

ECONOMIC POTENTIAL AND CONSERVATION OF BIODIVERSITY OF THE CASPIAN SEA

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ABSTRACT

This paper studies the economic potential of the Caspian Sea, which is mostly conditioned by the presence of rich hydrocarbon reserves, and reviews the environmental impact caused due to the development of oil and gas industries, production and transportation of fuel, as well as the issues of biodiversity of this basin. The Caspian region is the main source of autochthonous endemic bio-resources. The coastal states have recognized the urgency of the protection of the marine biodiversity, prevention of the depletion of fauna and flora, as well as the effective use, enhancement, and overall sustainability of these activities as a major strategic target. High impact on the Caspian Sea caused by large industrial production and fuel transportation makes necessary to foster the cooperation between the Caspian basin countries and undertake large-scale measures of prevention to provide sustainability in this region. In this context, current situation and main priorities related to the development of oil and gas industry and the relevant environmental impact are analyzed.

Keywords: economic countries, Caspian Basin countries, biodiversity, environmental, contamination

1. INTRODUCTION

Collapse of the post-Soviet space resulted in formation of a group of independent states in the Caspian region, and the region became the spotlight of attention of the world's leading states, receiving a promising perspective territorial status for its economic potential. The region covers an area of 3.5 million km², which constitutes for more than 10% of the world's closed drainage areas. With the Caspian Sea in the central part, the basin extends 2500km from the north to the south and 1000km from east to west. There are nine independent states in the region, and five of them are the Caspian Basin countries, which have direct access to the sea. The economic-geographical position of the area is characterised by its location at the intersection of the Eurasian continent, 6700km

coastlines, and many commercial seaports with historically established infrastructure potential, operating throughout the year.

Currently, the region is resided by 378.4 million people (01.01.2016), which makes 5.2% of the world's population [1]. There are more than 200 large urban agglomerations in the Caspian Sea area, and over 220 industrial complexes with strong impacts on the coastal waters' ecological status. The key regional distinctive feature includes its high economic potential, leading position in world hydrocarbon fuel supply, and, most importantly, central position in the east-west and north-south trade corridor. In such a situation, the growing use of the region's economic potential envisages the protection of the ecological security of the Caspian Sea, including its biodiversity, and defines the sustainable development of the coastal states as a major strategic task [2].

According to the estimations of British Petroleum (based on the final report for 2014), oil and gas reserves of the five Caspian Sea countries make 40.8 billion tonnes and 86.8 trillion m³ respectively, which comprise 17.0% of global proved oil revenues and 46.4% – natural gas reserves.

In addition to the hydrocarbon reserves, the Caspian region is also the main source of autochthonous endemic bio-resources. As a result of studies conducted by biologists, 1809 species of fauna, including 101 species of fish, 415 of vertebrates, Caspian mammals – seals, and 728 species of flora have been identified in the Caspian Sea [3]. At present, the biological resources of the Caspian Sea are estimated at 2.9 million tonnes. The basin, gather together the 90% of the world's sturgeon fish stocks, which is a major part of the food and export caviar. In this regard, it necessitates the effective use of fauna and flora resources and the need for their protection. This factor becomes a major stimulus for constructive cooperation among the coastal states.

2. SITUATION ANALYSIS

In general, the coastal states have recognised the protection of the marine biodiversity, prevention of their depletion, their effective use, enhancement, and overall sustainability of this field as a major strategic target and included them in the scope of activity.

One of the factors, contributing to the improvement of economic potential of the Caspian region, is the fact that the region has a diversified marine, ground, and pipelines transport network, their leading role in economic development and becoming of the Eurasia a strategic transport corridor [7]. Located at the intersection of Central and Near East, Central Asia, the Caucasus, including the southern part of Russian Federation, the Caspian region plays a crucial role in the provision of foreign and economic relationships of different countries, which makes it a region of economic interest for leading world powers. According to the estimations of international experts, foreign trade turnover between Europe and Asia is expected to rise 1.5-2.0 times over the next five to ten years, and the main transit corridor for the transportation of these cargoes is the Caspian region [6]. The attractiveness of this corridor is also related to 10-12 days faster delivery to consumers than other traditional transportation routes, while their cost of transportation is 20% cheaper [5].

Diversification trends, works on increasing the number of tankers, and their loading capacity are also accompanied by rise in production. According to OPEC's 2014 data, oil and natural gas production in the Caspian basin totalled 837.9 million tonnes and 969.3 billion m³, making 19.9 per cent of world oil production and 27.2 per cent of natural gas production. It should also be noted that 75% of oil and 67% of natural gas produced in the region countries fall to the

share of 160 km shelf zone of the Caspian Sea.

According to statistical reports of 2014, balanced comparison of oil and gas utilisation by region states with production intensity indicates that this ratio fluctuates between 19%: 6.3% and 27.2%: 20.2% respectively. Over-consumption of oil and natural gas, compared to their production, is almost a characteristic of all the Caspian states. It is no coincidence that, at present, such states of the regions as Azerbaijan, Kazakhstan, and Islamic Republic of Iran are mainly characterised as world oil exporters, while Russian Federation and Turkmenistan are world oil and gas exporters in the international geographic division of labour¹⁰. This shows that the countries of the region will strive for the strengthening of their economy and formation of national revenues in the near future by increasing the export of hydrocarbon fuels.

The analysis of the economic potential of the Caspian region shows that the sea basin gradually transforms into a centre of hydrocarbon fuel production, transit transportation and its infrastructure service corridor, and a strong residential area [11]. In these circumstances, considering the strategy of ensuring the environmental safety of the sea, which is an ecologically sensitive area, as a key driving force in overall development is among the main issues.

3. SPECIFIC PROBLEMS AND THEIR EVALUATION

One of the major issues is the preference of a comprehensive approach in defining the directions of the solution of the ecological problems of the sea basin. Therefore, the main pollutants of the offshore basin are divided into four groups, each being individually analysed to ensure optimal solution of the problem:

- oil and gas production on the continental shelf of the sea and contaminating effects of its transportation process;
- impacts of the rivers, flowing into the basin and pollutants, brought by those rivers, on the aquatic environment;
- contaminating impacts of life activity on the coastal zones in the cities;
- contaminating impacts of areas, exposed to floods as a result of sea level fluctuations, on basin;

Oil and gas production on the continental shelf of the sea is distinct in polluting effects to environment at all stages. Especially, this is evidenced in the course of geological exploration, drilling of production and exploration wells, oil and gas production, preparation of oil for transportation, oil storage, and at the same time, in the stages of transportation and processing of products [12].

Provision of environmental safety and assessment of risks for each stage in these processes is a targeted issue as well. According to the IOSD (International Organisation for Sustainable Development), the frequency and volume of repetition of oil spills, covering all stages of oil and gas production operations, varies between the rates of 102 times: 15.9 thousand tonnes, with 1.5 thousand tonnes of oil per every observed spill [13].

Ecological consequences of spills followed by accidents indicate that it is important to develop a strategy for interstate joint fight against oil spill in the Caspian basin, where large-scale oil projects are implemented, and adopt specific regulative loss norms for aquatorium as a closed water basin.

At present, the Russian Federation has identified the “petroleum losses norms” as the following, depending on the activity types:

- a) 420 tonnes per 1 million tonnes of oil transportation by railways;
- b) 171 tonnes per 1 million tonnes of oil;
- v) and 1400 tonnes per 1 million tonnes of oil loading by tanker [9].

In addition to the losses norms, it is of particular importance to ensure that some of the volume of production is spent for proportionate environmental sustainability in order to ensure the basin's environmental security. Although Russian Federation considers it to be 1% acceptable option, it can be concluded that these costs are not enough to minimise the contamination trend.

Also, importance of the adoption of this, as a normative option at 1.5-2.0% production volume for the Caspian coastal states as a final result of sustainability, has been determined by mathematical calculations. The following analysis materials of pollution once again prove that this is the justified option. Therefore, it is necessary to try that the status of a wasteland following the utilisation of oil and gas resources would not be attributed to the Caspian Sea basin, which is rich in bio-resources, and could remain as an inexhaustible wealth for the future generations.

4. CONCLUSION

However, the analysis of the environmental situation in the Caspian Sea indicates that the amount of pollutants in the basin continues to grow every year and pollutant absorptive capacity of the sea, i.e. the self-cleaning function, continues to decline year by year. Diagnostic monitoring studies conducted by the Caspian Environment Program revealed that 138.4 tonnes of oil, 104 tonnes of phosphorus compounds, and 886.1 tonnes of nitrogen compounds flow into the Caspian Sea from industrial complexes, cities, and transit rivers of the coastal states throughout the year [8].

In the near future, it is expected that the total annual volume of pollutants, flowing from the coastal states into the sea basin, will increase by 1.5-2.0 times, taking into account the current economic situation [14] (Table 1).

Table 1

Average annual volume of pollution by industrial complexes, municipal streams, and streams of transit rivers in the coastal states of the Caspian Sea for 2016-2020 (tonnes / year)

Coastal states	Oil products	Phosphorus compounds	Nitrogen compounds
Russian Federation	171,6	178,0	1620,6
Islamic Republic of Iran	41.4	17,4	57,2
Republic of Kazakhstan	17.2	2,4	27,2
Republic of Azerbaijan	36,0	6,9	49,7
Republic of Turkmenistan	11,0	6,1	1,5
Total	277,2	210,8	1756,2

Note: Indicators were projected based on the current level of development of coastal states, industrial technology, and urban clean-up rates.

The last hundred years of research shows that, due to the high rate of oil pollution in the basin, its phyto and zoobenthos have practically lost their function in the oil producing regions, anaerobic conditions were formed in sediments, while the initial photosynthesis of phytoplankton

reduced to 50 times⁴. The negative dynamics of the ecological situation have resulted in the observation of parasite and biogenic bacteria in the organisms of hydrobionts in Kazakhstan, Russian Federation, and Turkmenistan, including Azerbaijan [15].

Another issue that necessitates the prediction of the pollution potential in the Caspian basin is the sea level fluctuation and its role in contamination. Today, water-level fluctuations are accompanied by transgression and regression processes, covering more than 30 years (1978-2015). Thus, the development of a long-term common environmental basin program for preventing the formation of production facilities, located on the coastline and prone to water level fluctuations, as a source of contamination is among the necessary measures to eliminate the danger of sea pollution.

However, despite all the attempts made, conducted analyses show that the balancing mechanism has not been established between the use of the sea's economic potential and its ecological security, and the contamination tendency of the ecosystem continues.

Taking into account the real environmental threat, implementation of such important tasks as the requirements of the Tehran Framework Convention and its supplementary protocols, realisation of the marine environment impact assessment within the cross-boundary context, and development of a balanced mechanism between hydrocarbon production by the coastal states in the sea basin, transportation intensity, and protection of its unique ecosystem should be considered as major directions in the solution of environmental security, as well as the protection of bio-resources.

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