

OZIQ-OVQAT XAVFSIZLIGI: MILLIY VA GLOBAL MUAMMOLAR

Ilmiy jurnal

2025/2

SHAROF RASHIDOV NOMIDAGI SAMARQAND DAVLAT UNIVERSITETI
BIOKIMYO INSTITUTI

O‘ZBEKISTON RESPUBLIKASI OLIY TA’LIM, FAN VA INNOVATSIYALAR VAZIRLIGI

SHAROF RASHIDOV NOMIDAGI SAMARQAND DAVLAT UNIVERSITETI

“OZIQ-OVQAT XAVFSIZLIGI: MILLIY VA GLOBAL MUAMMOLAR” ILMIY JURNALI

(№2025/2)

Ilmiy jurnal O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi huzuridagi OAK Rayosatining 2023-yil 28-fevraldagi 333/5-sonli qarori bilan Biologiya fanlari bo‘yicha “Dissertatsiyalar asosiy ilmiy natijalarini chop etish tavsiya etilgan ilmiy nashrlar ro‘yxati”ga kiritilgan

Samarqand – 2025

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Maqolaning formati: Microsoft Office Word, Times New Roman, 12 o’lchamda, 1,5 interval, yuqori va pastdan – 2 sm; chapdan – 3 sm; o’ngdan – 1,5 sm, satr boshi (abzats) – 1,0 sm.

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“Oziq-ovqat xavfsizligi: Milliy va global muammolar” ilmiy jurnali biologiya va qishloq xo’jaligiga oid ilmiy amaliy nashr hisoblanib, O’zbekiston Respublikasi Prezidenti Administratsiyasi huzuridagi Axborot va ommaviy kommunikatsiya agentligi tomonidan 2021 yil 30-iyulda berilgan №1197-sonli guvohnomasiga binoan nashr etiladi.

Maqolalarning ilmiy saviyasi va keltirilgan ma’lumotlar uchun mualliflar javobgar hisoblanadi.

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https://doi.org/10.59251/2181-3973.2025.v1.138.1.3451

WATER AND COASTAL VEGETATION OF ZARAFSHAN NATIONAL NATURE PARK (UZBEKISTAN)

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Abstract. *Recently, aquatic ecosystems have been actively involved in the economic sphere of man, which is continuously increasing with the progress of civilization. Aquatic plants in reservoirs perform a number of basic functions: filtration (contribute to the settling of suspended particles); absorption (absorb biogenic elements, some organic and inorganic substances); accumulative (capable of accumulating some heavy metals, radionuclides, organic compounds, etc.); sanitary (have bactericidal properties); oxidative (in the process of photosynthesis, water is enriched with oxygen, absorbing carbon dioxide and releasing oxygen, plants determine the gas composition of water); detoxification (plants are able to accumulate toxic substances and turn them into non-toxic). The Zarafshan National Natural Park is located in the middle course of the Zarafshan River and is part of the Zarafshan State Reserve. This is a unique corner of nature where rare species of animals (Cervuselaphus bactrianus, Phasianuscolchicuszerafschanicus) and plants (Hippóphaë, Colchicum kesselringii) are found. This article discusses the current state of vegetation of the Zarafshan National Natural Park. Provides extensive information about the floristic study of the studied territories. Despite this, these data do not reflect the current state of the park's vegetation. During the long-term study of this region, modern methods were used, more than 700 samples of herbarium materials on aquatic and coastal plants were collected. More than 70 species of aquatic and coastal plants have been identified and the features of the formation of the park's vegetation have been studied. For the first time, 8 formations and 15 associations of aquatic and coastal vegetation were identified in the study area.*

Keywords: *wetland vegetation, formation, association.*

Аннотация. В последнее время водные экосистемы активно вовлекаются в хозяйственную сферу человека, которая непрерывно усиливается с прогрессом цивилизации. Водные растения в водоемах выполняют ряд основных функций: фильтрационная (способствуют осаждению взвешенных частиц); поглотительная (поглощают биогенные элементы, некоторые органические и неорганические вещества); накопительная (способны накапливать некоторые тяжелые металлы, радионуклиды, органические соединения и т.д.); санитарная (обладают бактерицидными свойствами); окислительная (в процессе фотосинтеза вода обогащается кислородом, поглощая углекислый газ и выделяя кислород, растения определяют газовый состав воды); детоксикационная (растения способны накапливать токсичные вещества и превращать их в нетоксичные). Выявлено более 70 видов водных и прибрежных растений, изучены особенности формирования растительности парка. Впервые на исследуемой территории выделено 8 формаций и 15 ассоциаций водной и прибрежной растительности.

Ключевые слова: *водно-болотная растительность, формация, ассоциация*

Annotatsiya. So‘nggi paytlarda suv ekotizimlari sivilizatsiya taraqqiyoti bilan doimiy ravishda o‘sib borayotgan insonning iqtisodiy sohasida faol ishtirok etmoqda. Suv havzalaridagi suv o‘simliklari bir qator asosiy funktsiyalarni bajaradi: filtrlash (to‘xtatilgan zarrachalarning cho‘kishiga yordam beradi); so‘rilish (biogen elementlarni, ba’zi organik va noorganik moddalarni so‘rib olish); akkumulyator (ba’zi og‘ir metallar, radionuklidlar, organik birikmalar va boshqalarni to‘plash qobiliyatiga ega); sanitariya (bakteritsid xususiyatlariga ega); oksidlovchi (fotosintez jarayonida suv kislorod bilan boyitiladi,

karbonat angidridni o‘zlashtiradi va kislorodni chiqaradi, o‘simliklar suvning gaz tarkibini aniqlaydi); detoksifikatsiya qilish (o‘simliklar zaharli moddalarni to‘plash va ularni toksik bo‘lmaganlarga aylantirishga qodir). Suv va suv bo‘yi o‘simliklarining 70 dan ortiq turlari aniqlangan, o‘simliklarining shakllanish xususiyatlari o‘rganilgan. O‘rganilayotgan hududda birinchi marta suv va suv bo‘yi o‘simliklarining 8 ta tuzilmasi va 15 ta assotsiatsiyasi aniqlandi.

Kalit so‘zlar: *suv va suv bo‘yi botqoq o‘simliklari, shakllanish, assotsiatsiya*

Introduction. Intensive economic use of water bodies, including their pollution, creates the need for constant monitoring of the state of aquatic ecosystems, one of the key components of which are aquatic plants. Floristic studies of water bodies and streams serve as the basis for studying vegetation, reconstructing the history of flora formation, identifying rare and vulnerable plant species that need protection, and provide data on the anthropogenic transformation of the territory [1].

The question of the importance of aquatic and wetland plants in the life of water bodies, of the management of their beneficial and negative properties, requires further in-depth study. Many types of marsh and wetland plants are quite widely used in various sectors of the national economy. They are the most important sources of medicinal, dyeing, food, fodder, tanning, vitamin-bearing, fibrous and other substances.

Thus, higher aquatic and wetland plants play an important role in the life of water bodies, in the circulation of substances, and are of great importance in the national economy. At the same time, it should be noted that the species composition of aquatic macrophytes and wetland plants in Uzbekistan has not yet been established. Regularities of growth, development, succession and belt distribution of higher aquatic and wetland plants and their productivity by seasons of the year depending on environmental conditions have not been revealed.

The relevance of studying the aquatic vegetation and coastal vegetation of the Zarafshan National Natural Park is due to the fact that primary producers, and primarily vascular aquatic and coastal aquatic plants, are of great importance for the normal functioning of aquatic ecosystems. They play a leading (energy) role in the functioning of hydroecosystems and largely determine the structure of the biota of water bodies.

Study of the flora and vegetation of the water bodies of the zarafshan river basin. The flora of higher wetland plants of the Samarkand region has not been fully studied to date. The species composition was not studied, taxonomic and floristic analysis was not carried out. In

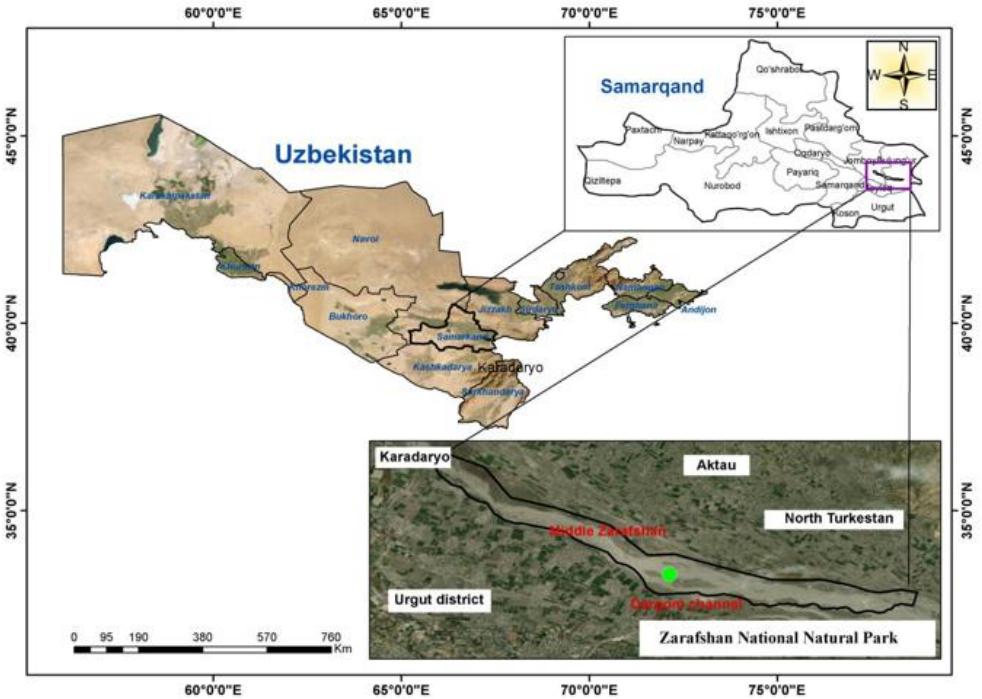

Figure 1. - located Zarafshan National Natural Park

addition, detailed information on the use of useful species of these plants in the national economy and on protected species distributed in this territory is very rare. In the monograph K.Z. Zakirov "Flora and Vegetation of the Zeravshan River Basin" [2], along with the higher plants of this area, information is given on higher wetland plants. In the first chapter of this book, in the sections devoted to the vegetation cover of riverbeds and tugai of the desert belt and adyrs (hilly places), brief information is given on the distribution of wetland plants growing in these areas.

In the monograph by T. Taubaev "Flora and vegetation of the water resources of Central Asia" [3], information is collected on the distribution of aquatic plants in the water basins of Central Asia, and all the data given in the monograph related to the Samarkand region were taken from the above monograph by K.Z. Zakirova [4].

E.S. Sulaymonov, F.Kh. Zhumaeva [5] gave information about the floristic composition and life forms of higher wetland plants distributed in individual canals, drainage waters and lakes of the Taylak and Samarkand districts of the Samarkand region. According to these data, 54 species of plants belonging to 19 families of 24 genera are found in the territories of these regions, and it is noted that 41 of them are perennial herbs, 13 species are annuals, and most of them have taproots.

According to Tashpulatov et al. [6], [7] [8] in different reservoirs of the Samarkand region, 72 species of higher aquatic plants were identified, which include 51 genera and 32 families. The authors provide information on taxonomy, distribution over the studied territory, a brief bioecological and biogeographical characteristics and economic significance of all these species.

Object of study. *Relief.* The reserve is located in the east of the Zeravshan valley between the Zarafshan and Turkestan ranges. The valley was formed due to the synclinal trough, the bottom of which is filled with Quaternary deposits carried by the river from the Pamir-Alay (Figure 1). The relief of the territory of the reserve is flat. The macrorelief shows a slope along the course of the Zarafshan River and towards its channel with a height difference from 900 to 620 m. Tertiary deposits are represented by red clays, which are overlapped by pebble deposits closer to the river. Downstream of the river, layers of sand and silt are included in the pebble strata [9].

Climate. Subtropical continental. A characteristic feature of the climate is a significant amplitude of daily and annual fluctuations in air temperature and precipitation. The average monthly air temperature varies from -0.9 °C in January to +27.4 °C in July. The duration of the frost-free period is 209 days. The average annual temperature is 13.8 °C. No more than 400 mm of precipitation falls per year. The maximum amount of precipitation, mainly in the form of rain, falls in winter and spring. In autumn and spring, southeasterly winds prevail, in summer and winter it is replaced by easterly [9].

Soils. According to the soil zoning, the soil cover belongs to the Zarafshan district to the belt of gray and desert floodplain-alluvial soils. The leading factor in soil formation is the depth of groundwater. Almost half of the reserve is occupied by areas with unformed soils (pebbles) with deep groundwater. Soil formation takes place in several stages. On fresh deposits, meadow floodplain-alluvial soils are formed, which are replaced by alluvial-meadow and meadow-takyr soils. Alluvial-meadow soils are characterized by high humus content and lack of salinity. The final stage of soil formation is light gray soils, which are typically characterized by low humus content and low salinity. The largest area in the reserve is occupied by floodplain-alluvial soils and alluvial-meadow soils. Meadow-marsh and marsh soils are rare [9].

Research methods. The collection and drying of herbarium materials was carried out according to the methods of L.I. Lisitsina [10]. Plants that grow on the water or at the bottom of the water basin were taken by hand, plants that grow a little deep in the water - with the help of hooks of different lengths. In determining the species composition and taxonomic analysis, monographs “The Key to Plants of Central Asia” were used [11].

Conducted a visual assessment of the species composition of plants. To determine the abundance of species, an eye account was used and the Drude abundance scale was used. The list of plants with abundance marks of species according to Drude is called a qualified list. The volumetric abundance of plants (the degree of filling of the water column with their stems and leaves) means the ratio of the sum of the volumes of spaces occupied by this species to the entire volume of the water column occupied by the community. Volumetric abundance is expressed as a function of coverage

and height of vegetation in relation to the area and depth of the biotope [1].In our work, we adhered to the principle of classification of vegetation according to physiognomic features [12].For higher aquatic vegetation, the following classification series has been adopted: an association is a formation, a subgroup of formations, a group of formations, a class of formations, a type of vegetation [1, 13].

Results. Below is a description of the plant formations of the reservoirs of the Zarafshan National Natural Park.

The class of formations is hydrophytic or real aquatic vegetation.

A group of plant formations completely submerged in water.

Subgroup formations rooting plants.

Formation of mollusks large (*Najadeta majoris*)

The association of mollusks is large with aquatic plants (Najadetum majoris aqui herbosum). The association includes: *Najas major* (cop^2), *Ceratophyllum demersum* (cop^1), *Potamogeton crispus* (sp).

A subgroup of formations of non-rooting plants.

Formation of the horn leaf immersed (*Ceratophylletademersi*)

The association of a robehead immersed with aquatic plants (Ceratophylletumdemersiaqui-herbosum). Grass in most cases, two-tier. Underwater level: *Ceratophyllumdemersum* (cop^2), *Ceratophyllumsubmersum* (sp), *Potamogetoncrispus* (sp), *Potamogetonperfolatus* (sp), *Potamogetonlucens* (cop^1). Flooding tier: *Lemna minor* (cop^1), *Potamogetonnatans* (sp).

A group of plant formations submerged in water with surface reproductive organs.

Subgroup formations rooting plants.

Formation of the brilliant ridge (*Potamogetonetalucentis*).

Association of brillant brilliant with aquatic plants (Potamogetonetumlucentisaquiherbosum). Herbage usually two-tier. Underwater tier *Potamogetonlucens* (cop^3) *Potamogetonperfolatus* (cop^1), *Ceratophyllumdemersum* (cop^1), *Potamogetoncrispus* (sp). Surface tier: *Lemna minor* (cop2).

Formation of the curly ridge (*Potamogetoneta crispi*).

The association of the curl curst with aquatic plants (Potamogetonetum crispi aqui herbosum). Herbage two three-tier. Underwater layer: *Potamogeton crispus* (cop^3), *Potamogeton perfolatus* (sp), *Potamogeton lucens* (cop^1), *Ceratophyllum demersum* (cop^1), *Myriophyllum verticillatum* (sp). Floodline: *Lemna minor* (cop^1). Tier of surface plants: *Sagittaria sagittifolia* (sp), *Butomus umbellatus* (sp).

Formation of pierced leaf (*Potamogetoneta perfoliati*)

The association of the primitolithia rdesta with aquatic plants (Potamogetonetum perfoliati aqui-herbosum).

Grass two-tier. Tier flood plants: *Lemna minor* (cop^1), *Lemna trisulca* (cop^1). Tier of underwater plants: *Potamogeton perfolatus* (cop^3), *Potamogeton lucens* (cop^1), *Myriophyllum verticillatum* (sp), *Potamogeton crispus* (sp).

Formation of the floating pride (*Potamogetoneta natantis*)

The association of the river float with aquatic plants (Potamogetonetum natantis aqui-herbosum). Herbage, mainly bunk. Underwater layer: *Ceratophyllum demersum* (cop^2), *Potamogeton perfolatus* (sp), *Potamogeton lucens* (sp). Floodline: *Potamogeton natans* (cop^2), *Lemna minor* (cop^1).

Formation of duckweed (*Lemneta minoris*).

The association of the small duckweed with aquatic plants (Lemnetum minoris aqui-herbosum). Grass two-tier. Flooded tier most often make up *Lemna minor* (cop^3), *Potamogeton natans* (sp). Tier underwater plants: *Ceratophyllum demersum* (cop^2), *Potamogeton perfolatus* (cop^1), *Potamogeton crispus* (cop^1).

Formation class coastal aquatic vegetation.

Formation of the reed of the south (*Phragmitetaaustralis*).

Association of reed south with lake reeds (Phragmitetumaustralisscirposum). In addition to *Phragmitesaustralis* (cop^3) and *Scirpuslacustris* (cop1), the community may include *Butomusumbellatus* (sp) and *Sagittariasagittifolia* (sp).

The association of the reed of the south with the cone-leaf-leaved (Phragmitetumaustralistyphosum). Herbage single tier. In addition to *Phragmitesaustralis* (cop^3) and *Typhaangustifolia* (cop1), single specimens of *Sagittariasagittifolia*, *Typhalatifolia*, *Butomusumbellatus*are noted.

Association of the reed of the south with the duckweed (Phragmitetum australis lemnosum). Grass two-tier. Floodline: *Lemna minor* (cop1),

Lemna trisulca (sp). Tier of surface plants: *Phragmites australis* (cop[2]), *Typha angustifolia* (sp), *Scirpus lacustris* (sp).

Formation of cattail of typha (*Typhetaangustifoliae*)

The association of typhaangustifies with the reed lake (Typhetumangustifiliaescirposum). Herbage one bunk. The association consists of *Typhaangustifolia* (cop[2]), *Scirpuslacustris* (cop[1]), as well as single specimens of *Butomusumbellatus*, *Ceratophyllumdemersum*.

The association of typhaangustifolia with umbellate susak (Typhetumangustifiliaebutomosum). Herbage one bunk. Apart from *Typhaangustifolia* (cop[3]) and *Butomusumbellatus* (cop1), the association may include *Sagittariasagittifolia* (sol), *Sparganiumerectum* (sol), *Lemna minor* (sp).

Formation of umbrella bridle (*Butometaumbellati*).

The association of the umbellate banana with aquatic plants (Butometum umbellate aquiherbosum). Grass two-tier. Floodline: *Lemna minor* (cop[1]). Surface tier: *Butomusumbellatus*(cop[2]), *Phragmitesaustralis* (sp), *Scirpuslacustris* (sp), *Sagittariasagittifolia* (sp).

Formation of the marine tubercle (*Bolboschoenetamaritimae*)

The association of sea klubnekamish with aquatic plants (Bolboschoenetum maritime aqui-herbosum). The association includes: *Bolboschoenusmaritimus* (cop[2]), *Sparganiumerectum* (cop[1]), *Butomusumbellatus* (sp), *Typhaangustifolia* (cop[1]).

Formation of a part of the plantain (*Alismeta plantago-aquaticae*)

The association of the common plant with water plants (Alismetum plantago aquatic aqui-herbosum). Herbage single tier. In addition to *Alisma plantago-aquatica* (cop[2]), the association may include *Sparganium erectum* (sp), *Butomus umbellatus* (sp), *Sium latifolium* (sp).

Formation of lake reeds (*Scirpeta lacustris*).

Association of lake reeds with aquatic plants (Scirpetum lacustris aqui herbosum). Two-level grass, less often three-tier. The surface tier includes: *Scirpus lacustris* (cop[2]), *Butomus umbellatus* (sp), *Sagittaria sagittifolia* (sp), *Typha angustifolia* (sp). *Lemna minor* (cop1) make up the flood tier. *Ceratophyllum demersum* occasionally forms an underwater layer.

Formation of arrowhead arrow (*Sagittarieta sagittifoliae*)

The association of arrowheads with arrowheads with aquatic plants (Sagittarietum sagittifoliae aqui-herbosum). Herbage two three-tier. Surface tier: *Sagittaria sagittifolia* (cop[2]), *Butomus umbellatus* (sp), *Sparganium erectum* (sp), *Alisma plantago-aquatica* (sp), *Scirpus lacustris* (sp). The flood tier may include *Lemna minor* (cop[1]) or *Lemna trisulca* (cop[1]), *Salvinia natans* (sp). Underwater layer: *Ceratophyllum demersum* (cop[1]), *Potamogeton crispus* (sp), *Potamogeton perfolatus* (sp).

Formation of the headrest (*Sparganieta erecti*)

The association of the headrest straight with aquatic plants (Sparganietum erecti aqui-herbosum). Two-tier grass stand. Tier of underwater plants: *Potamogeton lucens* (cop2), *Potamogeton crispus* (cop1), *Potamogeton perfolatus* (cop1), *Ceratophyllum demersus* (sp). Floodline: *Lemna minor* (cop1). Surface tier: *Sparganium erectum* (cop2), *Scirpus lacustris* (cop1), *Butomus umbellatus* (sp), *Sagittaria sagittifolia* (sp), *Persicaria amphibia* (sp).

Conclusions. In the vegetation cover of different types of water bodies of the Zarafshan National Natural Park, 15 formations were identified, which unite 18 associations. Community vegetation is characterized by poverty of species composition and relative simplicity of structure.

Based on the analysis of the obtained materials, it became known that 2 classes, 25 families, 40 genera and 58 species of higher wetland plants are common in the Zarafshan National Natural Park. The predominant families include PotamogetonaceaeJuss., Poaceae Barnhart, CyperaceaeJuss., PolygonaceaeJuss. 12 species are medicinal; 18 species are fodder plants.

Acknowledgements. The authors express their gratitude to the staff of the Zarafshan National Natural Park for their assistance in collecting material.

Conflicts of Interest. The authors declare no conflicts of interest regarding the publication of this paper.

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Oziq-ovqat xavfsizligi:
Milliy va global muammolar
ilmiy iurnali
2025-yil 2-soni
ISSN (onlayn): 2181-3973

Bosishga ruxsat etildi: 15.06.2025
"Times New Roman" garnituras