

# High Plant Species Distributed in and around Dengizkul, Bukhara Region

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## Abstract

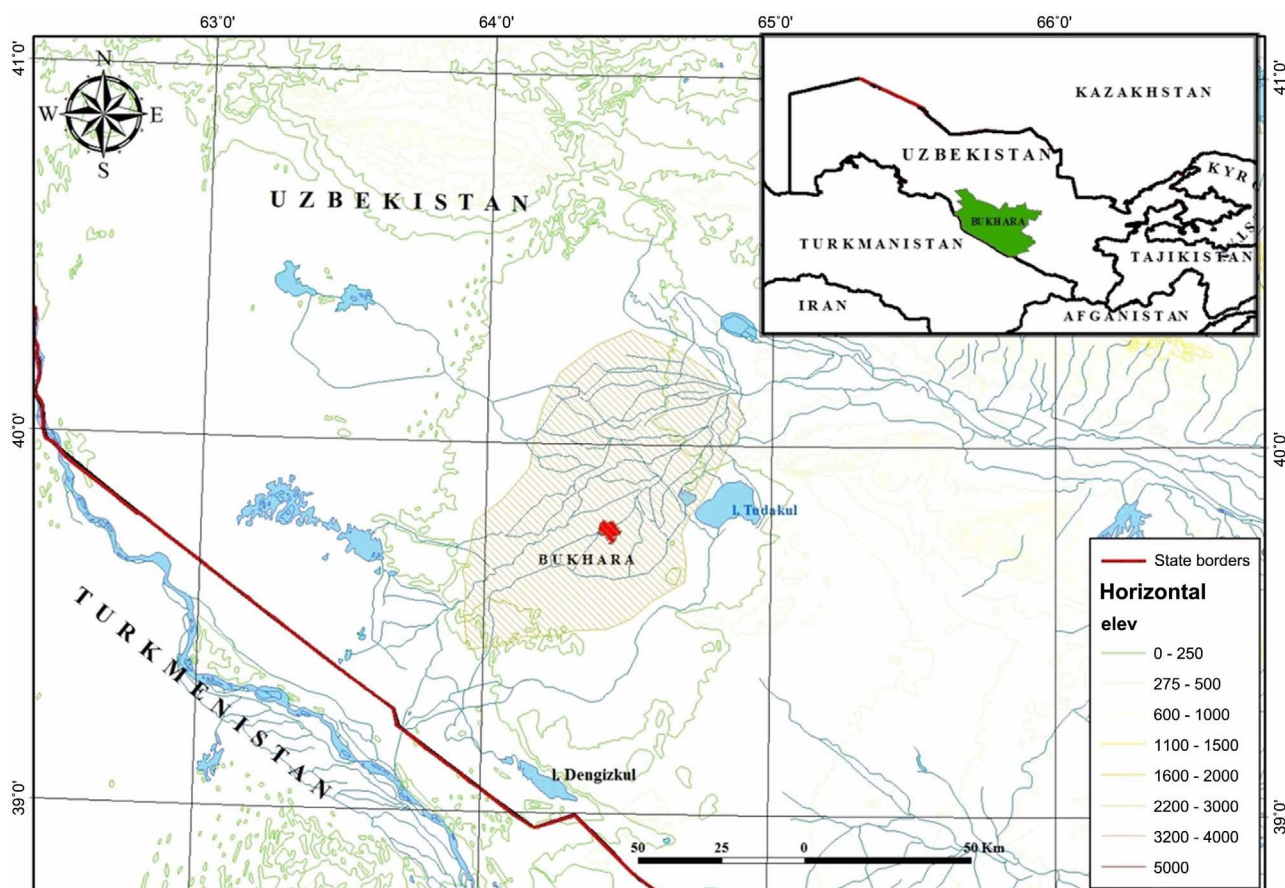
The article presents the results of research conducted in Dengizkul and around this area. It identifies plant species in and around the lake and analyzes species composition. As a result of the analysis, 70 species of tall plants belonging to 24 families were identified in the lake. The identified species are divided into aquatic and riparian plants. Of these, 18 species are found in lake water and 52 species in its vicinity. The low number of high plant species in the lake water is due to the salinity of the water. The protection of this area is based on the natural conservation of the surrounding plant population.

## Keywords

Dengizkul, Bukhara, Zarafshan River, Water Basin, High Plants, Water

## 1. Introduction

There are more than 500 lakes in Uzbekistan and they are used wisely for various purposes [1]. A number of studies have been conducted on the hydrobiology of these lakes. However, not all lakes have been fully studied along the waterfront and aquatic plants. One such lake is Dengizkul Lake. Dengizkul is located in the south-west of the Republic of Uzbekistan, in the Alat district of Bukhara region, 75 km from the city of Bukhara, on the border with Turkmenistan, 40 km north-west of the center of Alat district (**Figure 1**). Dengizkul physically and geographically occupies the depth part of the plains of Bukhara region. In the twentieth century, the Zarafshan River played an important role in the formation of the Dengizkul River. The lower tributary of the Zarafshan River, Tayqir, flows into the lake [2]. Currently, the main water source of the lake is the southern Alat collector. In recent years, the salinity of the water has increased significantly as a result of the decrease in the amount of water discharged into the lake. Lake Dengizkul is a reservoir formed as a result of the discharge of water from the Bukhara



**Figure 1.** Location of Dengizkul lake.

and Karakul oases through the Khamza collector in the 1960s-1970s on the site of a natural depression [3].

Currently, Dengizkul receives sewage and collector water from Bukhara region. But these waters cannot maintain the water level of the lake permanently. In summer, very hot days cause the lake water to evaporate, and as a result of the decrease in the amount of water, the amount of salt in it increases, leading to the accumulation of salt at the bottom of the lake up to half a meter. The results of such studies serve as a scientific basis for improving the economic development and epidemiological sanitation of these areas.

## 2. Literature Review

Scientists from Central Asia and the Republic of Uzbekistan have conducted a number of scientific studies on aquatic and marine plants. In particular, the aquatic plants found in the Farkhod Reservoir are N.V. Generalov [4], K.V. on the formation of aquatic plants. Dobroxotova [5] [6], data on the ecology of plants distributed in water basins V.S. Pokrovskiy [7], V.V. Nikitin [8] is mentioned in his scientific works. The distribution of aquatic plants T.G. Matyukova [9], A.A. Ashirova [10], V.M. was studied by Katansky [11] and others. The largest research work on the study of aquatic and coastal plants in Central Asia was con-

ducted by M.G. Popov, E.P. Korovin, V.P. Drobov, N.V. Pavlov, A.M. Muzafarov, K.Z. Zakirov, L.E. Rodina, I.I. Granitov, F.N. Belongs to Rusanov and others. On the composition of species of plants and their useful properties in the water basins of Uzbekistan and its environs A.M. Muzafarov and others [12], A.E. Ergashev [13], T. Taubaev [14], S. Keldibekov [15], N.E. Rashidov [16] and other scientists. High plants have been studied by Esanov [17] and lists 11 species of water and coastal plant species. Also, the plants of Karakir Lake are studied by A.M. Kobilov and others. [18], Devkhona Lake Plants are studied by A.R. Kuzmetov and others [19].

### 3. Research Methodology

The object of study is the tall plants distributed in and around Lake Dengizkul, Bukhara region. Data from Flora of Uzbekistan [20], Opredelitel rasteniy Sredney Azii [21] and Analysis of Flora of Bukhara Oasis [22] were used to determine the composition of plant species. Herbarium specimens were collected by the route [23] method. The scientific names of the categories and species are “Opredelitel rasteniy Sredney Azii” [21], according to international indexes—International Plants Names Index [24], The Plant List [25] and the authors of the species Brummit, R.K., Powell, C.E. [26]. The map of Bukhara region was created on the basis of ArcGIS 10 program.

### 4. Research Results

In existing scientific sources [2] [20] [21] [27] Dengizkul data on marine vegetation have been provided. Some information about the plants is given only in the reports. Therefore, the water and waterfront vegetation of the lake in 2019-2020 were studied. Preliminary results of the study showed that due to the high salinity of the lake water, there were very few species of aquatic plants in it. It can be seen that the natural populations of higher plant species around Dengizkul Lake are very well preserved (Figure 2).

Due to the fact that this area is the object of Lukoil, it was studied on the basis of the collection of herbarium samples during the study that the lands are protected and the plant population is naturally preserved. *Calligonium matteianum* Drobow, *C. paletzkianum* Litv., *C. setosum* Litv., included in the Red Data Book of Uzbekistan, are very rare in this region and species encountered. As a result of the research, the collected 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 on the waterfront (Table 1).

**Table 1.** Plants which are separated in Dengizkul.

№	Type of vegetation	Water growing	Water along growing
<b>Ephedraceae</b>			
1	<i>Ephedra strobilacea</i> Bunge		+

## Continued

<b>Ceratophyllaceae</b>		
2	<i>Ceratophyllum demersum</i> L.	+
<b>Ranunculaceae</b>		
3	<i>Ceratocephala falcata</i> (L.) Pers.	+
4	<i>Consolida leptocarpa</i> Nevski	+
5	<i>Consolida camptocarpa</i> (Fisch. & C.A.Mey. ex Ledeb.) Nevski	+
6	<i>Acanthophyllum elatius</i> Bunge	+
<b>Papaveraceae</b>		
7	<i>Roemeria refracta</i> (Stev.) DC.	+
8	<i>Papaver pavoninum</i> Schrenk	+
<b>Chenopodiaceae</b>		
9	<i>Agriophyllum latifolium</i> Fisch. et C.A. Mey.	
10	<i>Atriplex dimorphostegia</i> Kar. et Kir.	+
11	<i>Atriplex tatarica</i> L.	+
12	<i>Chenopodium album</i> L.	+
13	<i>Climacoptera sukaczewii</i> Botsch.	+
14	<i>Corispermum korovinii</i> Iljin	+
15	<i>Halimocnemis latifolia</i> Iljin	+
16	<i>Halocnemum strobilaceum</i> (Pall.) M. Bieb.	+
17	<i>Halostachys bélangeriana</i> (Moq.) Botsch.	+
18	<i>Halothamnus subaphyllus</i> (C.A.Mey.) Botsch.	+
19	<i>Haloxylon persicum</i> Bunge	+
20	<i>Horaninovia ulicina</i> Fisch. et C.A. Mey	+
21	<i>Kalidium caspicum</i> (L.) Ung.-Sternb.	+
22	<i>Salsola incanescens</i> C. A. Mey.	+
23	<i>Salsola richterii</i> (Moq.) Kar. ex Litv.	+
24	<i>Suaeda crassifolia</i> Pall	+
<b>Polygonaceae</b>		
25	<i>Polygonum persicaria</i> L.	+
26	<i>Polygonum aviculari</i> L.	+
<b>Plumbaginaceae</b>		
27	<i>Limonium meyeri</i> (Boiss.) Kuntze.	+
<b>Tamaricaceae</b>		
28	<i>Tamarix hispida</i> Willd.	+
29	<i>Tamarix ramosissima</i> Lab.	+
<b>Brassicaceae</b>		
30	<i>Arabidopsis pumila</i> (Steph.) N.Busch	+
<b>Fabaceae</b>		

## Continued

31	<i>Alhagi pseudalhagi</i> (M.B.) Desv.	+
32	<i>Astragalus chiwensis</i> Bunge	+
33	<i>Astragalus unifolius</i> Bunge	+
34	<i>Astragalus villosissimus</i> Bunge	+
35	<i>Smirnovia turkestanica</i> Bunge	+
<b>Haloragaceae</b>		
36	<i>Myriophyllum spicatum</i> L.	+
37	<i>Myriophyllum verticillatum</i> L.	+
<b>Asteraceae</b>		
38	<i>Acroptilon repens</i> (L.) D.C.	+
39	<i>Hyalea pulchella</i> (Ledeb.) K.Koch	+
40	<i>Karelinia caspia</i> (Pall.) Less.	+
41	<i>Lactuca tatarica</i> (L.) Cam.	+
42	<i>Paramicrorhynchus procumbens</i> (Roxb.) Kirp	+
43	<i>Senecio subdentatus</i> Ledeb.	+
<b>Apocynaceae</b>		
44	<i>Cynanchum sibiricum</i> Willd.	+
<b>Convolvulaceae</b>		
45	<i>Convolvulus divaricatus</i> Regel & Schmalh.	+
46	<i>Convolvulus arvensis</i> L.	+
<b>Boraginaceae</b>		
48	<i>Arnebia decumbens</i> (Vent.) Coss. & Kralik	+
49	<i>Heliotropium arguzioides</i> Kar. et Kir.	+
<b>Plantaginaceae</b>		
50	<i>Plantago lanceolata</i> L.	+
<b>Lamiaceae</b>		
51	<i>Chamaesphacos ilicifolius</i> Schrenk	+
<b>Juncaceae</b>		
52	<i>Juncus articulatus</i> L.	+
53	<i>Juncus gerardii</i> Loisel.	+
<b>Butomaceae</b>		
54	<i>Butomus umbellatus</i> L.	+
<b>Cyperaceae</b>		
55	<i>Bolboschoenus popovii</i> T.V. Egorova	+
56	<i>Cyperus rotundus</i> L.	+
57	<i>Scirpus mucronatus</i> L.	+
58	<i>Scirpus triqueter</i> L.	+
<b>Poaceae</b>		



## Continued

59	<i>Cynodon dactylon</i> (L.) Pers.	+
60	<i>Aeluropus litoralis</i> (Gouan) Parl.	+
61	<i>Calamagrostis dubia</i> Bunge.	+
62	<i>Echinochloa crus galli</i> R. et. Sch.	+
63	<i>Phragmites australis</i> (L.) Trin.	+
64	<i>Erianthus ravennae</i> (L) P. Beauv.	+
<b>Najadaceae</b>		
65	<i>Najas marina</i> L.	+
<b>Potamogetonaceae</b>		
66	<i>Potamogeton crispus</i> L.	+
67	<i>Potamogeton perfoliatus</i> L.	+
<b>Typhaceae</b>		
68	<i>Typha angustifolia</i> L.	+
69	<i>Typha laxmannii</i> Lepech.	+
70	<i>Typha minima</i> Funck	+

*Tamarix ramosissima* Ledeb.*Salsola richterii* (Moq.) Kar. ex Litv.*Phragmites australis* (L.) Trin.**Figure 2.** Natural population of around Dengizkul.

In this region 70 species of tall plants belonging to 24 families have been identified. Of these, 18 species are found in lake water and 52 species in its vicinity. Unlike other lakes in Bukhara region, the number of aquatic plant species was small.

## 5. Conclusion

Lake Dengizkul was rich in flora and fauna in the early days of its emergence. However, in recent years, the decrease in the amount of water discharged into the lake and the strong transpiration process have increased the salinity of the water, leading to a decrease in the number of higher aquatic plants. The number of species in this lake was lower than in other lakes of Bukhara region. Even *Phragmites australis* and *Typha angustifolia*, which are recorded as the main plant of all lakes, can be found only in some parts of the lake shores. The population of terrestrial plants around the sea is naturally preserved and rich in species.

## Conflicts of Interest

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

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