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NATURAL GEOGRAPHIC AND ECOLOGICAL ASPECTS OF GEOSYSTEM MANAGEMENT IN THE DRIED PART OF THE ARAL SEA

Annotation: The Aral Sea – once the world's largest lake and a major water reservoir located in Central Asia. However, since the 1960s, due to human activity, particularly the use of water for irrigation, the Aral Sea has been drying up. Today, the Aral Sea has become one of the largest environmental disasters in the world. This article discusses measures and actions to prevent further deterioration of the lake.

Key words: The Aral Sea,Management of geosystem dynamics,Development of phytomelioration, Aeolian sands.

Introduction: Today, the Aral Sea and Aral Sea basin issue, which has evolved from a regional ecological problem to a global environmental challenge, attracts the attention not only of Central Asia but also of the international community. In this regard, as a result of the retreat of the Aral Sea, unique new landscapes have formed in sandy-salty areas covering five million hectares in its place. From this perspective, studying and analyzing the natural geographical changes occurring in the Aral Sea is considered scientifically and practically urgent. Since the emergence of the Aral Sea and Aral Sea basin problem, this region has become an object of research in various fields. Many scientific studies have been conducted focusing on various natural characteristics of this region.

Research Subject and Methodology: The Amu Darya and Syr Darya river basins in the Aral Sea region are considered the largest irrigated crop areas. Favorable soil and climatic conditions in irrigated areas guarantee the possibility of obtaining abundant yields of various agricultural crops. Since 1961, the rapid increase in the use of river water mainly for irrigation has led to a sharp decrease in the flow of rivers feeding the Aral Sea. As a result, the hydrological and hydrochemical regimes of the sea have been severely disrupted. [1].

All of these factors negatively affect the natural environment and socio-economic conditions of the Aral Sea region, with the impact being particularly significant in the lower reaches of the Amu Darya and Syr Darya rivers, which are largely dependent on the state of the sea. Albatta! Mana ilmiy ingliz tilidagi tarjimasi:

This situation has currently led to the conversion of alluvial lands in the deltas into deserts, and with the drying up of the Aral Sea, the areas of desertification are also increasing.

The drying shoreline of the sea is considered the area completely devoid of water in the Aral Sea region, where the emergence, formation, and development of continental primary natural complexes are observed, and the process of forming new natural environmental components is taking place. [3].

Moreover, the dried seabed is gradually transforming into an area dominated by eolian processes characteristic of desert zones. Deflation processes spread large amounts of salts along with dust into the surrounding areas, which accumulate in the soils due to the rapid evaporation of surface waters.

The increasing risk of deterioration of the region’s geosystems requires the development of proportionate scientifically grounded measures. [1].

Research Results and Their Discussion. The management of the dynamics of the Aral Sea’s dried seabed geosystems is becoming increasingly complex year by year as a result of the continuous decline in the sea level. This situation is not only related to the expansion of the dried seabed area but also to the intensification of wind activity, the transport of salts and saline dust storms to peripheral areas, the acceleration of salt accumulation, and, in general, the occupation of large territories by newly formed salt-

saturated continental masses and migrating sand masses. The multifactorial nature of the Aral Sea's drying dynamics regime necessitates the regular implementation of comprehensive measures to optimize the region's natural and ecological environment. Reducing and mitigating existing and potential negative environmental changes.

Rational organization of the current and prospective development of a single economy in the Aral region against the backdrop of changing natural conditions. The potential to further develop the forecast of geographic changes and socio-economic consequences, which serves to prevent adverse outcomes in the future.

The main object of phytomelioration development is the sandy strip located along the sea bottom coast (0-5 mizobata). The sands near the coast mainly consist of barchans, followed by alternating high and low sand dunes. In areas adjacent to residual saline soils, there is a strip of sandy land under shrubs, which gradually transitions into loose, hollowed sands [4].

The strip of aeolian sands (ranging from 1 to 5-6 km, and up to 20 km or more in the eastern part) is suitable for stabilization with vegetation. The takyr residual saline soils, covering the 6-8 mizobata and characterized by natural ameliorative conditions, have a high salt concentration (3-5%, locally 10-15%) and are only suitable for halophytic plants that are tolerant to these conditions. [3].

Residual saline soils (9-17 mizobata) are not very suitable for phytomelioration because the root zone is heavily saturated with salts (5-10%, in some areas 10-20% and higher) [3].

Typical active saline soils (18-25 mizobata) are considered completely unsuitable for phytomelioration in the near future, as they are highly unfavorable for the normal development of plants that grow well in saline environments. [4].

Thus, zoning related to the assessment of the possibilities for applying phytomelioration on the dried part of the seabed shows that currently, the strip of aeolian sands around the seabed coast is relatively suitable for conversion into shelterbelts, whereas the takyr residual saline soils are less adapted for this purpose..

"Reed beds should be widely used to combat aeolian processes, especially near populated areas, main roads, irrigation canals, and collectors. [3].

"Additionally, chemical agents (such as potassium-based compounds, PPA, and other polymers), bitumen emulsions, petroleum products, and other materials can also be used as binding agents; however, under market conditions, they are very expensive. Therefore, it is advisable to use relatively more affordable methods. In the conditions of this region, it is necessary to utilize available materials such as reeds, willow, and other shrubs..

Water management measures aimed at regulating water resources are well known. applying scientifically based irrigation norms, utilizing groundwater, desalinating saline waters, and treating polluted water. All these measures have a certain impact on the ecosystems of the Karakalpakstan (or Priaral) region; therefore, this factor must be taken into account when considering water management activities aimed at combating desertification caused by human activities.

Maintaining the level of the Aral Sea at a certain absolute height is a vital necessity; if the future decline of the sea level is not prevented, it will be impossible to preserve it at any meaningful level. In conditions where river water is scarce, stabilizing the sea level is very challenging, and therefore, there are few ways to achieve this.

In many studies, issues related to the preservation of the Aral Sea were not addressed; most of them focused on the conservation and rehabilitation of the natural environment of the Aral region. According to their opinion, the fate of the sea is sealed; it will completely dry up, and there is no possibility of preserving it. However, such a viewpoint is a disregard for nature, as it is considered unique for the entire Central Asian region. "For this reason, it is first necessary to attempt to preserve a part of it; in the future, when the possibility arises to send a large volume of water to it through the Amu Darya and Syr Darya rivers, it will be possible to expand the sea's water area to a certain extent.

During years of low water availability and in the future, the Aral Sea level will continue to decline rapidly, which does not guarantee the preservation of the eastern part of the Large Sea's water area and complicates the situation. "In other words, it is impossible to regularly supply the sea with a flow of 20 km³ (from rivers and drainage-

collector waters), which is one of the options for preserving the water area of the Large Sea. [2].

"Taking into account the emergence of water scarcity in the region, we emphasize the feasibility of preserving the sea in its western part, which is the deepest section of the basin. "The western part of the Large Sea should be the main focus for preserving the Aral Sea. To maintain the water level of the Large Sea (2024) in this part, which covers an area of 5-6 thousand km² and has a water volume of 40-48 km³, at an average rate of 23.2 mm, an annual inflow of 8-10 km³ of water is required. In years with relatively abundant water, the flow volume of the Amu Darya is 8-10 km³, while in years with scarce water, it is less than 3-7 km³. "Thus, the basin's regular annual supply of 6-7 km³ of flow plays an important role in regulating the sea's hydrological regime. "If the flow is less than 5 km³, it leads to increased salinization as the sea becomes a closed basin; whereas at volumes of 8-10 km³ or more, salinization decreases due to the lake's outflow. er such a regime, part of the water flows into the uncontrollable eastern part of the Large Sea. The greater the flow, the more rapid the water dispersion. [4].

If the water flow from the Amu Darya enters the lake from the south (which is the most effective option), a relatively fresher water zone with a salinity difference of 5-10 g/l compared to the middle and northern parts of the river’s delta will form. In the future, this difference will increase; however, at the same time, demineralization is observed in other parts of the lake, especially in its central and northern waters. "This leads to an increase in water salinity in the northern direction. [4].

In the western part of the Large Sea, for the purpose of accumulating a large volume of water—such as along the 20 mizobata—a hydraulic dam can be constructed in the strait (between the former Komsomol Island and the northern and southern lands of the Kulanda peninsula). such a structure can only be constructed after desalination of the water masses, taking into account the discharge of excess water and salts into its eastern part [4].

To direct the Amu Darya flow to the western part of the Large Sea, from the river’s discharge area to the southern part of the water basin, according to calculations (V. Rafikov, 2022). [4], It is proposed to construct a canal approximately 200–220 km

in length. The canal's water-carrying capacity should not be less than 1,250 m³ per second, because during years of increased Amu Darya flow, the volume of water in its lower reaches can also be large. To prevent the discharge of large water volumes outside, the canal channel must be designed to carry more than 1,000 m³ of water per second.

The canal bed should be constructed from soil to prevent water seepage into the ground. Over time, due to the settling of the lining materials, the canal bed will become less permeable to moisture. The waters from collectors KS-1, KS-3, and KS-4, as well as the collector coming from Ayoz Qal'a Lake, should be combined into a single channel and discharged into the western part of the sea. The collector flow coming from the left bank of the Amu Darya delta should also be directed into the basin through the dried part of the Ajiboy Bay. is case, it is necessary to pass all collector waters through a bioplato before entering the Amu Darya to purify them from various chemical and other harmful substances. Over time, natural groves and thickets of trees and shrubs develop along the Amu Darya (or White Darya) canal and collector routes, which protect the channel from erosion and sand encroachment.

justification process for the set of ecological measures involves considering the disruption of ecological balance in the region. Furthermore, all actions must take into account the need to restore this balance, as well as to preserve the gene pool and biodiversity. e ecological approach, engineering measures must be harmonized with forest reclamation, phytoreclamation, and agricultural complexes. The optimal integration of hydrotechnical, agro-reclamation, and phytoreclamation measures ensures high efficiency in fundamentally improving the disturbed biogeocoenosis.

e landscape approach requires that the set of measures be implemented only within naturally bounded areas—that is, within territories corresponding to specific geotopes. Indeed, landscape complexes reflect the natural characteristics of an area and determine the compatibility of groups of measures aimed at differentially optimizing the disturbed balance of ecosystems at the micro- and macrogeotope levels. In other words, the landscape structure of a region is the primary factor for the placement of various reclamation measures. In this regard, the reliability and quality level of the landscape

map are key guarantees for the effective implementation of measures aimed at increasing the productivity of ecosystems, soils, and geotopes in general. se scientific approaches must be applied comprehensively, as they complement each other and collectively form a unified scientific framework for developing the concept of optimizing the natural environment of the region.

Forest cover is the most effective in preventing soil erosion by wind, as confirmed by practical experience in other regions of Uzbekistan. In soil management, the primary focus should be on growing fodder for livestock. Additionally, a specific area must be allocated for cultivating fodder crops, since only reed cannot fully substitute for alfalfa, corn silage, and other crops.

The annually expanding dried seabed of the Aral Sea represents a potential land resource; however, due to high soil salinity, very low productivity of pastures, and the lack of irrigation on the seabed, its land and pasture resources are not yet utilized in agricultural production. Currently, the dried part of the sea causes the windborne spread of sand, salt dust, and salts to the surrounding plains.

Conclusion: The drying up of the Aral Sea has led to significant natural, geographical, economic, and social changes in the sea and its surrounding areas

It is hard to believe that what is now a hot, arid desert was once an actual sea, ranked as the fourth largest in the world. arge ships used to sail there for fishing, waves would crash against the coastal cliffs, and hundreds of tourists would come to its beaches for swimming and sunbathing. Over the years, the Aral Sea was an important natural resource of the Asian region. the 1960s, with the launch of large-scale irrigation programs for agriculture in the Soviet Union, the water level of the Aral Sea significantly decreased.

g up of the Aral Sea has caused significant natural, geographical, economic, and social changes in the sea and its surrounding areas. The Aral Sea’s shrinkage has led to a complete alteration of the coastlines and the disappearance of more than three hundred islands.

The drying up of the Aral Sea has caused not only changes in the country's geomorphology but also alterations in climatic elements. Even new natural phenomena,

such as dust and salt storms (first observed from space in 1977), have intensified. Currently, dust and salt storms rising from the dried Aral Sea bed are creating complex ecological and social problems.

Vegetation cover over a very large area: "Forests, reed beds, and many animal species have disappeared. Most importantly, the drying up of the Aral Sea has led to an increase in various diseases among the population and the emergence of economic and social problems. e Aral Sea issue has become a complex problem for the Central Asian republics and for all of humanity. e rapid salinization phenomenon occurring in the Aral Sea and its surroundings is unprecedented in global experience.

Protecting our nature, preserving it, using natural resources wisely, and fostering ecological culture and awareness in society is not only the responsibility of environmental protection agencies but also a filial duty of every person living on this land towards our homeland and its nature

Bibliography

1. Акрамов З.М., Рафиков А.А. Прошлое, настоящее и будущее Аральского моря. –Ташкент. Мехнат, 1991. –143 с.
2. ZvonkovaT.V. Hududiy prognozlashtirish asoslari. – M.: Nauka, 2007.–248 b.
3. Rafiqov A.A. Geoekologik muammolar. –Toshkent. «O‘qituvchi», 1997.–112 c
4. Рафиков В.А. Оценка, прогноз и воссоздание геосистем дельты Амударьи и обсохшего дна Аральского моря. – Ташкент. UMID DESIGN, 2022. – 198 с.