, the number and quantity of macrozoobenthic organisms living in the coastal waters of the Azerbaijani sector of the South Caspian were not stable over the years and seasons and changed under the influence of these factors. Thus, in 2020, 22 species of macrozoobenthic organisms belonging to 5 systematic groups were discovered in the coastal waters of the South Caspian. 18 of the discovered species were found in spring, 22 species in summer, and 13 species in autumn. During the study period, the following species stood out according to their occurrence intensity.

5 groups of organisms participated in the formation of the quantitative indicators of the macrozoobenthic organisms of the coastal waters of the Azerbaijani sector of the South Caspian. Thus, in 2021, this group The average annual biomass of organisms was 68.91 g/m2, and the number was 331 individuals/m² (table 1).

Table 1. Dynamics of development of macrozoobenthos of coastal waters of the South Caspian by seasons in 2021 ((individuals) g/m²)

Groups	Number of species	Chapters			On average
		Spring	Summer	Autumn	
Polychaeta	1	16/0,23	20/0,28	10/0,11	15/0,20
Cirripedia	2	20/4,90	29/6,18	11/2,95	20/4,68
Amphipoda	12	170/4,68	218/5,98	130/2,12	172/4,26
Mollusca	4	110/49,85	132/60,35	78/32,60	107/47,60
Decapoda	3	12/10,30	30/17,60	9/8,60	17/12,17
TOTAL:	22	328/69,96	429/90,39	238/46,38	331/68,91

The maximum development of macrozoobenthic organisms was observed in the spring-summer seasons. Thus, the biomass of these organisms in the spring was 69.96 g/m², and in the summer - 90.39 g/m², and their number varied between 328-429 individuals/m², respectively (table 1). During the study period, the leading group in the formation of biomass was mollusks and centipedes. Thus, 69.1% of the total biomass was accounted for by mollusks, and 17.7% by centipedes.

In 2022, 20 species of organisms belonging to 5 systematic groups were found in the coastal waters of the South Caspian. The number of species found varied depending on the seasons of the year. Thus, the highest species diversity was recorded in the summer season (20 species), and the weakest biodiversity was recorded in the autumn season (10 species). This year, the first place in terms of the number of species in macrozoobenthos was occupied by semi-aquatic crustaceans - 10 species (50%), and the second place was occupied by mollusks - 4 species (20%).

The species Cerastoderma rhomboides, Nereis diversicolor, Mytilaster lineatus, Balanus improvisus, Niphargoides robustoides, Dikerogammarus haemobaphes differ in their occurrence intensity in all seasons of the year.

This year, the average annual biomass of macrozoobenthic organisms was 85.15 g/m², and their number was 425 individuals/m² (table 2).

Table 2. Seasonal dynamics of macrozoobenthos development in the coastal waters of the South Caspian in 2022 ((individuals) g/m²)

Groups	Number of species	Chapters			On average
		Spring	Summer	Autumn	
Polychaeta	1	15 / 0,25	21 / 0,30	12 / 0,12	16 / 0,22
Cirripedia	2	36 / 3,0	47 / 9,40	20 / 6,30	34 / 6,23
Amphipoda	10	228 / 13,85	318 / 16,92	168 / 10,45	238 / 13,74
Mollusca	4	120 / 49,98	158 / 64,85	78 / 39,50	119 / 51,44
Decapoda	3	17 / 13,85	27 / 17,80	10 / 8,90	18 / 13,52
TOTAL:	20	416 / 80,93	571 / 109,27	288 / 65,27	425 / 85,15

The dominant group in terms of biomass in macrozoobenthos was mollusks. Thus, 60.4% of the total biomass falls on them. The second place was occupied by decapods (15.9%). The maximum development of macrozoobenthic organisms in terms of biomass was recorded in the summer season (109.27 g/m2), and the minimum development was recorded in the autumn season (80.93 g/m2) (Table 2).

4 Conclusion

In 2021-2022, 22 species of macrozoobenthic organisms belonging to 5 systematic groups were detected in the coastal waters of the Azerbaijani sector of the South Caspian. The dominant group among macrozoobenthic organisms was semi-floating crustaceans (12 species). Thus, it was determined that 54.5% of the total species fell into this group. In 2021-2022, the maximum number of species of macrozoobenthic organisms in the coastal waters of the South Caspian was found in the spring-summer seasons (20-22 species), and the minimum number of species was found in the autumn season (10-13 species). The average annual biomass of macrozoobenthic organisms found in the coastal waters of the South Caspian in 2021-2022 ranged from 68.91-85.15 g/m2, and the number varied between 331-425 individuals/m2. The maximum development dynamics of macrozoobenthic organisms was detected in the summer season at 90.39 -

109.27 g/m2, and the minimum development was detected in the autumn season at 46.38 - 65.27. The formation of biomass occurred due to 7 species of benthic organisms. Among these benthic organisms, the dominant organisms in terms of biomass were mollusks and decapods. The average annual mass of this group of organisms was determined to be 69.1-17.7% in 2021, and 60.4-15.9% in 2022.

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