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High Vegetation of Lake Ayakagitma in Bukhara Region and Their Distribution

Shamsiyev Naim Amonovich, Qobilov Aziz Muxtorovich

Bukhara State University, Bukhara, Uzbekistan
Email: azizqobilov-87@mail.ru

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Abstract

More than 500 lakes are found in Uzbekistan. Ayakagitma Lake is located on the border of the Northern Gijduvon and Shafirkon districts of Bukhara region. This lake was formed in 1985-1986 at the expense of the waters of the sewage dump collector. The area of the lake is 8200 hectares, the maximum depth is 35 m, on average 10 - 15 m, the minimum is 3 - 5 meters. The chemical composition of lake water is chloride-sulfate and has a calcareous character. 67 species of high plants belonging to 22 families were found in this area. 17 of these species are found in the water of the lake and 50 species are found around it. Of the most common species, Phragmites communis reach a height of 4.5 - 5.5 meters. Phragmites communis make up the total area of the lake 8 - 10 hectares.

Keywords

Mesotrophic, Zooplankton, Zoobentos, Nectobentos, Bentos, Detritus, Mesophytes, Xerophytes, Hygrophytes, Biomass

1. Introduction

High water plants found in water bodies of Bukhara region are mainly herbivores. High plants that grow in water, animals that live in water (fish, zooplankton, zoobentos, etc.), which serves to various degrees of importance for: habitat for fish species; wintering place for mollusks, crustaceans and aquatic insects; substrate for benthos organisms; nesting site and feed for waterfowl; feed for herbivorous fish, muskrat, nutria and other aquatic animals; hiding place from predatory aquatic animals. This condition is important in the formation and maintenance of biodiversity in water bodies of high water plants.

The aim is to study the Floristic, taxonomic analysis of high water plants distributed in the natural body of Ayakagitma, as well as the characteristics of cer-

tain species identified.

2. Literature Review

More than 500 lakes are found in Uzbekistan and are rationally used for various purposes [1]. A number of studies have been carried out on the Hydrobiology of these lakes. But not all lakes have been fully explored by aquifers and aquatic plants. On the species composition, distribution area and their beneficial properties of plants scattered in and around the water bodies of Uzbekistan A. M. Muzafarov *et al.* [2], A. E. Eragashev [3], T. Taubaev [4], S. Keldibekov [5], and is cited in the work of other scientists.

Higher plants of Bukhara Region H. Q. Esanov [6] [7] [8] it has been studied by and contains 11 species of plants found along the water and Aqueduct. As well as the systematics of high water and aquatic vegetation on Lake Karakir from natural reservoirs, the prevalence of A. M. Kabilov *et al.* [9] [10], Hydrobiology of Devkhona Lake Z. Khadjaeva and others [11], on the study of the base of natural feed N. A. Shamsiyev [12], as well as high water plants A. R. Kuzmetov *et al.* [13], indigenous plants of the Ayacagitma water body N. A. Shamsiyev [14], and others, the flora of the Dengizkul natural water body S. B. Buriev and others [15] [16], were investigated by.

3. Research Methodology

Field research work on the study of high-water plants of the Ayakagitma natural water body was carried out in 2016-2021. During the research work, the Ayakagitma natural pond was made an object of high vegetation scattered along the water and water. Samples were taken from the shallows of the pond as well as land near the shore, and herbariums were prepared from them. "Flora Uzbekistan" [17], "Opredelitel rasteniy Sredney Azii" [18], "Flora Analysis of the Bukhara Oasis" [8] were used to determine the species composition of the watershed. The Route method was used when collecting herbarium samples [19]. Scientific names of categories and species "Opredelitel rasteny Sredney Azii" [18], international indexes—International Plants Names Index [20], The Plant List [21] and authors of taxons Brummit R. K., Powell C. E. [22] brought on the basis of the manual. The list of higher plants was compiled on the basis of the data "Flora Analysis of the Bukhara Oasis" [8]. The map of the Bukhara region was created on the basis of the ArcGIS 10 program.

4. Research Results

Collector waters in the Bukhara region are formed as a result of irrigation and salt washing of land and are collected in such large lakes as Dengizkul, Karakir, Tuzkon, Ayakagitma A. M. Kobilov *et al.* [9]. One such lake is Lake Ayakagitma. Ayakagitma Lake is located in the north of Bukhara region on the border of the districts of Gijduvon and Shafirkon. This lake was formed in 1985-1986 at the expense of collector waters. The area of the lake is 8200 hectares, the maximum

depth is 35 m, on average 10 - 15 m, the minimum is 3 - 5 meters. Lake water enters the chloride-sulfate and calcium group. Water clarity oscillates up to 5 - 6 meters in the northern part of the lake, and 0.5 - 0.8 m in the Deviation throw collector, which is poured into the lake. The lake is located in the semi-desert zone (Figure 1) Ayakagitma Lake considers as a mesotrophic lake like the lower Zarafshan lakes [14].

The amount of aquatic vegetation and the distribution of biomass over the lake is not the same. A high indicator of vegetation coverage is the south-western part of the lake. This part of the foot lake is quite shallow. The maximum depth is 10 m (35% - 40%), the average depth is 5 - 6 meters (60% - 65%).

In order to increase the biological productivity of Lake Ayakagitma and its use for Fisheries, its hydrobionts have been studied since 1989. The main groups of Bioresources are considered to be higher and lower aquatic plants, lower and higher aquatic animals, zoobentos, nectobentos and detritus.

The above groups of organisms use the quality of the feed of the fish caught. For this reason, we bring detailed information about the high water vegetation, which is considered one of the main Bioresources of Lake Ayakagitma, which is based on fisheries.

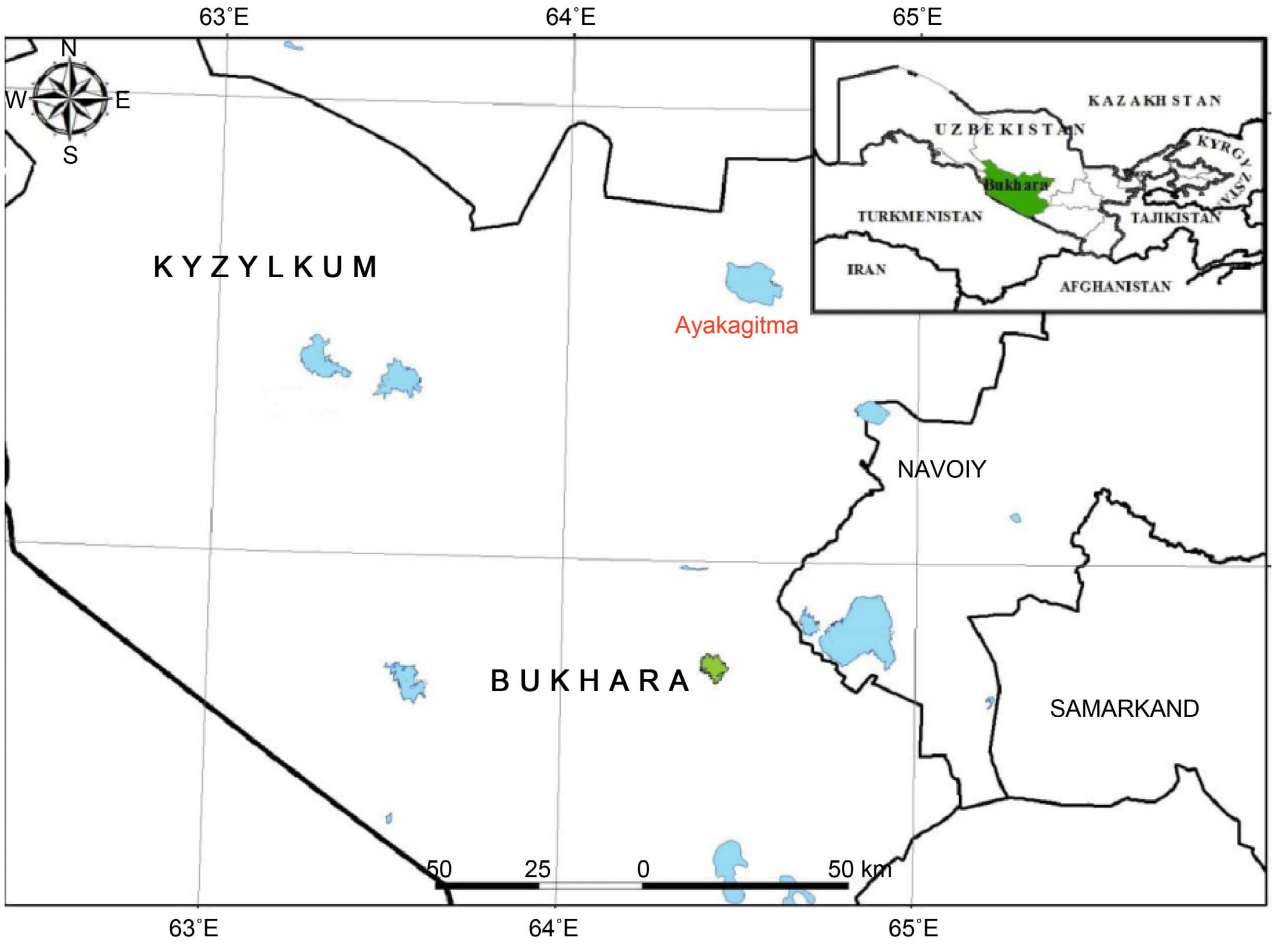

Figure 1. Lake Ayakagitma.

Table 1. High water vegetation of lake Ayakagitma.

No	Plant type	Water-growing	Waterside-growing
Ephedraceae Dumort			
1	*Ephedra strobilacea* Bunge		+
Ceratophyllaceae			
2	*Ceratophylum demersum L.*	+	
Ranunculaceae			
3	*Ceratocephala falcata* (L.) Pers.		+
4	*Consolida leptocarpa* Nevski		+
5	*Consolida camptocarpa* (Fisch. & C. A. Mey. ex Ledeb.) Nevski		+
6	*Acanthophyllum elatius* Bunge		+
Papaveraceae Juss			
7	*Roemeria refracta* (*Stev.*) *DC.*		+
8	*Papaver pavoninum Schrenk*		+
Chenopodiaceae			
9	*Agriophyllum latifolium* Fisch. et C. A. Mey.		+
10	*Atriplex dimorphostegia* Kar. et Kir.		+
11	*Atriplex tatarica L.*		+
12	*Chenopodium album L.*		+
13	*Climacoptera sukaczevii* Botsch.		+
14	*Corispermum korovinii* Iljin		+
15	*Halimocnemis latifolia* Iljin		+
16	*Halocnemum strobilaceum* (Pall.) M. Bieb.		+
17	*Halostachys bélangeriana* (Moq.) Botsch.		+
18	*Halothamnus subaphyllus* (C. A. Mey.) Botsch.		+
19	*Haloxylon persicum* Bunge		+
20	*Horaninovia ulicina* Fisch. et C. A. Mey		+
21	*Kalidium caspicum* (*L.*) *Ung.-Sternb.*		+
22	*Salsola incanescens C. A. Mey.*		+
23	*Salsola richterii* (Moq.) Kar. ex Litv.		+
24	*Suaeda crassifolia* Pall		+
Polygonaceae			
25	*Polygonum persicaria L.*	+	
26	*Polygonum aviculari L.*		+
Plumbaginaceae			
27	*Limonium meyeri* (Boiss.) Kuntze.		+
Tamaricaceae			
28	*Tamarix hispida Willd.*		+

Continued

29	*Tamarix ramosissima Lab.*		+
Brassicaceae			
30	*Arabidopsis pumila* (Steph.) N.Busch		+
Fabaceae			
31	*Alhagi pseudalhagi* (M. B.) Desv.		+
32	*Astragalus chiwensis* Bunge		+
33	*Astragalus unifoliatus* Bunge		+
34	*Astragalus villosissimus* Bunge		+
35	*Smirnovia turkestana* Bunge		+
Haloragaceae			
36	*Myriophyllum spicatum L.*	+	
37	*Myriophyllum verticilatum L.*	+	
Asteraceae			
38	*Acroptilon repens* (*L.*) *D. C.*		+
39	*Hyalea pulchella* (Ledeb.) K. Koch		+
40	*Karelinia caspia* (Pall.) Less.		+
41	*Lactuca tatarica* (*L.*) *Cam.*		+
42	*Paramicrorhynchus procumbens* (Roxb.) Kirp		+
43	*Senecio subdentatus* Ledeb.		+
Apocynaceae			
44	*Cynanchum sibiricum Willd.*		+
Convolvulaceae Juss			
45	*Convolvulus divaricatus* Regel & Schmalh.		+
46	*Convolvulus arvensis* L.		+
Boraginaceae Juss			
47	*Arnebia decumbens* (Vent.) Coss. & Kralik		+
48	*Heliotropium arguzioides* Kar. et Kir.		+
Plantaginaceae			
49	*Plantago lanceolata L.*		+
Juncaceae			
50	*Juncus articulates L.*	+	
51	*Juncus gerardii* Loisel.	+	
Butomaceae			
52	*Butomus umbellatus L.*	+	
Cyperaceae			
53	*Bolboschoenus popovii* T. V. Egorova	+	
54	*Cyperus rotundus L.*		+

Continued

55	*Scirpus mucronatus* L.	+	
56	*Scirpus triqueter* L.	+	
Poaceae			
57	*Cynodon dactylon* (*L.*) *Pers.*		+
58	*Aeluropus litoralis* (*Gouan*) *Parl.*		+
59	*Calamagrostis dubia Bunge.*		+
60	*Echinochloa crus galli R. et. Sch.*	+	
61	*Phragmites astralis* (*L.*) *Trin.*	+	
62	*Erianthus ravennae* (*L*) *P. Beauv.*		+
Potamogetonaceae			
63	*Potamogeton crispus* L	+	
64	*Potamogeton perfoliatus* L	+	
Typhaceae			
65	*Typha angustifolia* L.	+	
66	*Typha laxmannii Lepech.*	+	
67	*Typha minima* Funck	+	

As a result of the research carried out, the plants were systematically analyzed and an initial list of species was compiled. They were divided into groups according to their meeting in the water and by the water (Table 1).

67 species of high plants belonging to 22 families were found in this area. 17 species of this, are found in the water of the lake and 50 species are found around it.

From the plants identified as a result of the studies, it was found that 16 species (23.8%) belong to the Chenopodiaceae family as a result of taxonomic analyzes. All species belonging to this family are scattered around the body of water. 6 plant species belonging to each of the Poaceae (8.9%) and Asteraceae (8.9%) families have been identified. Of the 6 species in the Poaceae family, 2 of the 4 remaining in the water grow by the water. All species belonging to the Asteraceae family were found in humid areas around the body of water. In aquatic plants, 3 species belonging to the Typhaceae family cover the shores of a body of water, growing together with *Phragmites communis* to form a single Assocasia. Almost all of the identified species are herbivores only two species belonging to the *Tamaricaceae* family the shrub has a viable form. The most common plant of the identified species in a body of water is *Phragmites communis*, which forms a large biomass in a body of water.

Phragmites communis the height is 4.5 - 5.5 meters, the stems are extremely energetic, remaining in the water in early spring and forming an association that is unique. From June, the water will remain on the shore as it decreases. The total area of this association is 8 - 10 ha.

Unlike other lakes of the Bukhara region, plant species found in water made up a small amount. In places close to the shores of the lake, mesophytes and xerophytes are also found, along with hygrophytes. The occurrence of plants that belong to these ecological groups is mainly due to changes in water levels during the growing season.

5. Conclusion

The total area of the studied reservoir is 8200 ha. In this area, 67 species of higher plants belonging to 22 families were found. Of these, 17 species live in the water of the lake and 50 species in its vicinity. During the studies, the southwestern part of the lake is made up of aquatic plants *Phrogmites communis*, *Typha angustifolia*, *Scyrpus sp*, *Potamogeton sp*, *Ceratophyllum demersum* covered with plants such as. These plants cause lake water to eutrophize. It is also a source of nutrients for hydrobionts, a substrate that lays the shell for phytophilic fish, serves to reduce the mineralization of water by absorbing excess in water and salts that are harmful to living organisms. To improve the biomeliorative state of the lake, the use of herbivorous fish gives an effect. This requires a comprehensive study of the biology of herbivorous fish.

Conflicts of Interest

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

References

[1] Towards the Development of Regional Cooperation on Water Quality Assurance in Central Asia (2012) Diagnostic Report and Cooperation Development Plan. 7-10.

[2] Muzafarov, A.M. and Musaev, K.Y. (1961) Materials for the Flora of Algae in the Storage Water of the Zarafshon River Basin. Tashkent State University, Toshkent, 235-249. (In Russian)

[3] Ergashev, A.E. (1960) On the Vegetation of the Collective Network of the Bukhara Region. Fan, Tashkent, 23-26.

[4] Taubaev, T.T. (1970) Flora and Vegetation of Water Bodies of Central Asia. Fan, Toshkent, 490.

[5] Keldibekov, S. (1981) Flora and Vegetation of Fish Farms Chirchik-Angren Basin. Fan, Tashkent, 82-101.

[6] Esanov, H.K. (2016) New Plant Species in the Flora of Bukhara Oasis. *Turczaninowia*, **19**, 77-81. https://doi.org/10.14258/turczaninowia.19.2.10

[7] Esanov, H.K. and Usmonov, M.X. (2018) Two Alien Species of Asteraceae New to Uzbekistan (Bukhara Oasis). *Turczaninowia*, **21**, 175-180.
http://turczaninowia.asu.ru
https://doi.org/10.14258/turczaninowia.21.4.18

[8] Esanov, H.K. (2017) Flora Analysis of the Bukhara Oasis. Philosophy of Biological Science, Tashkent, 179.

[9] Mukhtorovich, K.A. and Burievich, B.S. (2019) Distribution of High Water Plants of Lake Karakir in Bukhara Region in Ecological Groups. *American Journal of Plant*

Sciences, **10**, 2203-2207. https://doi.org/10.4236/ajps.2019.1012155

[10] Mukhtorovich, K.A., Burievich, B.S., Qurbonovich, E.H. and Tolibovich, Y.L. (2020) Distribution and Taxonomy of High Plant Species in Lake Karakir Bukhara Region. *American Journal of Plant Sciences*, **11**, 589-594. https://doi.org/10.4236/ajps.2020.114044

[11] Xodjayeva, Z. (2021) Lake Devkhona Is as Hydrobiological Object. *Center for Scientific Publications*, **8**.

[12] Shamsiyev, N.A. (2020) Devkhana Lake Hydrobionts as a Natural Food Source (Buxdu. uz). *Center for Scientific Publications*, **2**, 121-124.

[13] Kuzmetov, A.R., Toshov, H.M., Esanov, H.K. and Isroilov, S.U. (2019) The Species Composition of High-Water Plants and Their Significance in Lake Devkhona, Bukhara Region. *Bulletin of the Agricultural Science of Uzbekistan*, **2**, 138-141.

[14] Shamsiyev, N.A., Amonova, D.N., Hayitboyev, J.T. and Saidov, S.B. (2021) Phytoplankton of Lakeayakagimta. *Central Asian Journal of Medical and Natural Sciences*, **2**, 140-149.

[15] Buriev, S.B., Shodmonov, F.K. and Esanov, X.K. (2021) Razmnojenie mikroskopicheskix vodorosley i vыsshix vodnыx rasteniy v vodax Dengizkul buxarskoy oblasti. *Kronos*, **5**, 4-7.

[16] Esanov, H.K., *et al*. (2021) High Plant Species Distributed in and around Dengizkul, Bukhara Region. *American Journal of Plant Sciences*, **12**, 266-273. https://doi.org/10.4236/ajps.2021.122016

[17] Editorial Team (1941-1962) Flora Uzbekistana. Vol. 1-6, Editio Academiae Scientiarum UzSSR, Tashkent.

[18] Editorial Team (1968-1993) Conspectus Florae Asiae Mediae. Fan, Tashkent.

[19] Sherbakov, A.V. and Mayorov, S.R. (2006) Inventory of Flora and the Basics of Herbarium (Methodical Recommendations). Partnership of Scientific Publications KMK, Moscow, 48.

[20] International Plant Names Index. http://www.ipni.org/

[21] The Plant List. http://www.theplantlist.org/tpl1.1/record/gcc-133949

[22] Brummit, R.K. and Powell, C.E. (1992) Authors of Plant Names. Royal Botanic Gardens, Kew, 732 p.