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CHANGES IN THE DYNAMICS AND RECLAMATION STATE OF LANDSCAPES IN THE AMUDARYA DELTA AFTER 2020

Annotation: The meliorative condition of landscapes has become one of the most pressing issues today. The main reasons for this are, firstly, the need to provide the ever-growing population with food and other agricultural products, and secondly, the expansion of agriculture and development of new lands due to industrial growth, which has led to the deterioration of the meliorative state of the land. The term melioration fundamentally refers to creating favorable conditions for planting crops by taking into account the natural characteristics of agricultural landscapes, increasing the productivity of pastures, and developing measures to combat various negative phenomena. In this regard, in our country, particular attention is paid to the rational use of land resources, the introduction of advanced technologies in agriculture, prevention of soil degradation, maintenance of biodiversity, and combating desertification.

Key words: reclamation, landscape, salinity, suffusion, erosion, facies, relief, geosystem, anthropogenic, automorphic, hydromorphic, alluvial, collector.

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ИЗМЕНЕНИЯ ДИНАМИКИ И МЕЛИОРАТИВНОГО СОСТОЯНИЯ ЛАНДШАФТОВ В ДЕЛЬТЕ АМУДАРЬИ ПОСЛЕ 2020 ГОДА

Аннотация: Мелиоративное состояние ландшафтов сегодня является одной из наиболее актуальных проблем. Основными причинами этого служат, во-первых, необходимость обеспечения постоянно растущего населения продовольствием и другой сельскохозяйственной продукцией, а во-вторых — расширение масштабов сельского хозяйства и освоение новых земель на фоне промышленного роста, что привело к ухудшению мелиоративного состояния земель. Понятие «мелиорация» в своей основе подразумевает создание благоприятных условий для возделывания сельскохозяйственных культур с учетом природных особенностей агроландшафтов, повышение продуктивности пастбищ и разработку мер по борьбе с различными негативными явлениями. В связи с этим в нашей стране особое внимание уделяется рациональному использованию земельных ресурсов, внедрению передовых технологий в сельское хозяйство, предотвращению деградации почв, сохранению биоразнообразия и борьбе с опустыниванием.

Ключевые слова: мелиорация, ландшафт, засоление, суффозия, эрозия, фация, рельеф, геосистема, антропогенный, автоморфный, гидроморфный, аллювиальный, коллектор.

Introduction. The Amudarya delta in many respects resembles the previously formed Akchadarya, Janadarya, and Sarykamysh deltas. At the current stage of geosystem development, they are one level higher compared to the present deltas of the Syr Darya and Amu Darya. In other words, under the conditions of an automorphic development tendency, the landscapes of alluvial plains in these regions may show certain similarities when forecasting their development, since subaerial delta landscapes have already passed through evolutionary stages observed in earlier periods.

Main part. The desiccation of the Aral Sea has led to the movement of groundwater in the Amudarya delta toward the dried-up part of the Aral Sea. At the same time, as the shoreline has retreated toward the central part of the Aral Sea, the influence of the Amudarya delta's drainage system has increased to some extent. However, in this case, several factors must be taken into account, as they affect the scale and intensity of the drainage impact on the basin of the drying sea through various mechanisms.

When the sea level had previously remained steadily above 53 meters, there existed a specific hydrostatic pressure from the groundwater masses directed toward the Amudarya delta. This was particularly characteristic of areas within the Amudarya delta plain where the relief was somewhat complex. As a result, natural hydromorphic soils, together with wetlands, began to form in the present deltas of the Amu Darya and Syr Darya. At present, due to the disappearance of this influence, the former hydromorphic soils have gradually been replaced by saline hydromorphic and semi-hydromorphic soils.

The restoration and preservation of the hydromorphic landscapes of the Amudarya delta had been possible until the 1960 s, but today it is no longer feasible. However, by ensuring a regular supply of water to the delta landscapes, it is still possible to create moist environments close to natural hydromorphic complexes. The scarcity of irrigation water requires strict adherence to established water-use standards when supplying water to delta ecosystems and dictates minimizing water losses during use. Therefore, the amount of water allocated for reed irrigation, wetlands, reservoirs, and streams must be predetermined. Compliance with the established norms for ensuring water supply to the delta is essential.

V.Rafikov considers the implementation of phytomeliorative measures throughout the Amudarya delta to be one of the most important methods of combating desertification. Forests are highly effective in preventing soil deflation (wind-induced degradation), and this has been practically proven in other regions of Uzbekistan. Naturally, the presence of tugai (riparian) forests along river branches serves as an excellent barrier against strong winds and deflation. However, many of these branches have already dried up due to the absence of water flow, leading to the decline of tugai forests. If these channels are provided with water again, the forests will certainly be restored. Yet, since it is impossible

to supply water to all channels even once a year, it is advisable to establish forests only in those areas where regular access to water can be ensured. At the same time, it is necessary to increase the proportion of drought-resistant and salt-tolerant tree species in forest plantations. Dense forest zones should mainly be developed near settlements, along roads and canals, and around lakes and water reservoirs.

The structural-dynamic characteristics of the natural complexes of the Amudarya delta are highly complex and variable, allowing us to observe the general trend of landscape transformation. This very feature determines the zonation of landscapes across the entire delta area. The lawful combination of natural complexes from the delta plains to the Aral Sea coastline reflects the gradual change in coastal landscapes from subaquatic to eluvial types. The regular spatial structural-dynamic transformation of natural complexes also causes their boundaries to remain unstable, continually shifting in the direction from the delta to the former seabed, forming sequences of automorphic, semi-hydromorphic, and hydromorphic complexes.

When studying the structure of natural complexes of the Amudarya delta, D. Khursanov emphasized the concept of “element,” systematically distinguishing two elements of the relief—elevations and depressions. According to him, the identified elevations and depressions form the internal structure of the object on the one hand, and its internal stratification on the other. For example, the elevations and depressions identified in the Kazakhdarya small delta sharply differ from those of other small deltas within the Amudarya delta in terms of their internal structure. The elevations located in the Kazakhdarya delta gradually decrease in height toward the east and northeast, unlike the floodplain ridges of the Amu Darya. In other words, the spatial distribution of landscapes across elevations and depressions in the small deltas of the Amu Darya differs significantly: since the area of elevations is relatively small compared to depressions, hydromorphic landscapes cover a much larger area than automorphic ones. The formation of non-irrigated small deltas also sharply differs from the landscapes formed within collector–drainage basins.

Therefore, one of the most complex tasks in physical geography is the study of the formation, structure, dynamics, and development of geographical complexes or

landscapes. For this reason, modern geographical researchers pay particular attention to identifying the factors influencing the origin, structure, dynamics, and development of such geographical complexes and conduct extensive research.

V.V. Dokuchaev, who developed the laws of geographical zonality in physical geography, identified two geographical factors that influence the formation, dynamics, and development of geographical complexes. Climate, as the first factor, plays the main role in the latitudinal differentiation of geographical complexes, while relief, as the second factor, plays a key role in their variation within smaller territories.

Each component of the natural environment must reach a stage of stable development. In particular, the groundwater regime must have a stable character—that is, the depth of groundwater, its mineralization, and other properties should remain stable. As a result of natural evolution, the soil cover must reach a completed stage of development or stabilize within the hydromorphic (semi-hydromorphic) or automorphic soil series. For example, takyr soils, sandy desert soils, residual takyrs, meadow soils, and others may form dominant soil covers. Under the current conditions of the Amudarya delta, such processes are still in the developmental stage; therefore, many components—especially the mobile parts of the natural system—are still far from reaching their final stage of development. Consequently, in the near future, one should not expect the formation of a new type of ecological equilibrium.

Water resources are critically important for both the environment and society. However, due to climate change, improper land use, the construction of dams and reservoirs, and unsustainable water consumption, the shrinkage of the Aral Sea has become one of the most disastrous environmental catastrophes in the world. The Amu Darya is one of the most important water resources in Central Asia and one of the main rivers feeding the Aral Sea. Its basin includes Tajikistan, Kyrgyzstan, Afghanistan, Turkmenistan, and Uzbekistan. Since the 1960s, improper use of river water for irrigation has destabilized the water balance of the Aral Sea, leading to its gradual shrinkage. Furthermore, after the collapse of the Soviet Union in the 1990s, the Amu Darya became a transboundary river, and mismanagement of water resources—particularly the conflict

between upstream hydropower generation and downstream irrigation—led to widespread soil salinization.

The Amudarya delta is one of the territories highly susceptible to land degradation. Reductions in the ecological productivity of vegetation and soils, as well as the loss of natural biodiversity, have been influenced by factors such as precipitation, temperature, drought, water withdrawal, canal systems, livestock pressure, soil salinity, and population growth. Some areas, especially the lower reaches near the Aral Sea, have experienced a decline in their natural resilience to external impacts, resulting in the deterioration of the natural potential of landscapes. Soil salinization in the delta is the primary manifestation of severe land degradation in the region. Between 1990 and 2000, the most influential factors causing degradation of croplands and natural vegetation were improper water use and decreased precipitation. Later, during the period from 2000 to 2015, salinization of irrigated lands became the main driver of vegetation decline and land degradation. The rise of the groundwater table led to secondary soil salinization, with a significant portion of increased soil salinity (45%) occurring during this period. Notably, due to the drying of the Aral Sea, some surrounding terrestrial areas have undergone strong degradation.

Assessing the natural and meliorative state of irrigated lands for agriculture requires taking into account numerous factors that affect their usability and normal functioning, including the technical possibilities of implementing engineering, agromeliorative, and other measures in agriculture. Systematic management of natural processes, creating favorable vegetation conditions for normal plant growth, the use of agricultural machinery, and developing principles and methodologies for evaluating areas for irrigated farming are among the urgent issues of today.

The most important natural factors in planning the reclamation and use of irrigated lands include relief, soil, hydrogeological conditions, the water-salt regime of soils, geochemical factors, and natural-geographical processes. Analyzing these factors makes it possible to determine the soil-meliorative condition of irrigated areas and the complexity of the natural-meliorative conditions for improving newly reclaimed irrigated lands.

It was found that the central and western parts of the Amudarya delta underwent significant changes between 1961 and 2015: previously existing lake-marsh landscapes almost completely transformed into semi-hydromorphic and automorphic stages. Furthermore, this transformation occurred in several stages:

1. 1961–1973 – general drying of ecosystems;
2. 1974–1977 – accumulation of salts in soils and the wide spread of xerophytic and halophytic plants;
3. 1978–1993 – development of eolian processes on flatlands;
4. 1994–2015 – observed eolian processes and both submersed and above-ground soil salinization.

Thus, each stage is characterized by the development of certain natural conditions where the influence of specific factors predominates.

During land development, these areas are often leveled to create relief conditions suitable for crop planting and irrigation. After a certain period (2–3 years), reclaimed lands undergo various changes: previous lowlands may subside again, or new depressions may form. In mapped facies, excessive soil moisture was noted in lowlands, and excessive salt accumulation in elevated areas. Therefore, landscape maps not only record meliorative conditions but also designate areas for implementing meliorative measures. While such locations can also be identified using soil maps, landscape maps provide comprehensive information on relief, soil structure, groundwater, vegetation cover, and land-use characteristics, making them highly effective for planning and management.

Conclusion. As a result of studying issues such as the dynamic processes occurring in the Amu Darya delta landscapes due to improper water use, deterioration of the meliorative state of landscapes, soil and vegetation degradation, technogenic disturbances of irrigated lands, changes in landscapes under the influence of melioration, and the meliorative condition of irrigated lands, the following scientific and practical conclusions were drawn:

1. The natural-meliorative condition of the Amu Darya delta landscapes is determined by factors such as the region’s lithological and geomorphological structure, hydrogeological processes, the soil water-salt regime, and the natural drainage of lands.

2. Due to the peculiarities of natural conditions in the Amu Darya delta, as well as the mineralization of groundwater and soil water and the degree of soil salinization, the soils of the region were classified into the following categories: non-saline, weakly saline, strongly saline, and extremely saline.

3. A comprehensive quantitative and qualitative analysis of the natural factors determining the meliorative condition of landscapes showed that their layered use for agricultural purposes, as well as irrigation and development of protected lands, is crucial for identifying the causes of meliorative problems. When identifying changes in natural landscapes, it is important to consider the specific location of certain landscapes in the Amu Darya delta and the dried-up seabed areas. In some cases, permanently saline landscapes may experience the constant emergence of highly mineralized groundwater, while in others, the natural complexes' salinization can be reduced due to the soil moisture being below 5–7 meters. The stepwise lowering of groundwater levels is strongly influenced by local lithogenic factors, which play a crucial role.

REFERENCES

1. Абдуллаев С. - Агрофизические основы мелиорации засоленных почв низовий Амударьи. автореферат дис.доктора сельскохозяйственных наук Ташкент.1995. 40. б.

2. Алланазаров. К.Ж. Оценка природных условий и ресурсов неорошаемой части дельты Амударьи для развития сельского хозяйства. Автореф. дис ..канд. географических наук. – Т.: 2001-52 с.

3. Попов В. А. Проблема Арала и ландшафты дельты Амударьи. - Т.: Фан Уз ССР, 1990. - 112 с

4. Рафиков А.А. Природно-мелиоративная оценка земель Голодной степи. –Ташкент: Фан УзССР, 1976. -160 с.

5. Рафиков А.А. Природные условия осушающегося южного побережья Аральского моря. – Ташкент: ФАН, 1982. – 148 с.

6. Рафиков В.А. Вопросы улучшения мелиоративного состояния орошаемых земель дельты Амударьи в условиях их опустынивания// Известия географического общества Узбекистана. – Ташкент, 2013. – № 41. – С. 106-111.