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ON ENVIRONMENTAL FACTORS AFFECTING BIODIVERSITY OF THE CASPIAN SEA AND TAKEN ELIMINATION MEASURES

Yusif Mahmudov*

Azerbaijan National Academy of Science, Baku, Azerbaijan

Abstract. The paper deals with the problems of biodivesity of the Caspian Sea. The envoroumental factors that influence on these problems are analysed. Proctical steps necessary to stop the pollution of the sea, develop the measures to improve the ecological situation and biodiversity are suggested.

Keywords: *Caspian sea, biodiversity, environmental factors, industrial waste, complex measures, consequences of environmental problems.*

****Corresponding Author:*** *Yusif Mahmudov, Azerbaijan National Academy of Science, Baku, Azerbaijan, e-mail: diriliqurbani@gmail.com*

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1. Introduction

The Caspian Sea is one of the most unique water bodies in the world. Its coastal areas are home to about 15 million people, including one-third of the former Soviet Union's population. Their livelihoods are directly related to this sea (especially fishing). The Caspian Sea, the most productive body of water on Earth, is the only sea where large stocks of sturgeon (about 95%) are concentrated. Its rich natural resources and the importance of medicine have historically led to the settlement of many people around it**.** However, the situation in the Caspian Sea over the past 50 years has caused serious concern at home and internationally. Because this sea is a living system, it is very sensitive to the effects of human activities. Therefore, a number of factors pose a threat to its biodiversity. The presence of accidentally introduced aggressive species *Mnemiopsis leidyi,* increased pollution and excessive fishing (especially sturgeon) can be attributed to this threat (Aliyev, 2004). Many environmental problems have already threatened the sustainable development of the Caspian Sea, leading to water pollution and rising water levels. Thus, both pollution and fishing pose a threat of a sharp decline in sturgeon stocks (UNDP, 1999). The strong production potential of the basin is a decisive factor in destabilizing its ecosystem. 11.4 bln. m^3 of polluted water, including 10.2 bln. m^3 with Volga, and 522 mln. m^3 of waste with Kura river are discharged into the Caspian Sea. Most of them (497 million m^3) fall to the share of Georgia and Armenia through the Kura River (State Report, 1993). All the waste of more than a hundred developed industrial cities, the natural secretions of 120 million people are collected in the Caspian Sea. The annual volume of polluted water discharged into the Caspian Sea is 1.5 times higher than the annual water balance of the Kura and Araz.

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Today, the list of chemicals dumped in the Caspian Sea includes 200 types of chemical compounds (Salmanov, 1993). Undoubtedly, this affects the biodiversity of the Caspian Sea.

2. Caspian biodiversity

In modern times, biodiversity conservation measures are directly related to biogeographic areas. From this point of view, the division of the territory of Azerbaijan into zoo-geographical areas is of special importance. Modern zoogeography of the Caspian Sea is another problem. Research conducted by Professor G.T Mustafayev and his colleagues helped to solve this problem (Mustafayev *et* al., 2011a). The taxonomic spectrum of vertebrates included in the fauna of Azerbaijan was also studied for the first time under the leadership of G.T Mustafayev. Taxonomic innovations achieved in the last 15-20 years are reflected in the spectrum (Mustafayev *et al*., 2011b). Most of the plant and animal species found in the Caspian Sea, which is rich in biodiversity, are endemic. It is home to more than 100 species and subspecies of fish (40 species of fishery importance) (Askerov *et al.,* 2003), 1 species of seal, 3 species and subspecies of river crayfish, 449 species of phytoplankton, 315 species of zooplankton, 556 species of microbenthos and 306 species of macrobenthos (Kasumov, 1994). One representative of the Cyclostomata class (Caspian lamprey) is spread in our republic. 10 groups of bony fish were registered in the Caspian region (Aliyev, 2004). In addition to sturgeons of high importance in the sea, there are 42 species of carp, 31 species of goby, 17 species of herring and 2 species of salmon (National Action Plan, 1998). In addition, 44 of the 247 species of waterfowl found on Earth are found in the coastal zone of the Azerbaijani part of the Caspian Sea. Some of these birds use the area as a shelter (Babayev *et al*., 2007). The migration route of millions of birds passes through here. Along with the rare and endangered species included in the Red Book of Azerbaijan, there are also species with greater protection importance and global threat The flora of the Caspian Sea consists mainly of coastal and aquatic plants. Compared to animals, their number is small (Sultanzade & Humbatova, 2001). Flowering plants are characterized by a lack of flora .16 species of algae are endemic to the Caspian Sea (Aliyev, 2004). Unfortunately, over the last 50 years, the unique fauna and flora of the Caspian Sea have decreased, many of them have been completely destroyed, and large areas have become "dead zones" (Salmanov, 1993). In general, the Caspian Sea, characterized by its abundance of natural resources, has changed significantly over the centuries under the influence of various factors, and its biological productivity has significantly decreased. This is primarily due to anthropogenic factors. Among these factors, it is necessary to mention the names of petrochemical, mechanical engineering, leather, transport and timber industries. Our research shows that during the production process, generated polluted water is often discharged directly into the Caspian Sea without treatment, which seriously damages its ecological environment (Dirili, 1996; 1998; Mahmudov, 2014).

3. Influence of anthropogenic factors

Even in the 19th century, when industrial enterprises were poorly developed, we came across reports of pollution of the Caspian Sea with harmful substances. According to sources, the severe crisis in Russia in 1881-1882 and the ongoing long-term

depression also aggravated the situation in the Baku oil industry, which supplied fuel to the Russian market. Therefore, in the oil industry, oil and fuel oil reserves were often discharged into the sea and lakes in Absheron, burned and destroyed (Bahramov & Mahmudov, 2014). This led to the constant environmental pollution of Baku and the Absheron Peninsula as an industrial center. As a result, the health of the population and labor activity were seriously damaged. On the other hand, the excessive pollution of the Caspian Sea is accompanied by the poisoning of living organisms, periodic explosions in oil fields along the coast, strong oil fountains from wells, polluting water bodies and soil, rendering them unusable. Unfortunately, this process continued in the following periods, during the Soviet era, the Caspian Sea and its environs could not get rid of environmental problems. It is true that during this period the country paid more or less attention to the protection of the environment. For example, in order to solve the environmental problems of the Caspian Sea through the efforts of Heydar Aliyev in 1978-1981, 114.8 mln. manats (rubles) were allocated (Hasanov, 2013). It should be noted that after the occupation of the Azerbaijan People's Republic by the XI Red Army in April 1920, the republic's surface and underground resources were nationalized, and in the first year of Soviet rule (1920) a sanitary service was established to control environmental pollution. However, the practical solution to this problem was not given due attention, and the creation and development of new industries was often not coordinated with environmental protection. Azerbaijan's offshore oil industry created a new important problem from the point of view of modern history - the annual deterioration of the ecology of the sea and the Absheron Peninsula as a whole, and the search for solutions. The emergence and discovery of the offshore oil industry in the 1950s, and the intensive exploitation of new oil fields, led to severe pollution of the Caspian Sea (Bahramov, 1999). In general, the former USSR did not pay much attention to environmental protection. Only after the second half of the twentieth century did this problem begin to receive more or less attention. If in the first half of the twentieth century we could talk about the positive and negative aspects of this process, the 1950s were already talking about large-scale environmental and social losses. It should be noted that the attitude to environmental problems was non-existent until the 1950s. For the first time, on June 16, 1959, at the second session of the Supreme Soviet of the Azerbaijan SSR of the Fifth Convocation, the issue "On nature protection in the Azerbaijan SSR" was included in the agenda. The following problems were reflected in the discussion of the issue: 1. Protection of land. 2. Protection of forests. 3. Wildlife protection. 3. Fish protection. 4. Protection of underground resources. 5. Protection of water and air from pollution. 6. Protection of cultural monuments. Thus, the Law "On nature protection of the Azerbaijan SSR" consisting of 11 articles was adopted. As can be seen, water protection was one of the most controversial issues. It is no coincidence that in the same year the "Committee on Water Supply, Protection and Use of Water Resources" under the Council of Ministers of the Azerbaijan SSR began to function. The fact that without treatment polluted water flowed into the Kura, Araz, Goshgar, Paragachay, Gilgilchay, and Oxchuchay water basins, forced them to take this step (Aliyev, 1969). At that time, the construction and reconstruction of treatment plants and water supply circulation system were weak. The efficiency of the existing facilities was low. The industrial cities of the Caspian littoral states, including Baku, dumped large amounts of hazardous waste from the oil and metallurgical industries into the sea. Such pollutants were mostly discharged from the oil-producing regions (Neft Dashlari, Pirallahi, Sangachal, Gobustan) into the sea, adversely affecting fish and other aquatic

animals. In connection with this, in the late 1960s, compared to 1913, the catch of sturgeon decreased by 21 times, and the catch of other large fish decreased by 7.9 times (Aliyev & Akhundov, 1970). The chemical, petrochemical and oil refining industries, offshore and onshore oil companies, metallurgy and transport companies were the most polluting areas of the Caspian Sea. Daily 20 mln. m^3 of oil-mixed dirty water was discharged by these companies . Baku plants alone send 1 million tons of polluted water (Gul, 1968). In 1966-1967, 150,000 m^3 of dirty water flowed into the sea from the capital every day, rendering it unusable. As 80% of the cargo transported by sea was oil products, 15,000 tons of oil was spilled into the Caspian Sea from ships every year. The oil fields of "Neftgazchikharma" also had a negative impact on the small lakes around Baku: Boyukshor, Khojasan, Kirmizi, Bulbula lakes had intolerable ecological conditions, and their produced water turned into puddles. Polluted water overflowed into the sea, turning the soil into a swamp, evaporating and causing toxic substances to enter the atmosphere (Ahmadov, 1989). Regardless of the location of oil production (onshore or offshore), the level of pollution in the Caspian Sea was many times higher than the norm adopted during the Soviet era. By the end of the Soviet era, the concentration of oil in Baku Bay was 10 times higher than the established maximum. Until 1968, all industrial wastes, including drilling and well repairs, oil and gas production, and the collection, transportation, and storage of oil, were discharged into the sea. The daily volume of produced and polluted water discharged into the sea from offshore oil fields alone was more than 36,000 m^3 (Aliyev, 2003).

During this period, the construction of a series of reservoirs on the Kura River was also ecologically flawed. Reservoirs built on the rivers had a impact on the reduction of fish stocks in the Caspian Sea. Thus, the hydrological balance was disturbed due to the water taken from the rivers for irrigation purposes, and the waste discharged from the oil rocks into the sea destroyed the fish stocks. It is known that the Caspian Sea had a special place in the Union and in the world due to the importance of fishing. It accounted for about 40% (0.4 thousand tons) of fish in the country's inland waters. The richness of species and catch of fish have been declining year by year due to the environmental pollution of the sea, and some species have become extinct. If in 1932-1936 the production of industrially important fish species (sturgeon, carp, herring, pikeperch, bream) was 400,000 tons, in 1986-88 this figure fell to 70,000 tons. Due to the discharge of polluted water into the sea, a sharp decline in water flow, the increase of oil and gas fields in the open sea, etc. caused mass deaths of sturgeon on the northern shores of the Caspian Sea. 425,000 tons of harmful organic and mineral substances entered the Caspian Sea annually from the mouth of the Volga River. In the territory of Astrakhan region, 2-6 times more oil compounds were registered in the sea water. 70% of oil and 90% of gas produced in the country are extracted from offshore wells, in return for which 590,000 tons of suspended solids, 32,000 tons of nitrite, 29,000 tons of oil products, 670 tons of zinc, 490 tons of copper and other substances were discharged into the Caspian Sea. 21,000 tons of organic pollutants were dumped into the sea from Baku Bay during the year. It is no coincidence that for the last 30-40 years the sea has longed for clean water. Therefore, fisheries lost their significance in a large area from the Absheron Peninsula to Cape Bandovan (in the past, where salmon, herring and kutum were abundant) (Yunusoglu, 1991).

One of the main problems for the Caspian Sea was the spillage of large amounts of oil into the sea from the wrecked ships. In addition, oil tankers fill tanks with water to form ballast, which is then discharged into the sea. As a result, an oil screen formed on

the surface of the sea. This led to the mass death of plankton and microorganisms, and the starvation of fish. From petrochemical enterprises "Azneftkimyamash PU" discharged 78,000 m^3 of polluted water into Baku Bay per day. Each liter of such water contained 35-150 mg of oil product. This was 700-3000 times more than the norm. "Khazardenizneftgazsanaye PU" released 108,000 m^3 of sewage into the sea every day during drilling. As we have mentioned, as a result of accidents, oil and oil products were mixed with sea water. For example, in February-March 1988, 240.8 km^2 or more than 24,000 hectares of floating oil slicks were discovered on the surface of the sea in the "Neft Dashlari" region. The volume of that oil was more than 188 tons on some days. Observations made by "Khazarsunazarat" with the "Azerbhidrometrologiya" department showed that the ecological situation in the "Neft Dashlari" region had become increasingly tense (Ahmadov, 1989). Serious accidents in the deeper layers were not uncommon. The aggravation of the situation did not allow the localization of the field by evocative means and the purification of oil from the upper sea. Between 1981 and 1991, there were 20 major accidents (spills of oil into the sea), which were the enormous damage to the nature (Mansurova, 1991).

Increased oil production and transportation in the Caspian Sea causes water pollution in the area. As a result, the concentration of toxic substances in the water increases due to waste, and some functional changes occur in the body of fish living here. In the study of this issue, it was found that when the concentration of crude oil is 100 mg/l and 150 mg/l, the amount of lipid peroxidation products increases sharply in both muscle and liver tissues. At 10 mg / l, the amount of lipid peroxidation products in both tissues doubles in 20 days. When the concentration of crude oil in the water is 150 mg/l, fish live for a short time (Allahverdiyev and Gurbanova, 2008). The mixture of one ton of oil with water creates a special layer covering the surface of the water in an area of 2.6 km^2. Thus, living things perish due to the weakening of the light flux, photosynthesis and oxygen supply of water. (Askerov *et al*., 2007).

The sturgeon feeds on small benthic animals. Bottom contamination has a negative effect on benthicin reduction, indirectly on sturgeon growth and health. Severe pollution of Baku Bay has a negative impact on its fauna and flora. In the last 20 years, especially at depths of 100-200 m, the level of oxygen in these areas has dropped to 40 %, and the diversity of bottom fauna in polluted areas has decreased three times (National Action, 1998). The impact of oil-containing sand, produced water, drilling mud and solution, as well as some reagents used in exploration and drilling is very large. It was determined that the lethal concentration of drilling mud for aquatic organisms in the Caspian Sea is 1.5-2.9 g/l, and the final limit is 2.0-2.3 g/l. It was studied that the harmless concentration of drilling cuttings for the representatives of the Caspian fauna is 0.3-0.4 g/l (National Action, 1998). Studies show that fish escape from contaminated areas (sturgeon, salmon, herring, shama, kutum) with an oil concentration of 2-3 mg/l. When there are strong storms, herring can be seen in the area, but they leave quickly. Over the past 25 years, pollution of the sea with mutagenic and cumulative, toxic substances has led to changes in the genetic code of organisms living here. Chronic pollution of the Caspian Sea leads to a decrease in its biological responsibility, the spread of carcinogenic diseases in fish and invertebrates (Kasumov, 1998).

The height of contaminated oil and oil products accumulated on the seabed near the wells reaches a height of 1.5 m. The thickness of oil products collected in the Baku coastal zone reaches 2.5 m. That is why there is very little flora and fauna here. A number of different species have been discovered in new oil fields and oil production

zones. For example, there are 11 species of seaweed, 17 species of sea animals and 10 species of fish in the "Azeri" field. There are 43 species of seaweed, 29 species of zooplankton, 16 species of animals and 9 species of fish around the "Chirag" field. At present, the conservation of biodiversity in these fields is one of the biggest challenges. Now the study of the state of flora and fauna occupies a special place in the action plan for the development of oil fields (UNDP, 1997).

It should be noted that the negative impact of not only the oil industry, but also chemical enterprises on the Caspian Sea is quite high. For example, about 1,200 tons of oil products, 2,600 tons of chemical acids, 130 tons of surfactants, and 35 tons of hydrocarbons were discharged into the sea annually from Sumgayit's chemical enterprises (Ismailov, 1990). Contamination of oil products and phenol in the "Baku Bay" and "Neft Dashlari" regions of the Caspian Sea was 2.5 and 8 times higher than normal, respectively. The mixture of oil products in the water of Baku Bay was 18 times higher than the allowable level, phenol mixture was 33 times higher, 5-8 times higher in Shikh-Sangachal region, 3-11 times higher on the shores of Sumgayit, as a result Baku Bay and Sumgayit shores became a dead zone for aquatic animals (AzETETII, 1989).

Contaminated water containing many harmful substances was discharged into water basins from other production areas. The Baku Iodine and Neftchala Iodine-Bromine plants also dumped large amounts of sewage into the sea. Each liter of sewage discharged into the Caspian Sea and Kura River by the enterprises of "Azerbaligsanaye" PU contained 100 mg of various fats, sulfur and nitrogen compounds, fish scales instead of the norm of 0.05 mg (Ahmadov, 1989). In addition, "Baku Leather and Leather Enterprises" PU discharged sewage containing chromium, phenols, sulfates, etc. sulfur compounds produced from tanning of the leather. In general, the daily volume of industrial waste of "Gon-Deri" PU was equal to 8000-9000 m^3. The content of chromium sulfate in polluted waters was found to be 150-200 mg/l, phenol 120-150 mg/l, sulfides 80-120 mg/l, and sulfates 285-300 mg/l. When the amount of phenol in water bodies exceeds 1 mg/m^3, there is a threat to the lives of living things. During the day, 1 ton of phenol is released into the sea, resulting in the disposal of millions of cubic meters of seawater and the destruction of living things there (Garibov *et al*., 1987). The agro-industrial complex of the republic also played a significant role in the pollution of water bodies. Toxic chemical compounds in each irrigated area were the number one in the country. In 1984, 35,000 tons of various toxic chemicals and more than 400,000 tons of mineral fertilizers were used in the country. Due to the lack of storage facilities for toxic drugs and mineral fertilizers, most of them are stored in open areas and are filtered during washing and irrigation and discharged into rivers and drainage collectors, from where they flow into rivers and the sea (Mansurova, 1995). The Kura and Ural rivers also play an important role in the pollution of the Caspian Sea. Sewage from Tbilisi, Rustavi and industrial enterprises, as well as various toxic substances used in agriculture, enter the Caspian Sea through the Kura River. Sewage discharged into the sea from the cities of Baku, Sumgayit, Makhachkala, Astrakhan, Turkmenbashi, Rasht, Anzali on the shores of the Caspian Sea is one of its main pollutants. Contamination of the bottom, which is the most polluted Baku Bay, leads to a decrease in organisms and benthos, and in some places the extinction of bottom fauna. Pollution of sea water has caused great tension in the ecological conditions of the Caspian Sea, and created an ecological crisis in some of its coastal regions. The ecological conditions of the sea were also negatively affected by the creation of a number of reservoirs in the Volga and Kura basins. This has deprived a number of very valuable fish species of their

traditional spawning grounds. Thus, the construction of hydrological facilities on the major rivers flowing into the Caspian Basin blocks the flow of boats to the rivers for reproduction. For example, after the construction of the Mingachevir and Bahramtepe dams on the Kura and Araz rivers, their natural breeding grounds decreased (National Report, 2004). Environmental conditions are also affected by sea level fluctuations. When sea levels fall, salinity increases, fish feed in coastal areas, and the productivity and area of the area decreases. When the sea level rises, the salinity of the water, especially in the areas adjacent to the deltas of large rivers, decreases, and food reserves increase.

Although the development of small navies is economically and militarily important, they also play a significant role as a polluting factor. Sources of pollution of waters discharged from large ships. Construction of new ports, shipbuilding, transportation of oil and oil products, etc. is one of the main causes of water pollution. The creation of navies in the Caspian littoral states is one of those factors.

The source of pollution of the Caspian Sea can not be attributed only to physical and chemical reasons. Biological pollution also plays a role in the problem. So, a few years ago, aggressive jellyfish were found in the Turkmen sector of the sea. This North American invertebrate, Mnemiopsis leidyi, which falls into the Caspian Sea via the Volga-Don Canal, has grown so much in the Caspian Sea that its mass exceeds the total mass of marine bioresources. This living organism has no rival in the Caspian Sea. Climatic conditions are favorable for its reproduction and survival. The forage base of Mnemiopsis leidyi is zooplankton, spawn and larvae of spawning fish (herring, mullet, anchovy, etc.). It was thought that the extinction of anchovy and herring, the main prey of sturgeon and seals, would lead to a sharp decline in sturgeons and seals. It could be the biggest environmental disaster in human history. For comparison, the industrial significance of valuable fishing has decreased due to the decrease in their number in the Azov and Black Seas National Report, 2004).

Socio-political processes and conflicting conflicts in the Caspian littoral countries have also affected the marine environment. For example, the Russo-Chechen war, which began in 1991, has created certain problems in the marine ecosystem. Thus, the amount of hydrocarbons on the Russian shores of the Caspian Sea has increased significantly due to the Chechen war. 20-30 military wastes were registered in the basin during the year. In addition, the number of man-made accidents has increased significantly.

Many of these and other problems concern not only Azerbaijan and other Caspian littoral states, but also other countries around the world. Therefore, on June 13, 1991, the First International Conference on the Caspian Sea was held in Baku. The conference participants appealed to the governments of the Caspian littoral states and international organizations regarding the situation. This did not have a serious impact on the solution of the problem. If we consider that the situation in the Caspian Sea was still considered the beginning of the crisis period in terms of fisheries and sanitary-toxic properties at the end of the Soviet Union, then the significance of this appeal becomes clear. In 1992, the Volga Basin and the Caspian coastal zone were called "ecological disaster zones" for similar reasons.

Interestingly, although the appearance of oil rigs at sea was once considered an achievement of science and technology, some scientists have given alarming reports that it will have harmful consequences in the near future. About 50-60 years later, those ideas came true. The Caspian Sea has already become a global problem. Its ecological

condition is now a cause for concern around the world. Baku, being the most polluted part of the Caspian Sea, has gained the status of a biologically "dead bay".

On September 20, 1994, an agreement entitled "Contract of the Century" was signed in connection with the joint exploitation of Azerbaijani fields. The agreement, signed by world-renowned oil corporations, aimed to bring Azerbaijani crude oil to the world market. Other oil producers in the region have shown similar interest. Oil and gas production centers have been opened in Kazakhstan and Turkmenistan, as well as in Absheron. The ecological situation in these regions is not good compared to our republic. Because the oil extracted here contains a lot of mercaptans and more sulfur compounds. Such oil needs to be refined in a special way, which creates additional problems. Environmental standards must be taken into account in this process, otherwise the entire Caspian Sea area could deteriorate. New institutions were needed to take adequate action. One of such organizations was established in 1994 in Baku by the joint efforts of ecologists. This organization, called the International Caspian Fund, was aimed at solving the problem of pollution of Baku Bay (Hasanov, 1997).

Currently, the ecological situation in the Caspian Sea is tense. The problem is even more acute in the offshore zone, where dead zones have already formed. In some places, the cost of pollutants exceeds the norm by 10-20 times. The sources of pollution in the Caspian Sea are very diverse. However, they can be grouped as follows. 1) Pollutants from rivers flowing into the Caspian Sea, 2) Pollution from cities and industrial facilities in the coastal zone, 3) Pollution from offshore oil production and transportation, 4) Pollution from flooded sources in the coastal zone as a result of rising Caspian Sea level. The first sources of pollution are pollutants brought to the Caspian Sea by rivers. According to the data, 75 mln. tons of oil products are imported, 95% of which falls on the Volga River. Poaching has become widespread due to the lack of a unanimous agreement between the Caspian littoral states to protect the sea. Increased pollution and poaching, as well as the failure of fish farms around the Caspian Sea to work at full capacity, have created a problem of depletion of many species in the sea, especially sturgeon.

Changes in sea levels have always caused socio-economic and environmental problems in the coastal zone. For example, when the level drops, all hydraulic facilities, including ports, need to be rebuilt. The area of the shelf zone where the Caspian fauna is inhabited and developed is declining, preventing fish from crossing the rivers to spawn (Newtimes.az).

4. Measures taken

In order to improve the environmental situation in the Caspian Sea, certain measures are being taken to address the issues arising from the decree "On some measures to protect the Caspian Sea from pollution" signed by the President of the Republic of Azerbaijan on June 20, 2007. The decree notes that the untreated discharge of wastewater from coastal areas has polluted the Caspian Sea with harmful chemicals and, as a result, degraded its unique biological diversity. The implementation of appropriate measures serves to restore the marine biodiversity and recreation area by reducing the anthropogenic impact on the Caspian ecosystem, and this is already yielding positive results. Based on this order, modular local wastewater treatment plants meeting international standards have been installed on the shores of the Caspian Sea. These devices consist of equipment manufactured in

Italy, USA, Germany, Taiwan, Turkey, France and are equipped with a module in Turkey. Taking into account the oil storage equipment, these facilities have a total capacity of treating 4070 m^3 of wastewater per day.

According to the Decree of the President of the Republic of Azerbaijan dated 28 September 2006 on the "Comprehensive Action Plan for 2006-2010 to improve the environmental situation in the Republic of Azerbaijan", the Hovsan canal should be turned into a closed canal by the end of 2010 and a biological treatment plant had to be built at the entrance to the Caspian sea .

Despite the expiration of the period mentioned in the order, about 4,000 m of the canal was closed, and no measures were taken in connection with the construction of treatment facilities at the outlet to the sea (http://eco.gov.az/en/102-xezer-denizi). As the Caspian Sea is a closed water basin, the development of industry, the development of natural resources and the deployment of productive forces in the coastal areas determine the ecological situation in the Caspian region as a whole. Success in solving the existing problem requires interstate cooperation. As it is known, for many years the issues of the Caspian Sea were discussed within the framework of the USSR-Iran talks. The talks focused on the development of maritime industry and the expansion of trade relations with the sea, without taking into account the protection of marine biodiversity. However, after the restoration of independence in our country, some progress is clearly felt in this direction. For example, one of the main provisions of the Framework Convention for the Protection of the Caspian Sea, signed by the representatives of the five Caspian littoral states in Tehran on November 4, 2003, is "Prevention, Reduction and Control of Pollution" and "Protection, Preservation and Restoration of the Marine Environment". The units created new opportunities for constructive cooperation between the parties. In our opinion, if each of the Caspian littoral states adopts relevant domestic laws and decisions for the "protection of the Caspian Sea and the environment", it can be of effective importance for the region. It is no coincidence that the Caspian littoral countries approach cooperation in the field of environmental protection in the region in two more important and urgent areas: 1) use and protection of fish resources, 2) joint cooperation to reduce pollution and other wastes. From this point of view, it cannot be said that little has been done in this area. Of course, many programs, projects and measures have been developed and implemented over the past 20 years to eliminate the problem. For example, back in 1995, the Caspian Environment Program was implemented with the support of the European Union and major international financial institutions, given that the Caspian Sea is a unique ecosystem and the importance of its protection (Aliqizi, 2003). Relevant governmental and non-governmental organizations of the Caspian littoral states have been involved in this work. The Caspian Environmental Program has been operating in Baku since 1998 with the participation of the Caspian littoral states and international support (UN Development Program, Environment Program, World Bank and EU TACIS Program). The main goal of the program is to promote the management and sustainable development of the Caspian Sea environment. Initially planned for four years, the program mainly implemented the following activities:

1. Carrying out Transboundary Diagnostic Analysis of the Caspian Sea;
2. Preparation of the National Caspian Action Plan;

3. Preparation of the Framework Convention for the Protection of the Environment of the Caspian Sea;

4. Implementation of the Superior Investment Bag Project.

For this purpose, thematic centers have been established in the Caspian littoral states in various areas (pollution control, biodiversity protection, combating desertification, legal and economic tools, etc.)

The private sectors also assist in biodiversity monitoring and research. For example, British Petroleum (BP) monitors both coastal and marine biodiversity. The Caspian Sea Biodiversity Strategy and the Caspian Sea Environmental Program (GEP) are supported by several donor organizations (UEP, UNEP, UNDP, World Bank, TACIS). The goal of the program is to address cross-border environmental issues such as pollution and biodiversity loss through coordinated measures. Under the leadership of GEP, a "Biodiversity Strategy and Action Plan for the Caspian Sea" was developed in 2001 with the participation of the Caspian littoral states. It is good that due to the gradual increase in oil and gas production in the Caspian Sea, companies working in this field assess the environmental impact of each project they start and take into account the results of this analysis during operations. In accordance with the UN Convention on Biodiversity, a State Commission was established to ensure the implementation of the commitments made by the Republic of Azerbaijan and the implementation of comprehensive measures to prevent the threat of extinction of genetic resources (Aliyev, 2004).

The order of the President of the Republic of Azerbaijan dated January 13, 2003 "On ensuring the regulation of the use of the shores of the Caspian Sea" is of great importance due to the negative impact on the environment as a result of the construction of many facilities in coastal areas without observing environmental and sanitary norms (Aliyev, 2004).

State measures taken to create an appropriate legal framework, especially in the field of legislation, play an important role in solving this problem. Thus, among the international conventions on the environment ratified by the Milli Majlis of the Republic of Azerbaijan, "On Biodiversity", "On the use and protection of transboundary watercourses and international lakes", "Rare and endangered fauna", which are also important for the problems of the Caspian Sea. and “On international trade of flora species”, “On prevention of pollution from ships”, “On wetlands of international importance”, etc. conventions [42], about 30 adopted environmental laws, including “On Fisheries” (1998), “On Environmental Protection” (1999), “On Ecological Security” (1999) and others. Laws and decisions (Khuduoglu, 2006) serve as a basis for overcoming long-standing environmental problems for the Caspian region.

The measures taken in the field of environmental education have also been successful. Thus, the republican competition "Our Caspian" organized by the Republican Center for Ecological Education and Practice on the Caspian Sea and its ecology on the basis of the relevant order of the Ministry of Education is a positive step towards environmental education of schoolchildren in the Caspian region Mahmudov, 2015).

5. Conclusion

The Caspian Sea has a special role in ensuring the ecological balance of Baku, as well as the region. However, the legal status of the sea remains undefined, limiting its protection from pollution and the possibility of taking multilateral measures to protect its rare fauna. Nevertheless, Azerbaijan is a country that has unilaterally invested heavily in protecting the Caspian Sea from pollution and rescuing one of the world's rarest fish species, especially sturgeon, and creating the necessary infrastructure. This activity has gained momentum over the past few years. It should be noted that in 2010 alone, about 1 billion manat was spent on the creation of infrastructure for the treatment of wastewater discharged into the Caspian Sea. The Republic of Azerbaijan is the only country among the Caspian littoral states that implements comprehensive measures to clean the sea and its waters from pollution. Continuation of these measures in the coming years will result in further cleaning of the Caspian Sea and the removal of the Absheron Peninsula from the sources of pollution of the Caspian Sea.

Practical suggestions. In order to increase the biological productivity of the Caspian Sea and more effectively protect its biodiversity, the legislative framework must be improved;

Priority should be given to the organization of public monitoring, along with periodic government measures to increase the efficiency of the use of the Caspian marine environment and the natural resources of the coastal strip, and to conduct a transparent environmental assessment process;

Ensure maximum involvement of environmental NGOs in Caspian-related projects;

Environmental education should be expanded in order to popularize attitudes towards the environment;

Periodicals and electronic media reflecting the ecology of the Caspian Sea and its environmental problems should be established, or their number and frequency should be increased;

Given the global importance of the environmental problems of the Caspian Sea, materials on the ecology and problems of the basin should be included in the relevant textbooks of secondary schools in a separate section, and more space should be allocated to this issue in out-of-school institutions.

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