Journal of Geology, Geography and Geoecology

Journal home page: geology-dnu.dp.ua

ISSN 2617-2909 (print) ISSN 2617-2119 (online)

Journ. Geol. Geograph. Geology, 30(4), 652–665. doi: 10.15421/112160

Imrani Z. T., Mammadova S. İ., Hadjiyeva N. N., Vysotskyi O. Y.

Journ. Geol. Geograph. Geoecology, 30(4), 652-665

The main directions of sustainable socio-economic development of the Caspian littoral areas of the Republic of Azerbaijan and the existing environmental problems

Zaur T. Imrani¹, Shakar İ. Mammadova², Nasiba N. Hadjiyeva³, Oleksandr Y. Vysotskyi⁴

¹Institute of Geography named after acad. H.A. Aliyev of National Academy of Sciences of Azerbaijan, Baku, Azerbaijan ²Baku State University, Baku, Azerbaijan ³Comin State University, Comin, Azerbaijan

³Ganja State University. Ganja, Azerbaijan

⁴Oles Honchar Dnipro National University, Dnipro, Ukraine, vysalek@gmail.com

Received: 31.08.2021 Received in revised form: 07.10.2021 Accepted: 20.11.2021 **Abstract.** In Azerbaijan, since the earliest times, the Caspian Sea has contributed to the settlement of population and structure of the economy. The favourable natural geographical conditions of the coasts, exploitation of offshore oil and gas fields and rich tourist-recreational potential favoured the economy of Azerbaijan significantly. However, sea-level fluctuations

and environmental damage observed due to exploitation of natural resources served as curbing factor in the development. In modern times, planning of residential areas in the coastal areas, improvement of industrial, agricultural and tourism infrastructure, and successful management of the ecological situation are achievable through effective use of the natural resources and human potential of the Caspian Sea. The coastal region of the Caspian Sea, composed of three zones, is favourable for the development of Azerbaijan's economy. The attractiveness of coastal areas is related mainly to preferences of natural conditions and resources and the advantages of their transport-geographical location. As a result, the development level of the economy of the Pre-Caspian region is higher compared to other regions of the country. The region accounts for 88.7% of the total industrial output in the country. The main part of it, i.e. 95.7% is shared by the city of Baku. The cause of significant difference in development level between the regions and the capital Baku is associated with the use of oil and gas resources of the Caspian. Thus, offshore oil and gas reserves in the Caspian have played a notable role in the development of coastal areas, and of the country's whole economy. This has led to inequality in terms of regional development. This factor prompted the need to study the role of the use of resources of the Caspian Sea in the sustainable development of Azerbaijan's economy. In order to achieve the goal, a comparative analysis of the leading economic branches in the Pre-Caspian regions was carried out from a historical point of view. The obtained information was systematized, and the socio-economic aspects of sustainable development were identified based on statistical-mathematical materials. Aerospace data were used as well.

Keywords: sustainable development; socio-economic development; resettlement of the population; industry; investment; ecological problem; Caspian Sea.

Основні напрямки сталого соціально-економічного розвитку прикаспійських прибережних районів Азербайджанської Республіки та існуючі екологічні проблеми

З.Т. Імрані¹, Ш.І. Маммадова², Н.Н. Хаджієва³, О.Ю. Висоцький⁴

¹Інститут географії імені академіка Х.А. Алієва Національної академії наук Азербайджану, Баку, Азербайджан

² Бакинський державний університет, Баку, Азербайджан

³ Гянджинський державний університет, Гянджа, Азербайджан

⁴ Дніпровський національний університет імені Олеся Гончара, м. Дніпро, Україна, vysalek@gmail.com

Анотація. В Азербайджані з найдавніших часів Каспійське море сприяє розселенню населення і визначає структуру економіки. Сприятливі природно-географічні умови узбережжя, а також експлуатація морських нафтових і газових родовищ і багатий туристично-рекреаційний потенціал значно сприяли розвитку економіки Азербайджану. Однак коливання рівня моря, а також збиток навколишньому середовищу, що спостерігається в результаті використання природних ресурсів, послужили стримуючим фактором в економічному розвитку. У теперішній час планування житлових районів в прибережних районах, поліпшення промислової, сільськогосподарської та туристичної інфраструктури, а також успішне управління екологічною ситуацією досяжні за рахунок ефективного використання природних ресурсів і людського потенціалу Каспійського моря. Прибережний Регіон Каспійського моря, що складається з трьох зон, сприятливий для розвитку економіки Азербайджану. Привабливість прибережних районів пов'язана в основному з перевагами природних умов і ресурсів, а також перевагами їх транспортно-географічного положення. Рівень розвитку економіки Прикаспійського регіону вищий порівняно з іншими регіонами країни. На частку регіону припадає 88,7% від загального обсягу промислового виробництва в країні. Основна його частина, тобто 95,7%,

припадає на місто Баку. Причина значної різниці в рівні розвитку між регіонами і столицею Баку пов'язана з використанням нафтогазових ресурсів Каспію. Таким чином, морські запаси нафти і газу на Каспії зіграли виняткову роль не тільки в розвитку прибережних районів, але і всієї економіки країни. Це призвело до нерівності з точки зору регіонального розвитку. Саме цей фактор викликав необхідність вивчення ролі використання ресурсів Каспійського моря в сталому розвитку економіки Азербайджану. Для досягнення поставленої мети був проведений порівняльний аналіз провідних галузей економіки прикаспійських регіонів з історичної точки зору. Отримана інформація була систематизована, і на основі статистико-математичних матеріалів були виявлені соціально-економічні аспекти сталого розвитку. Також використовувалися аерокосмічні дані.

Ключові слова: сталий розвиток; соціально-економічний розвиток; розселення населення; промисловість; інвестиції; екологічна проблема; Каспійське море.

Introduction.

Population transformation is a complex process that depends on socio-economic changes. This process is directly influenced by the economic and geographical position of the region (capital, border, etc.) (Nelipa, 2017). At the same time, natural conditions, demographic situation, socio-economic development, location of production areas, etc., in turn, participate in this process (VyatkinandVyatkin, 2018). However, in this case, we must not forget about the environment and environmental factors. Because the consideration of environmental values in economic decisions, unlike the previous principle, enhances the role of ecology, offers a new strategic approach to achieving socioeconomic equality in relations between society and nature (Zagorsky et al., 2015). In determining the main directions of sustainable socio-economic development, we have tried to study the existing environmental problems and the natural conditions of the area, the location of settlements and production areas.

During the collapse of the USSR, Azerbaijan had the most immense and most explored resource potential in the Caspian Sea. The region has been extracting hydrocarbon resources industrially for about two centuries (Zavyalova, 2017). Although the increase in oil production is of great importance for economic development and employment, it has led to an increase in environmental risk. Therefore, the Caspian Sea must be seriously studied, and its potential must be used and preserved for future generations.

Object of study.

The Caspian Sea Basin is an ancient structural element, covered with-thick sediments of the Quaternary Period and of the modern period. The sea is located in the splice of the two main tectonic regions – the Turan platform and the Caspian geosyncline.

Studies conducted over many years show that many complex and diverse geological processes heavily influence the Caspian Sea. Together with the Black Sea, the Caspian Sea was a part of the ancient Sarmatian Sea for a long time, covering a large water area where the World Ocean combined with the Tethys. Only in the Piacenzian Pleocene (2–3 million years ago), which was one of the critical phases of Caucasus Mountain system formation, did the outlines of the Caspian Sea began to take shape. In the Akchagil period, the formation of the Caspian Sea's depression was completed.

In modern times, the physical parameters of the Caspian Sea vary depending on its level. Currently, the total area of the Caspian Sea, which is 28 meters below the ocean level, is 380 thousand km², and the length of its coastline is about 4,800 km. It is located between five states – the Republic of Azerbaijan (825 km), the Russian Federation (747 km), the Republic of Kazakhstan (1422 km), the Republic of Turkmenistan (1035 km) and the Islamic Republic of Iran (728 km). The Caspian Sea extends over 1,200 km along the meridian. Its maximum width is 435 km, while the narrowest width is 196 km. Lankaran trench (1025 m) is the deepest area in the Caspian.

The Caspian Sea is considered to be one of the wealthiest water basins in the world. The valuable fish, its black caviar, oil, gas, and salt reserves, and recreation resources of the sea play an essential role in all national economies present on the Caspian coast.

Within the boundaries of Azerbaijan, the Caspian Sea extends 825 km from the Samur River in the north to Astarachay in the south. In terms of natural-geographical conditions and socio-economic development, the Pre-Caspian regions of Azerbaijan can be divided formally into three zones: the Northern region that includes Khachmaz, Shabran, Siyazan and Khizi administrative districts; the Central region, which includes Absheron administrative district, as well as the cities of Baku and Sumgait; and the South, where Saylan, Neftchala, Masalli, Lankaran and Astara districts are located.

The primary purpose of the research is to determine the role of the Caspian Sea in the sustainable development of the Azerbaijani economy and to eliminate future environmental problems by exploring ways to use its natural resource potential effectively.

Material and Methods.

The information base of the study consists of journals published by the Ministry of Economy of the Republic of Azerbaijan, the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan, and the State Statistics Committee of Azerbaijan, the fund materials of the Institutes of Geography and Economics of the Azerbaijan National Academy of Sciences, current legislation of the Republic of Azerbaijan, scientific works of scientists who have researched in this field, methodological instructions, as well as the results of scientific research carried out by the authors.

Historical-geographical approach, mathematicalstatistical, comparative, and systematic analysis, Geographic Information Systems (GIS), field observations, and other methods were used in carrying out the research work.

Sea level fluctuations in the Caspian. One of the most important elements of the hydrological regime of the Caspian Sea is fluctuations in its level. Since the level fluctuation in the Caspian Sea is very disputable issue, different approaches to this question have been observed up to the present. P.S. Pallas, E.I. Eikhvald, K.M. Ber, E.H. Lenz, A. Voyeykov, G.S. Karelin, G.K. Gul, R.M. Mammadov and other scientists were engaged in this. Level fluctuation has been explained by geomorphological, geological, climatic, hydrological and human factors. It should be added that there is still no commonly accepted idea about sea level variation in the Caspian.

The level of the Caspian Sea is affected by various economic branches that are present on its shores. Fall of sea level leads to the increase of needs for hydrotechnical installations, including seaports. It also entails the reduction of the shelf zone where marine creatures are primarily concentrated. The process impedes fishes in their regularly migration to the rivers for spawning. The hydrometeorological regime of the coastal areas changes unfavourably as well. Rise in sea level may considerably damage the socioeconomic condition of the coastal regions, leading to deterioration of the environmental conditions and the formation of swamps. Moreover, rise in groundwater level may result in inundation of houses and vulnerable lands.

According to the data obtained, the level of the Caspian Sea in the last century equaled 3.2 m. The lowest level during this period was recorded in 1977, when it reached a critical level (-29 m). Since 1978 the water level up to 2.5 m in the sea has seriously damaged the low-inclined areas of the coastal zone. From 1978 to 1995, the average annual rainfall in the region increased by 40–60 mm, and the volume of water of rivers flowing into the Caspian Sea increased by 10–11 %. There has been a slight decrease in water level since 1996. In 1996–2000, the decline of the sea level was observed. Since 2001 the level rose as much as about 30 cm. Although in 2006 the water level dropped by 3–5 cm compared to the previous year, the level has remained relatively stable in recent years (Imrani, 2009).

The level change in the Caspian Sea had a severe impact on the coastal areas' economy. For example, the fall of the level in 1930s in the Zarat-Gilachi area resulted in accumulation processes, and later, beginning from 1977, the beach areas were partially washed off. Because the Nabran coastal area faced accumulation, the sea level rise later caused inundation in the low-inclined areas. The south-eastern Shirvan and Salyan plains can be mentioned as well, where groundwater levels have risen. As a result, the marsh and grass-covered ecological landscapes were replaced by the aquatic landscapes around the Kizilaghaj Gulf. In Baku seaport, the rise in the level resulted in damage costing about 1 million USD. The above mentioned issues show that all construction and installation works must be conducted by taking into account the level of the Caspian Sea to prevent related adverse events in the future.

From 1978 to 1998, 80.72 hectares of Azerbaijani territory was inundated by sea water, while the damage directly caused to the coastal zone made up about 2 billion USD. Of this amount, 89.1 % was shared by Neftchala and Lankaran districts. In these areas, seawaters inundated areas 300–500 m in length, and communication systems (highways, railways and electric lines) were destroyed. In addition, fisheries faced considerable damage as well (Imrani, 2014).

The changes in level cause changes in the volume of water, coastline configuration, bathymetry and the all morphometric parameters of the Caspian Sea. From this point of view, it is essential to carry out comprehensive research on the change of the level of the Caspian Sea. This can relate to the identification of critical factors responsible for level changes in terms of their quality and quantity, limits of water balance and perennial forecast of them, the contribution of anthropogenic factors in the level change, socio-economic and geographical aspects, use of Azersky satellite images, development of relevant scenarios.

Population settlement in the coastal areas of the Caspian Sea. Archaeological excavations carried out in the coastal areas discovered settlements in the region's plains the age of which is assumed to be 3–4 thousand B.C. Historical sources prove that ancient settlements dated to the period of Manna, Media, Albania, Atropatena – the ancient states in the territory of Azerbaijan existed here in the past. One of them was the town of Shabran. Founded in the mid-I millennium and located on the Great Silk Road, this city was a big economic, commercial and cultural center and existed until the middle of the eighteenth century. The ruins of the city were discovered near Shahnazarli village during the archaeological excavations carried out in the mid-1930s. The area of the Historical Reserve of "Shabran city" was established as a worldwide archaeological monument upon Order No. 1343 dated September 27, 2003, signed by the President of the Republic of Azerbaijan.

The total area of the Pre-Caspian region is 14.65 thousand km², accounting for 16.9% of the country's territory. The population was 3,858.4 thousand or 39.3% of the country's population in 2016 (Table 1). However,

the conducted studies show that 59.7% (5,858.4 thousand) of the country's population is concentrated in the Caspian region (mainly Baku city). The unregistered people are those migrating from different regions of

the country to Baku and Sumgait cities because of employment factors. This process has led to an increase in the urbanization rate.

Table 1.Demographic and settlement indicators of the Pre-Caspian region of Azer	baijan
---	--------

Territory	Territory, sq. km²	Population number, thousand persons	Population density per 1 sq. km	Number		
				City	Urban settlement	Village
Khacmaz administrative district	1.06	174.8	165	2	12	137
Shabran administrative district	1.09	58.0	53	1	-	68
Siyazan administrative district	0.70	41.4	59	1	1	32
Khizi administrative district	1.67	16.6	10	1	3	25
Absheron administrative district	1.97	207.5	105	1	8	8
Sumgait city	0.09	339.0	3767	1	2	-
Baku city	2.14	2245.8	1049	1	59	-
Salyan administrative district	1.60	135.6	85	1	2	48
Neftchala administrative district	1.45	86.5	60	1	3	48
Masalli administrative district	0.72	221,5	308	1	2	100
Lankaran administrative district	1.54	225.2	146	2	8	83
Astara administrative district	0.62	106.5	172	1	2	89
Total:	14.65	3858.4	263	14	102	638
Republic of Azerbaijan	86.6	9810.0	113	78	262	4255

Source: Administrative and territorial units. Library of Affairs Department of the President of the Republic of Azerbaijan. Baku, 2017

In this region, represented by 14 cities, 102 urban settlements and 638 rural settlements, population density data varies for its different parts. The population density for the overall territory of the region is 263 per km². The last is higher than the average figure. Sumgait (3,767 persons per km²) and Baku (1,049 persons per km²) cities are the most populous areas. The development of these cities was affected significantly by such factors as the use of natural resources of the Caspian Sea, transport and geographical position, and the function of the capital city borne by Baku. Population density in other cities and administrative districts ranges from 105 to 308 per km². The areas with low density are Shabran, Siyazan, Neftchala and Salyan districts. The most sparsely populated area is the territory of Khizi administrative district (10 persons per 1 km²).

The Northern Zone of the Pre-Caspian territories includes five cities, 16 settlements and 262 villages. The region accounts for 30.8% of the territory and 7.5% of the population of all coastal regions.

In the Northern Zone, the Khachmaz administrative district is the largest in population (174.8 thousand persons) and population density (165 people / km^2). The fact that Khachmaz borders Russia has a positive impact on the economic development of this district. The large settlements of the administrative district include Khachmaz, Khudat, Yeni Hayat, Mugtadir, Mushkur, Gusarchay, Narajan and others. Guneshli (25 persons), Tourist (45) and Samurchay (49) are the smallest settlements. These settlements have fully

exhausted their potential capabilities, and the population of them typically migrates to other areas in search of employment.

The second most populous administrative district in the Northern Zone is Shabran (58.0 thousand people). Most of its territory is mountainous. The territory of Shabran district is washed by the Caspian Sea to the East, and the length of the coastline is 40 km. The population density is 53 persons/km². The largest settlements in the administrative district are Shabran city, and also Gandov, Aghalig, and Davachi villages. The population is settled almost evenly across the territory.

Siyazan – the third most populous administrative district of the Northern Zone is inhabited by 41,500 people. Most of them (65.6%) live in Siyazan city. Siyazan district is located in the Samur-Davachi lowland, and it has a more favourable naturalgeographical position in terms of settlement. In the east this district borders the Caspian Sea. The largest settlements here are Gilgilchay settlement, Yenikand, Hemye, Mashrif, and Zarat.

The administrative district with the lowest population in the Northern Zone is Khizi. Population density in the administrative district is 10 people person/km² only. This is the lowest figure throughout the country. Khizi district mainly covers the northeastern slope of the Greater Caucasus and the Samur-Davachi plain, and is bordered by the Caspian Sea in the east. Its territory consists of low mountains and plains. Although the area has a favourable natural condition for settlement, the villages of Angilan, Yukhari Angilan and Gars are depopulated due to migration. Each of the villages of G1z1lgazma, Tudar and Guney Qishlag has about ten inhabitants.

The Central Zone is characterized by intensive land development, high population density, presence of different industrial and service facilities, and limited land resources. In Baku and Sumgait cities, relatively high population growth has created severe demographic, socio-economic and environmental problems in the region, and this process continues. 2,792,300 people live here, accounting for 72.4% of the total population of the Pre-Caspian region. In addition, this zone holds three towns, 69 urban settlements and eight rural settlements.

The largest city in the Central Zone is Baku. The history of the city of Baku dates back to the 3rd century. As authors of ancient antiquity have reported, Baku maintained trade relations with neighboring countries by caravan and sea ways. There are descriptions of oil wells drilled in and around Baku in the late ninth century and the transportation of oil to the Middle Eastern countries and India in the late 9th century. The economic upheaval of the city was related mainly to the development of

the oil industry. Economic relations between Baku and other areas expanded due to the oil factor as well. Among the most significant events, the construction of the Sabunchu and Surakhani oil fields (26 km long) in 1880, the construction of the Baku–Tbilisi railway in 1883 (520 km long), as well as the launch of the Baku-Batumi oil pipeline (885 km long) in 1907 should be noted in particular.

Since the 1930s, the migration of the population to the Absheron peninsula, mainly to Baku has been exacerbated due to the increase in oil production and demand for labour. As a result, urban-type settlements with a new status have been created around Baku (Figure 1). The status of urban-type settlement firstly was acquired by Alat in 1935. In 1936, 25 settlements more were given the same status. According to the 1939 census, there were 40 such settlements in the Baku agglomeration (including Sumgait), and 32 urban settlements in surroundings of Baku (Eminov, 2005). At present, 59 settlements are included in the administrative unit of Baku city. The city accounts for 58.2% of the population dwelling in the Pre-Caspian area, while the population density is 1,049 persons/km².



Fig.1. Distribution of population in the coastal area of the Caspian Sea (within the territory of Baku city)

The higher pace of development of Baku compared to the Pre-Caspian regions and other regions of the country was related to its natural resource (oil and gas) potential. Meanwhile, regional differences in living standards associated with the higher development of Baku will lead to the job-driven migration of the population from other regions, resulting in more severe demographic problems in the future. Since 2004 state programs on socio-economic development of the regions have been continuously adopted and implemented to overcome the problem. However, the complete solution to the problems has not been achieved yet. Nevertheless, in recent times serious projects have been developed in this direction, and since 2016 the implementation of "The Strategic road map for the national economy and main economic sectors" has been underway.

The second-largest settlement in the Central Zone is Sumgait. It is located on the western coast of the Caspian Sea and the bank of Sumgait River. Haji Zeynalabdin and Jorat settlements are subordinated to Sumgait city. The population density of Sumgait is the highest in the Caspian region (3,767 persons/km²). In the city, industrial and social infrastructure facilities are more developed than that of other regions.

The most sparsely populated area of the Central zone is Absheron district. Here the population density is 105 persons/km². In Absheron, most of the population (82.9%) is settled in cities. Absheron's administrative center is Khirdalan city, which received the status of city on 29th November 2006.

The Southern Zone accounts for 40.5% of the territory and 39.3% of the population of the entire Pre-Caspian region. The lesser density of population

is in Salyan (85 persons) and Neftchala (60 persons) districts. Salyan is located in the Southeastern Shirvan and Salyan plains, bordered by the Caspian Sea in the East. Here most of the population lives in rural areas (66.5%). On the other hand, the population of Neftchala administrative district is 86.5 thousand persons, the lowest in the south. The territory of this administrative district is situated in the eastern part of the Kura-Aras lowland, the plains of Southeastern Shirvan and Salyan, and partly in the Mughan Plain, while washed by the Caspian Sea in the east.

Masalli administrative district has the highest density (308 persons/km²) in the Southern Zone since its geographical location, and the natural condition is favourable for settlement. The territory of Masalli district is mainly plain (Lankaran lowland) and partly mountainous (Burovar Ridge) and borders the Caspian Sea in the east. Masalli district is mainly an agroindustrial region, while 84.3 % of its population lives in villages. It is the second district in the Pre-Caspian region behind Khachmaz for the number of villages (100 villages).

The Kura-Aras lowland surrounds the Lankaran administrative district in the north and the Caspian Sea in the east and south-east. The relief of its territory is mainly plain and in small part composed of foothills. Lankaran is one of the oldest settled areas in Azerbaijan. Currently, it is an agro-industrial region. Here the shares of the urban (40.3 %) and rural population (59.7 %) are almost equal.

Astara administrative district borders the Talish mountain ranges in the west, Lankaran lowland in the north-east, and the Caspian Sea in the east. It borders the Islamic Republic of Iran in the southwest and southeast. Though Astara's population is lowr, population density here is the second in the South Zone (172 persons/km2). Most of the population (77.0%) is composed of inhabitants of villages.

The study found that the demographic pressure in the Pre-Caspian region is much more complicated than that of other regions of the Republic of Azerbaijan. While social infrastructure facilities have been increased, zones of environmental tension have been grown, and high risk areas are formed. It has also affected the efficient organization of productive forces throughout the country.

Modern development level of industry in the coastal areas of the Caspian Sea. The first offshore well on the coasts of Azerbaijan was drilled in shallow waters. Oil and gas production on an industrial scale in the Caspian Sea began in 1949. Although solid industrial potential was formed in Azerbaijan during the former USSR, the economy's structure was completely adapted to the requirements of the Union. The country's industrial production funds, namely 67%,

were composed of the oil-related primary industries and ready-made products. However, after gaining independence, the Republic of Azerbaijan succeeded in attracting foreign investments to the country's economy associated with rich oil and gas deposits. An agreement called "Contract of the Century", aiming at the exploitation of oilfields of "Azeri", "Chirag" and Deep-water "Gunashli" was signed in 1994. According to this contract, it was planned to produce 510 million tons of oil, while the volume of investments was planned to make up 7.4 billion US dollars.

Many countries regard investment policy as an essential component of their economic development strategy in the modern world. This is because investments positively affect production and employment and lead to capital increase. From this view, investments should be used fully and more efficiently in the condition of the market economy to provide successful development of economic sectors.

The share of investment in the state budget is an indicator of the priority feature of economic growth in the country's economic policy. Deepening the international distribution of labour allows the specialization level of national economies to be raised, thereby increasing production volume due to more efficient use of economic resources available. As a result of the development of foreign economic relations, countries can earn additional profits as they specialize in relatively productive products and these products are relatively efficient. In addition, the development of foreign economic relations enables countries to specialize in more efficient production and earn from the import of products which are less-efficient to produce domestically.

In 2016, 9.3 billion dollars was invested in the economy of the country. However, a major part (74.5%) of investments were directed towards Baku and 92.4% to the Pre-Caspian region as a whole, which was due to the fact that most investments deal with the exploitation of oil and gas resources. This has led to inequalities in the socio-economic development of the country's regions. At present, the Azerbaijan government is taking serious measures in this direction.

According to statistical data of 2016, 1153 industrial enterprises operate in Baku, accounting for 73.8% of all industrial enterprises operating in the Pre-Caspian region. The share of the private sector in industrial production is 81.7%. The total number of employees working in these facilities is 94,722 people. The products of the industrial facilities of Baku city include industrial gasoline, kerosene, diesel, black oil, cement, construction gypsum, etc., as well as light and food industry products.

In terms of industry, Sumgait city and Absheron administrative district are the most developed regions

in the Pre-Caspian region after Baku. They together account for 3.4% of the total industrial output. In Sumgait, 59.9% of industrial production is a portion of the non-state sector, and the figure is 71.1% in Absheron district. The industrial products of Sumgait city and Absheron district enterprises are nitrogen, chlorine acid, ethylene, polyethylene, construction brick and gypsum, limestone, and food products.

As for the resort districts of the Pre-Caspian region, they lag significantly in terms of industrial products and the average employed labour force. In these districts there are 181 industrial enterprises, which account for 0.9% of the total production. The number of employees is less than 2.700 people. The lowest corresponding figure is in Khizi administrative district, represented by seven industrial enterprises. Here, the total number of employees is 219 people only. The low level of indicators is related to the fact that those administrative districts are mainly agrarian-industrial ones. Among their products, oil, gas, iodine, construction sand, concrete, carpets, flour, canned fruits and vegetables, meat and meat products, dairy products, tea, cotton, etc. products can be mentioned.

The main place in the economic structure of the Northern Zone is occupied by the oil-extracting industry (based on the Chongar-Zarat, Siyazan-Zarat, and Sadan-Amirkhanli fields etc.), production of fruits and vegetables, and canning industry. The critical industrial branches in the zone are oil and gas extraction and production of the brick plants, gravel workshops, carpet factories, grain processing plants, and others.

The Central Zone has grown economically better than other zones. Its leading economic areas are the oil and gas industry, oil-processing, and chemical and petrochemical industries. Ferrous and non-ferrous metallurgy, heat power industry, machinery, raw materials and products of construction importance, light and food industries are developed here.

The economic structure of the Southern Zone is represented by the oil and gas industries, iodine-bromide production, machinery industry, brick production, wood processing, production of furniture, carpet production, food industry, etc. The Iodine-bromine plant in Neftchala produces approximately 25,000 m³ of iodine and brominated water a day converted into crystalline iodine. At present, the plant produces about 400 tons of iodine a year.

Development of industrial fields and involvement of investments in the region have a positive influence on trade turnover. Thus, the volume of trade turnover in the country has grown, reaching 17 billion USD in 2016. As a result, trade turnover in the Caspian region in total was as much as 64.9% of the overall trade by the country, the major part of which, i.e. the facilities of Baku, contributed 84.6%. The branch structure of the Caspian region's industry reflects the social division of labour and the level of differentiation and specialization of the various fields. The volume of industrial production here describes the socio-economic development of the region and the country and the employment and living conditions of the population. However, the present situation is not advantageous in terms of the country's territorial distribution of business activities. To eliminate the problem, there is a need to create strategically more appropriate new industries in other regions of the country (Figure 2)

Touristic and recreational importance of coastal areas of the Caspian Sea. The expansion of the system of international economic relations, the growth of people's standard of living, the development of industry and services, etc. are factors which positively affect the development of tourism. The tourism industry, in turn, contributes to employment, conduction of social and cultural events, and improvement of the ecological situation.

Tourism is one of the fastest-growing industries with an annual average growth rate of about 5%, and international travel numbers might nearly double until 2020 compared to 2006. Having experienced a growth of 25% between 1995 and 2005, tourism today accounts for 10% of the world's economic activity and is one of the leading employment generators. Tourism is also a significant source of foreign exchange earnings for many developing countries (Sustainable Tourism Development., 2008).

Tourism can improve the quality of life in an area by increasing the number of attractions, recreational opportunities, and services. Tourism offers opportunities to meet interesting people, form friendships, learn about the world, and expose oneself to new perspectives. Experiencing different cultural practices enriches experiences, broadens horizons, and increases insight and appreciation for different approaches to living (Glenn Krieg, 2001).

2.2 million foreigners visited Azerbaijan in 2016, of whom 90.9% visited with the purpose of rest (Tourism in Azerbaijan, 2017). Out of all foreign tourists, 697.1 thousand people enjoyed rest and entertainment, 691.7 thousand represented business tourism, 562.0 thousand visited their relatives and friends, 41.5 thousand visited for treatment purposes, 12.6 thousand visited sacred places, and the remaining 39.8 thousand visitors were motivated by other reasons. The fact that 96.4% of those tourists spent time in the Pre-Caspian regions indicates a significant regional imbalance in terms of tourism development.

The question of why people travel is both obvious and fundamental to any understanding of the practice of tourism and its consequences, including the geography



Compile: PhD. Zaur Imrani

Fig. 2.Socio-economic indicators of coastal areas of the Caspian Sea

of tourism. However, although there is general (though not universal) agreement that the primary motive for pleasure tourism is a real or perceived need to escape temporarily from the routine situations of the home, the workplace and the familiarity of their physical and social environments, the many theories of tourist motivation may differ quite substantially in their interpretation and explanations of resulting tourist patterns and behaviours (Stephen Williams, 1998).

There are natural and economic conditions and factors necessary for developing the tourism industry on the coast of the Caspian Sea. They include the beaches, clean marine air, boat trips, fishing, medicinal mud, thermal and mineral water sources, forests, rivers, islands, national parks, nature reserves, historical monuments, museums, the favourable transport position of the region and others.

The comfortably warm temperatures characteristic of the Pre-Caspian region enables the wide use of natural and recreational resources. The abundance of solar energy in the summer months favours the development of beach tourism in the country's coastal regions. Beach tourism, organized in the Pirshaghi, Bilgah, Buzovna, Mardakan, Shuvalan and Shikh areas of the Absheron peninsula, provides rest opportunities for both domestic and foreign tourists during summer. A network of rest centers, sanatoriums and tourist bases is created in these areas.

Most of the tourism and recreation complexes are located close to the beach areas, most of which are on the Absheron Peninsula and in the Yalama-Nabran area. According to statistical data of 2016, the majority (80.7%) of 272 travel agencies and tour operators operating in the country are concentrated in Baku. 1,472 out of 1,838 persons working in these facilities are directly dealing with tourism activities. In 2016, the incomes of travel agencies and tour operators made up 21.6 mln. US dollars, most of which were gained in the summer (Tourism in Azerbaijan, 2017).

Here the adoption of the Action Plan for the development of beach tourism in the Republic of Azerbaijan for the years 2017–2020 should be mentioned. The document envisages improving access to beaches, creating new beaches, providing relevant favourable conditions, and establishing related infrastructure (roads, water provision, sewerage, electricity, communications and other services).

Accommodation related businesses significantly contribute to the development of the tourism industry in the coastal areas. As an integral part of the tourism industry, the hotel business provides guests with temporary accommodation and offers relevant services. There are 548 hotels and hotel-type facilities in Azerbaijan, of which 50.9% are in the Pre-Caspian region. This region accounts for 61.7% of the country's hotel rooms, 60.1% of its capacity and 64.9% of people accommodated (Table 2).

In general, the Pre-Caspian areas are different for their recreational resources in the tourism industry.

The Northern Zone covers mainly the Yalama-Nabran, Samur-Davachi and Shollar plains. The Yalama-Nabran forest strip is 24 km in length and 7–9 km in width. This forest strip stretches up to the sandy beaches on the terrace in some parts, creating beautiful landscapes. In terms of tourism, it is the second main area after the Central Zone.

The territory has plenty of solar energy and is covered with coastal plain forests and sandy beaches. Thermal springs and natural sources of mineral waters

T't	Total number of hotels and	in those			
Territory	hotel types of	Number of	Capacity, bed	Number of accommodated	
	enterprises, unit	rooms, unit	places	persons total	
Khacmaz administrative district	50	2,282	6,220	15,851	
Shabran administrative district	4	21	50	1,115	
Siyazan administrative district	-	-	-	-	
Khizi administrative district	4	53	148	790	
Absheron administrative district	5	180	283	4,213	
Sumgait city	13	183	390	2,348	
Baku city	143	8,692	14,020	686,793	
Salyan administrative district	2	88	142	363	
Neftchala administrative district	1	32	60	-	
Masalli administrative district	29	441	1,148	6,474	
Lankaran administrative district	18	466	1322	8,681	
Astara administrative district	10	103	263	1,445	
Total:	279	12,541	24,046	728,073	
Republic of Azerbaijan	548	20,330	40,042	1,122,068	

Table 2. The main data of tourism facilities in the Pre-Caspian region

Source: Tourism in Azerbaijan. Statistical yearbook. Baku, 2017

are widespread as well. The absolute altitude of these areas varies from -28 m to 100 m, and the inclination ranges from 0.5 to 3.50. The duration of beach season when the seawater is above 18 °C, lasts up to 140 days in this territory. The presence of a variety of broadleaf trees in the coastal areas adds to the comfort offered by the vegetation cover. However, the current eco-geographical conditions of the forests are not good since the construction of numerous tourism and recreational centers have led to the decline in the area of forest.

In contrast, the wastes from those tourist facilities have the worsened ecological and sanitary conditions in the Pre-Caspian territories in general. Consequently, the degradation of the forests and the deterioration of the ecological situation in the coastal zone is observed (Geography of the Republic of Azerbaijan, 2014). The carbonate and hydrocarbonated mineral water resources of treatment importance are spread mainly in the Samur-Devechi lowland. The total flow of mineral water springs is over 5,000 litres per day. Although the natural potential is high, the horticultural sector is poorly developed in the zone. This harms the tourism industry.

The coastline of the Khachmaz administrative district is used mainly for tourism. Tourism facilities in the area are numerous; among them, there are 50 hotels and hotel-type facilities. Galaalti, the naftusya type water, located at 700 m of altitude in the territory of Shabran administrative district, has excellent healing importance. Based on the Galaalti water, "Galaalti Hotel & Spa" therapeutic and rehabilitation resort complex has been established. Besides this, the hunting farm of "Liman" operates on the coast of the Caspian Sea. The Beshbarmag parallel fortification (6-7th centuries) is of world importance; the Gilgilchay defence fortifications complex (5th century) and other historical and cultural monuments allow development of cultural and religious tourism. However, there is no hotel or hotel-type accommodation in the Siyazan administrative district.

The Central Zone is a suitable area for tourism due to its climatic conditions, being rich in mineral and thermal waters, healing muds, unique natural environment, and historical monuments. Most of the tourists arriving in Azerbaijan stay in this area since the capital city Baku has luxurious and modern hotels and improved infrastructure.

On the Absheron Peninsula, hydrogen-sulfide thermal waters are used to treat cardiovascular, gynecological and rheumatic diseases. The healing muds of the Masazir and Big Shor lakes are also in use. Such muds are also present in the Shikhov, Surakhani and Gobustan areas. However, the reserves of the last are small and are not used widely by resort facilities. (Ismailov, 2004).

The city of Baku, with its historical and architectural monuments (Maiden Tower, Shirvanshahs Palace, Juma Mosque, etc.) and beaches, attract a much larger number of tourists. Sumgait, the second-largest city in Absheron, is far behind Baku for the number of visitors. Though the number of tourists visiting Sumgait and its tourism facilities is smaller, the new parks and beaches recently opened for use are of great interest to tourists.

The Southern Zone is one of the areas lessused for tourism. However, this zone has favourable natural conditions and economic potential, suitable for the establishment of tourism businesses. There are possibilities for developing medical tourism near the mineral springs of Ag korpu, Istisu, Sim, Bi, Toradi, Sheikh Nasrallah and others. The seafront is mainly composed of sand and river stones. As a result of the rise in the level of seawater, the width of beach areas in some places has been reduced as 5–10 m as less.

The temperature of sodium-chlorine mineral water reserves of tourism-recreational importance may reach up to 45°C. This kind of thermal water are found in the Lankaran lowland, based on which the Istisu sanatorium operates. The last is the only operating facility of medical tourism that uses thermal water in the Southern Zone.

The main historical monuments in the Lankaran administrative district are Lankaran fortress, the Mayak building, the circular fortress called Zindan, the Ballabur fortress, the German church, the Jewish synagogue, etc., which attracts foreign tourists. The kurgans in the Astara administrative district, such as Dash gutu, Kholobin, Miki dolmen necklaces, and Baba Jabbar, Tangarud, Seyidjamal, Vago and others, dated to the Bronze Age, have cultural tourism importance. The Yanardagh and Istisu forests, composed of rare tree species and various springs, are found in the Masalli administrative district. Istisu water is used to treat muscles, the nervous system; skin, gastrointestinal and gynecological diseases. The Salyan and Neftchala districts territories are rich in historical and architectural monuments but less-developed in terms of tourism. There are only two hotels in Salyan, and only one hoteltype accommodation in Neftchala, not enough for the attraction of tourists in mass.

Considering the aforementioned, interregional differences must be eliminated to develop tourism in the Pre-Caspian zone as a complex. New tourism facilities should be created taking into account the natural environment and economic potential of each region.

Environmental problems of the Caspian Sea and ways of their solution. The ecological problems of the Caspian Sea and its surrounding zone are linked to the features of the historical development of the region's economy. In these circumstances, long-term natural changes (centuries-old change in the sea level, climate change) and the serious socio-economic problems of the modern era (transitional period, economic crisis, conflicts, interference of international companies, etc.) have been responsible for the deterioration of the ecological situation. The great interest taken in the hydrocarbon reserves of the Caspian Sea, the development of oil production, population growth and industrialization in the coastal zone, application of new synthetic substances in households, the use of agricultural chemicals, etc., have adversely affected the ecological situation of the Caspian Sea.(Mammadov, 2013).

Azerbaijan is much more closely interfaced with the Caspian Sea than other Pre-Caspian countries, considering its geographical location, the settlement of its population, and the development of the economy. In addition, the fact that most critical industrial facilities and the majority of the population in Azerbaijan are concentrated here has adverse ecological effects.

The development of forest and meadow landscapes in the northern zone is associated with the spread of groundwater in the conic-shaped plains near the lower flows of the Samur, Gusarchay, Gudyalchay and other rivers. During the historical period, anthropogenic impacts related to settlements and agricultural activities have led to partial deforestation in this territory. Currently, these areas are widely used in the irrigated plantations and horticulture. This harms the local environmental situation.

The environmental situation of the Central Zone is considered to be the most difficult. This is because large cities (Baku and Sumgait), petroleum, petrochemical, ferrous metallurgy, and other industrial facilities are located here. Moreover, the lack of sewerage systems in the enlarged and newly founded settlements have caused the direct discharge of wastewater into the Caspian Sea.

Although the Southern Zone is less polluted, the amount of household wastes in Lankaran and Masalli regions is higher. Therefore, works on the improvement of sewage systems are needed.

The rise of the Caspian and abrasion process often may result in subsidence, observed in the coastal areas and places where accumulation happens. This adverse process typically occurs when carbonate and sandyclay rocks are located horizontally in coastline areas, including the north-eastern coasts of the Absheron peninsula and Sangachal, Alat Pirsaat, Bandovan areas. Land subsidence is most common in the Nabran-Khachmaz, Alat-Bandovan and Lankaran-Astara coasts of the Caspian and in various river valleys.

As a result of the regression in the Caspian, erosion processes in the coastal areas are intensified. This condition may entail aeolian-type desertification as well when lands uncovered due to regression become salinized. Factors contributing to the desertification process in coastal areas are also global climate change and economic activities. Factors entailing the desertification process in recent years also include the unregulated destruction of forest areas by humans. For example, the disappearance of forests in the coastal areas from Beshbarmag Mountain to Pirsaat River can be shown. This deforestation happened because of planting and grazing of livestock which has persisted here for decades.

Currently, the solution of environmental problems is the most urgent among other problems related to the Caspian Sea. The Caspian is considered to be one of the most polluted water basins in the world.

The primary pollution sources in the Caspian Sea are rivers, oil extraction, transportation and processing, and wastes of residential and industrial facilities located in the coastal zone.

The rivers flowing into the Caspian Sea are considered the key sources of pollution since according to experts, the wastes contaminating the Caspian Sea mainly (90%) enter via river waters. The largest rivers flowing into the sea are Volga, Ural, Terek, Samur, Kura and Safidrud. Among them, the largest one is the Volga River, the annual flow of 250 km3 or 81.2% of the total river flow. 2.5 km3 of untreated and 7 m3 of insufficiently treated sewage enter the sea via the Volga River in a year (Mammadov et. al., 2000). Pollutants include oil products, iron and copper compounds, rapidly oxidizing organic compounds, etc. (Gul, 1956).

Another key source of pollution in the Caspian Sea is the technical accidents occurring during oil extraction and transportation. These accidents cause oil spills, which in some cases are 20 times more than the allowed limit. The most polluted areas in the Azerbaijani sector of the Caspian are "Neft Dashlari", "Bibiheybatoil", "Absheronoil", "28th May", "Gum adasi", etc.

The fires in the offshore fields also contribute to the pollution of the Caspian Sea. For example, the fire that happened in May 1989 on the "28th May" caused an oil slick to form on the sea 12 km in length and 4 km in width, which remained there for 15 days.

Sea pollution in the Caspian may also happen because of the discharge of industrial and domestic wastes along the coasts. These wastes are discharged in all settlements throughout the Caspian. Over 60 million m3 of pollutants are concentrated in the Baku Bay, of which 40 % are oil compounds. While the oxygen content in the waters of the Baku Bay must equal at least 10 mg/litre, the current figures vary between 1.8 and 3 mg/litre.

The fact that wastes containing hazardous chemical compounds are continuously discharged into the Caspian serves as an additional source of pollution for the sea. These chemicals include hydrocarbons, carbonuclides, chlorinated organic compounds, and heavy metals. The volume of phenol and heavy metals spilt into the sea is 3 times as much as the norm. In terms of the heaviness of pollution, the Northern Zone is less polluted than the Central and Southern zones. Currently, work on the construction of treatment facilities with 70,000 m3/day capacity is underway in the Khachmaz district. Similar works are planned in Shabran, Siyazan and Khizi districts as well.

The composition of samples taken from the bottom of the seabed includes oil products, phenols, and even mercury. The amount of phenol in Baku Bay is 0.2-1 g/kg, the amount of mercury is 5-14 g/kg. Near Sumgait, sea bottom sediments with 1-2 g/kg of hydrocarbons, 0.5-1 g/kg of phenols and 0.1-0.6 g/kg of mercury were found. Such a situation has led to the contamination and the decline and even extinction of marine species of fauna in some areas.

In 2016, the total amount of gaseous wastes emitted from various sources in the Pre-Caspian region was 146.5 thousand tons. In the densely populated Baku area, where numerous industrial and infrastructure facilities and also motor vehicles are present, the figure equaled 130 thousand tons. Wastes emitted in the region's other cities and administrative districts amounted to 16,500 tons, out of which 1.9 thousand tons were from to sources present in Sumgait city, 11,500 tons from Salyan district and 1.2 thousand tons from Siazan district.

The amount of sewage and domestic wastes are significantly different from those emitted into the air both for residential and industrial facilities of the region. The amount of sewage discharged from the facilities of Baku and Sumgait cities and Salyan and Neftchala districts together amounts to 3,371 million m3, accounting for 99.1 % of the total sewage water discharged in the pre-Caspian region. The major part of wastewater is discharged by facilities located in Salyan (1839.7 million m3) district (Regions of Azerbaijan, 2017).

Most of the domestic wastes are discharged from Baku (3,574.1 thousand m3) and Sumgait (626.0 thousand m3) cities. In 2009, the French company CNIM S.A. launched the construction of a modern Balakhani Garbage Recycling Plant in Baku to manage domestic wastes. The plant was put into operation in 2012. Two garbage burning lines with a capacity of 500,000 tons operate. Moreover, turbines capable of producing 230 megawatts/year of electricity are installed in the plant. The sludge formed due to the burning of garbage will be used for road construction (table 3).

Table 3. The main s	ources of pollution	in the Pre-Caspian	coasts of Azerbaijan
	carees or pomanon	in the rie cappian	ecable of their carjan

Territory	The amount of pollutants emitted into the atmosphere, thousand tons	The amount of waste water, million m ³	The amount of domestic waste, thousand m ³
Khacmaz administrative district	0.6	0.6	69.1
Shabran administrative district	0.01	0.9	9.0
Siyazan administrative district	1.2	0.8	3.3
Khizi administrative district	0.005	0.03	0.1
Absheron administrative district	0.1	25.8	48.0
Sumgait city	1.9	247.7	626.0
Baku city	130.0	842.7	3574.1
Salyan administrative district	11.5	1839.7	19.4
Neftchala administrative district	0.1	440.9	5.9
Masalli administrative district	0.02	0.1	23.1
Lankaran administrative district	0.009	1.1	43.1
Astara administrative district	1.1	0.08	10.4
Total:	146.5	3400	4431.1

Source: Regions of Azerbaijan. Baku, 2017

At present, one of the most critical issues related to the Caspian Sea is to predict the proliferation of pollution, depending on the specific conditions. This would enable effective anti-crisis measures to be carried out upon defining the extent of pollution in the seas.

Results.

The directions of development or nature-use of territories are determined taking into consideration the special differentiation of natural conditions and pattern of division of natural-resource potential (Hudzevich, et. at.2020). Socio-economic development is a complex and multifaceted concept that characterizes the activity of the national economy in two main areas (economic and social) (Grabowski, 2012). Along with the growth of a country's power, economic growth also stimulates the development of the social sphere, improves the living standards and material well-being of the country's population, and meets their needs.

Therefore, economic development is essentially an integral part of the goals of "sustainable development"

(environmental, economic and social) and ensures the sustainable development of the economy. Sustainable development in the economy depends on the establishment of socio-economic relations, economy, economic relations and economic management.

This, in turn, creates favourable conditions for the establishment of free-market relations, development of socio-economic infrastructure and elimination of environmental problems.

1. In places of settlement and socioeconomic activities where the demographic pressure is very high, social infrastructure facilities have increased, and, as a result, some environmental zones and risk areas have emerged.

2. The coastal areas, exposed to technogenic impact, have been changed and transformed much dramatically. This is due to the growth in the population as well as an increase in production.

3. Though healing mineral and thermal waters are widespread in the Pre-Caspian areas, these resources are markedly underutilised. To solve this problem, reconstruction of the existing resort centers should involve investments into this region. In addition, new treatment and recreation centers should be established based on the present resources as well.

Discussion.

The development of the regional economy is carried out through the trends, priorities and factors that determine the state of the national economy. Therefore, to effectively study such trends and factors, it is necessary to consider the socioeconomic priorities that shape and determine the current state of the domestic, regional economy. (Nazarova, 2011). When examining the place and position of the Caspian Sea in the Azerbaijani economy as an object of discussion, it becomes clear that environmental problems should first be investigated and prevented, because the surrounding areas of large settlements and industrial centres in the study area are severely polluted. Most coastal regions of the world face this problem. These include: urbanisation along the coastline of the Caspian Sea has amplified in recent years, with ever-increasing pressure on the landbased and marine environment. Population densities along the Caspian Sea coastline are uneven, and most of the population is concentrated in major urban centres in Azerbaijan, the Russian Federation and Iran. At the same time, the metropolitan area of Baku in Azerbaijan represents the most significant urban agglomeration (Project. Urbanisation and Climate Change Adaptation in the Caspian Sea Region, 2019).

- Sea-level changes pose considerable problems in biological and economic activities, both socio-economic and ecological, especially in shipping and fishing, both in the coastal zone and estuaries of rivers and on the high seas (Kenzhegaliev et. at., 2021).

- In the suburbs of Baku, there are very few cases in which the rise in sea level has directly affected houses. Instead, most concern stems from the economic and environmental effects of the rise in sea level, such as the blockage of sewerage lines and the deterioration of production enterprises (Kudat et. at., 1999).

- In the case of hazardous waste management, despite a proliferation of efforts to address problems of multiple contaminations of the Absheron Peninsula, no overall strategy of dealing with it exists that would involve optimum sequencing of activities, corresponding zoning, the role of financial instruments in assisting the process, environmental liability rules, and others (Country environmental analysis Azerbaijan. 2005).

- High population growth and the weakening of the health care system pose health problems to many people living around the Caspian Sea. This was due to sociopolitical and economic changes in the former Soviet republics (Caspian in maps and diagrams, France).

Conclusion.

1. Over the past ten years, demographic pressure (e.g., land acquisition by population increase) has become acute in the areas of the Caspian Basin, and the number of infrastructure facilities has increased, and as a result, some environmentally damaged zones and risk areas have emerged. Ecological tension zones and hazardous areas include Baku and Sumgait's seacoasts and Lankaran, Masalli and Khachmaz administrative districts because household wastes in these settlements are directly discharged into the sea and are a threat to the population's health.

2. Coastal areas exposed to technogenic pressure have been subjected to much faster change and transformation. This is due to the increase in the population and production volumes. At present, 88.7% of the country's total industrial output comes from the researched region. Carbon and other heat-generating gases emitted into the atmosphere through these facilities can increase the average annual temperatures in the region. To prevent this, climate change mitigation and adaptation are required.

3. Though mineral and thermal waters are widely used in the coastal areas of the Caspian Sea (Absheron Peninsula, Khachmaz and Lankaran administrative districts), they are used at a deficient level. These areas, which are the resort zone, are rich in fresh air, sea views, sandy beaches, and are more populated than many other areas. In order to solve the problem, investments in tourism and recreational firms are needed, reconstruction of resort centers should be carried out, and new treatment and recreation centers created (mainly in Baku city). 4. Absence of sewerage systems in newly built settlements in Baku and Sumgayit and direct discharge of wastewater, intensive destruction of forest massifs in Khachmaz, Lankaran and Astara administrative regions, development of agriculture and horticulture in their territories, reduction of the level of the Caspian Sea, strengthening of erosion processes in coastal areas and

References

- Country environmental analysis Azerbaijanm, 2005. Asian Development Bank.Philippines.
- Eminov, Z.N., 2005. Naselenie Azerbajdzhana [Population of Azerbaijan]. Baku (in Azerbaijani).
- Geografiya Azerbajdzhanskoj Respubliki [Geography of the Republic of Azerbaijan], 2014. Vol.1: Physical Geography. Baku: Europe. (In Azerbaijani).
- Glenn, K., 2001. The Impacts of Tourism. Minnesota.
- Gul, G.K., 1956. Kaspiyskoye more [The Caspian Sea]. Baku. (In Russian).
- Hudzevich, A.V., Nikitchenko, L.O., Baiurko, N.V. et al., 2020. Geoecological approach to organization of naturalized anthropogenically-modified territory. Journal of Geology, Geography and Geoecology, 29(3). Dnipro, 520–529. doi:10.15421/112047.
- Imrani, Z.T., 2009. Vliyanie kolebanij urovnya Kaspijskogo morya na pribrezhnye rajony Azerbajdzhana [Impact of the fluctuation of the Caspian Sea level on Azerbaijan's coastal areas] Transactions of fellow researchers, 2. Baku, 110–116. (In Azerbaijani).
- Imrani, Z.T., Zeynalova, K.Z., 2014. Ekonomikogeograficheskie osobennosti territorial'noj organizacii ekonomiki Azerbajdzhana [Economic and geographical features of territorial organization of the Azerbaijan economy]. Baku. (In Azerbaijani).
- Ismailov, Ch., 2004. Prirodnye resursy Kaspijskogo morya [Natural resources of the Caspian Sea]. Baku. (In Azerbaijani).
- Kaspij v kartah i diagrammah, 2011. [The Caspian in maps and diagrams]. Zoï environment network, France, 38 p. (In Russian).
- Kenzhegaliev, A., Kanbetov, A., Kulbatyrov, D., et. at., 2021. Fluctuation in the level of the Caspian sea and its consequences. E3S Web Conf., Volume 288. France, 1–4. https://doi.org/10.1051/e3sconf/202128801064.
- Kudat, A., Musayev, A., Ozbilgin B., 1999. Social Assessment of the Azerbaijan National Environmental Action Plan: A Focus on Community Responses to the Caspian Sea Environmental Disaster. Washington.
- Mammadov, R.M., 2013. Gidrometeorologiya Kaspiyskogo morya [Hydrometeorology of the Caspian Sea]. Baku. (In Russian).
- Mammadov, R.M., Humbatov, A.I., Mammadov, G.M., 2000. Izuchenie vetrovogo dvizheniya vody na zapadnyh beregah Kaspijskogo morya [Investigation of wind-

aeolian-type desertification processes have exacerbated the ecological situation. For example, the amount of phenol in Baku Bay was determined to be 0.2-1 g/kg, and the mercury content was 5-14 g/kg. This has led to a decrease in marine organisms and, in some cases, deep sea fauna.

driven water movement in the western shores of the Caspian Sea]. Proceedings of Azerbaijan National Academy of Sciences (series of Earth sciences). Baku, 35–38. (In Azerbaijani).

- Nazarova, M.I., 2011. Stimuli social'no ekonomichnogo rozvitku regionu [Stimuli of social and economic development of the region] Economy and state, 11, Kiev, 88–90. (In Ukrainian)
- Nelipa, K.G., 2017. Ponyattya transformaciï regional'nih sistem rozselennya [The concept of transformation of regional settlement systems] Proceedings of the Scientific and Practical Internet Conference Problems of Regional Studies: Past, Present, Future. Kiev, 26–29. (In Ukrainian)
- Project, 2019. Urbanisation and Climate Change Adaptation in the Caspian Sea Region. Azerbaijan and Iran.
- Qrabovski, O., 2015. Teoretichni osnovi social'noekonomichnogo rozvitku v konteksti Evropejs'koi integracii [Theoretical fundamentals of socio-economic development in the context of European integration] Collection of scientific works, efficacy public administration, Issue 45, Lviv, 94–100. (In Ukrainian)
- Regiony Azerbajdzhana, statisticheskij ezhegodnik, 2017. [Regions of Azerbaijan, Statistical yearbook]. Baku. (In Azerbaijani)
- Stephen, W., 1998. Tourism Geography. London.
- Sustainable Tourism Development in UNESCO Designated Sites in South-Eastern Europe. 2008. Ecological Tourism in Europe – ETE. Bonn.
- Turizm v Azerbajdzhane. Statisticheskij godovoj [Tourism in Azerbaijan. Statistical yearbook]. 2017. Baku. (In Azerbaijani)
- Vyatkin, K.I., Vyatkin, R.S., 2018. Sistema rozselennya naselennya v Ukraïni[Population resettlement system in Ukraine] Municipal utilities, Issue 142. Kharkiv, 199–204. (In Ukraine)
- Zagorsky, V., Borshchuk, E., Zholobchuk, I., 2015. Zabezpechennya stalogo rozvitku nacional'noï ekonomiki: social'ni ta ekologichni aspekti [Ensuring the stable development of national economies: social and environmental aspects] Collection of scientific works Efficacy public administration, Issue 44. Lviv, 9–17. (In Ukraine).
- Zavyalova, E.B., 2017. Kaspijskaya mechta i geopoliticheskaya [Caspian dream and geopolitical reality] Economic policy, 5, 1., 41–48. (In Russian).