

INFLUENCE OF WATER-LEVEL FLUCTUATION OF THE CASPIAN SEA ON COASTAL ZONES OF AZERBAIJAN

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The Caspian Sea holds a special position in the economy of the Azerbaijan Republic. The coastal regions of the Caspian Sea have considerably developed on account of exploitation of the rich oil and gas reserves and development of proper industrial spheres. Along with it exploitation of the health resort-recreation reserves in the Caspian Sea coastal zones has also positively influenced the region's development tendency.

The water of the Caspian Sea surrounds the coasts (shores) of the Republics of Azerbaijan, Kazakhstan, Turkmenistan, Russia, and Islamic Republic of Iran. Total area is 390 thousand square kilometers, coastline length – 6380 kilometers, and water volume is 78 thousand cube kilometers. Watershed of the Caspian Sea makes 3.6 billion square kilometers, and the main part of its water balance falls to the share of rivers. The water level of the sea is currently - 26.5 meters below sea level. During the last 500 years its level has changed 6-7 meters. The southern coasts of the Caspian Sea are characterized by subtropical climate and the northern coasts by continental climate.

One of the main ecological problems of the Azerbaijan Republic is a damage in coastal zones resulted from the water level fluctuation of the Caspian Sea. In case of water level drop of the Caspian Sea, a necessity emerges to rebuild all hydro technical settings, as well as ports. The territory of the shelf zone for location and development of the sea fauna is reducing, and the fish encounter difficulties in passing into the river for spawning. Negative changes also take place in this zone's hydrometeorological regime. In case of level decrease, the socio-economic life of the coastal zone is being considerably damaged, the ecological condition worsens, boggy zones are formed, houses and lands become submerged.

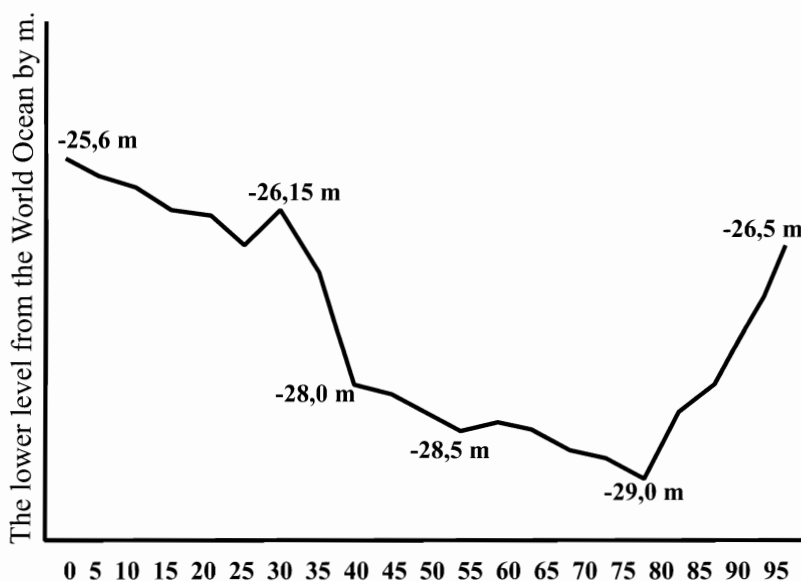
According to the gained information, the water-level fluctuation of the Caspian Sea was 3.2 meters during the last century. The lowest level was observed in 1977. At that time, the water level reached the critical point (-29 meters). Starting from 1977 as a result of 2.5 meter rise in sea level, water flood caused huge damage to shores of Azerbaijan because the coastal zone was less inclined and thickly developed. Average annual rainfall increased in 40-60 mm, and the water volume in rivers falling into the Caspian Sea increased in

10-11% during 1978-1995. All these factors have directly influenced to the increase in water of the Caspian Sea. Since 1996 water level has decreased a little.

The level of the Caspian Sea decreased in 1996-2000, but growing trend was observed again in 2001. Since the sea level increased to about 30 centimeters in 2001-2005; the level was observed to drop to 3-5 centimeters in 2006 in comparison with previous years. Recent years the water level fluctuation of the Caspian Sea remains relatively stable.

The sea level monthly becomes the subject to changes: its rate fluctuates within the interval between 30-40 sm. The level reaches its highest point in July-August and lowest point in December-February. Also, as a result of the influence of long-lasting winds, the level of water outlet and ebb processes take place. This process, especially, becomes clearly visible in the Northern Caspian. Here, in strong south east winds the water outlet can reach 4,5 meters and ebb – 2.5 meters.

Water level fluctuation dynamics of the Caspian Sea for 1900-1995



Source: The National activity plan on environmental protection. Baku, 1998

Studying of the Caspian Sea, as well as mainly hydrometeorological conditions of the ports in its coasts is very important. The reconstruction of the ports related to the water-level fluctuation and geographical matters of the development characteristics of the Caspian Sea are constantly investigated.

The transport that's the important sphere of the AR's economy and sea transport that's included into its composition have great importance in com-

mercial-economical relations of the country. The country's sea transport carries out its activities via Baku sea port.

Baku sea port lies about 2 kilometers with the coastal zone in the north of the nonfreezing Baku bay, in the south of the Absheron peninsula. The place chosen for the construction of the port is considered to be convenient from natural-economical point of view. The natural factors had great role in formation of the territory of the port and port economy. Baku sea port is situated in the bay of the same name that's the biggest one and most convenient for the depth in the Caspian Sea basin. It's very important for the functioning of the port economy, as well as the construction of the hydrotechnical equipments. The depth of the sea, wave and wind conditions (regime), the air temperature, currents, water-level fluctuation, and etc. factors had their influence on the formation of the Baku sea port.

At present, Baku sea port functions uninterruptedly the whole year and unloading and transportation of loads are realized during the whole day in 5 terminals of the port:

1. The main load terminal;
2. Absheron oil terminal (Dubendi);
3. The bay terminal;
4. The sea passenger station;
5. The container terminal.

The water-level fluctuation of the Caspian Sea negatively influences to the port economy. For example, the water-level fluctuation of the Caspian Sea has caused the port economic damage about some \$ 1 billion till 1996. In order to avoid it, all of the construction-installation issues in the port must be done by taking into consideration the water-level fluctuation of the Caspian Sea.

The climate and tectonic factors are considered to be the main reasons of the water level fluctuation of the Caspian Sea. The water level fluctuation of the Caspian Sea is observed over thousand years. The major factor influencing the water level is climate inconstancy in the Caspian Sea basin. Another reason of the increase in water level is related to the increase of the sea surface at high altitudes and as a result of this, decrease of evaporation instead of increase.

The water level fluctuation of the Caspian Sea is primarily explained by the inconstancy in the water volume of the Caspian Sea. The main reason of the water level fluctuation of the sea is a change in its water balance elements. The river flow make 80% of the water balance income and about 85% of it falls to the share of water from Volga River. By the way, it's worth to mention that 75 billion tons of oil products are flown into the Caspian Sea via rivers, and 95% of it falls to the share of Volga River. As we know, the carbohydrates causes serious discords to aquatic environment as being combinations hardly broken into pieces. Along with it, the water polluted by domestic waste and industrial pollution cause its biological pollution. Observations show that river

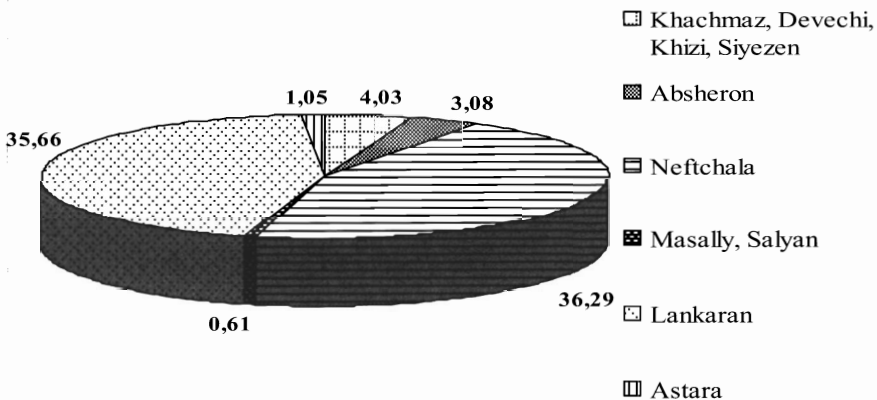
flows are subjected to changes in high intervals on average. The reason of it is the hydrometeorological processes in wide water shed of the sea.

In general, it was defined that the water lever fluctuation has periodic character and depends on the global processes in a climate. Along with it, it's worth to remember the tectonic processes in the Caspian Sea. Mountain formation processes in mountainous systems surrounding the Caspian Sea from the west, south, and south-west still take place nowadays. As a result of these tectonic processes, light and average seismic earthquakes are observed in the depth of the sea.

As was mentioned, along with the natural processes, it should be paid attention to anthropological influence to the water level fluctuation of the Caspian Sea. A dam constructed in the strait connecting the Caspian Sea with the 'Garaboghazgol' bay can be shown as an example. The dam was built to forestall the decrease in water level and caused the water increase in 10 cube kilometers in the Caspian Sea annually. Consequently, the water level started to increase, and special water permeable fields were established in 1985. Along with it, domestic waste and oil spots on the water surface of the Caspian Sea resulted from the oil leakage are visual examples of the anthropological influence.

80.72 ha of the Azerbaijan Republic were submerged and the coastal zones were damaged at great amount as a result of increase in water level from 1978 to 1998; 89,1% of it falls to the share of Neftchala and Lankaran administrative regions. Sea water in the region has moved forward the land about 300-500 meters. The beaches were submerged, communication systems (motorways, railways, and electric lines) were subjected to water flood and fish industry was seriously damaged as well.

Regions suffered from increase in water level of the Caspian Sea



Total area of damaged zones- 80,72 hectare

Source: The National activity plan on environmental protection. Baku, 1998

Abrasion processes in coastal territories of Absheron have intensified, the beaches were submerged, and Baku sea port and coastal technical services have become worthless. Along with it, Bibiheybat oil and gas extracting administration's ponds filled with well water leaked into the sea and landslide threat and ecological tension in coastal territories of Absheron has increased.

Abrasion processes have intensified in northern territories, ecological situation has been disturbed, region's attractiveness has been negatively influenced, and the number of resting people has reduced.

At present, long-lasting methods are utilized little in forecasting the water-level fluctuation in the Caspian Sea, because many scientists relate the level fluctuation to climate elements. However, this forecast is usually short-term and doesn't last more than 4-6 months.

Generally, it's difficult to estimate the economic damage resulted from increase in sea level and potential expenses for population protection or deportation in case of future increase in sea level. Intensive and periodical fluctuation of the water level in the Caspian Sea makes the people living in the coastal zones and economic spheres connected with sea always face great troubles. At the same time, this means the increase of ground water and submergence of oil-fields and industrial objects that is considered one of the main problems of the ecology of the Caspian Sea.

Some negative factors are observed in case of increase in the water level:

- Submerged lands has become worthless, boggy lands have been formed, and humidity has increased;
- The quality of drinking water from underground sources (water well and underground water supply) has distinctly worsened;
- Social infrastructure has been seriously damaged.

The opportunity to control the coastal zones in Azerbaijan can be improved by giving accurate information and forecast about the water-level inconsistency in the Caspian Sea. It is possible to improve the control system in suffered regions related to the level increase in the Caspian Sea. With this purpose, it would be primarily expedient to implement the following measures:

- Primarily creation of control plan over seaside zones;
- Preparation of information system forecasting the sea level fluctuation.

The Caspian Sea plays peerless role not only in the Republic's economy, but also in the people's health. If to take into consideration the level fluctuation in the Caspian Sea, in future we can get positive consequences in allocation of population and economic fields and increase in economic rationality.

Reference:

1. Abbasov C.R. Xəzər dənizinin iqtisadi problemləri. Bakı, 2002
2. İsmayılov Ç.N. Xəzər dənizinin təbii sərvətləri. Bakı, 2007
3. Ətraf mühitin mühafizəsi üzrə Milli fəaliyyət planı. Bakı, 1998
4. Şirinov N.Ş. və b. Xəzərin, onun sahillərinin təbiəti və ekologiyası. Bakı, 1998
5. Исмаилов Ч.Н. Нефтяной комплекс Прикаспийского региона: проблемы функционирования и развития. Баку, 2000

XƏZƏR DƏNİZİNİN SƏVİYYƏ TƏRƏDDÜDÜNÜN AZƏRBAYCANIN SAHİLYANI ƏRAZİLƏRİNƏ TƏSİRİ

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Azərbaycan Respublikasının iqtisadiyyatında Xəzər dənizi özünəməxsus yer tutur. Xəzərin sahil rayonları zəngin neft və qaz ehtiyatlarının istismarı və müvafiq sənaye sahələrinin yüksəlişi hesabına çox inkişaf etmişdir. Bu məqalədə Xəzər dənizinin səviyyə tərəddüdü zamanı dəyən zərərin qiymətləndirilməsi müəyyənləşdirilmişdir. Sonda isə dəyən zərərin azaldılması baxımından bəzi tövsiyə xarakterli elmi nəticələr verilmişdir.