Current state of Tugai vegetation of Akhangaran river basin

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Abstract. The paper involves phytocenotic and floristic diversity of the biota of the ecosystems of Akhangaran River basin. The current state, structure, areas of vegetation, especially in tugai communities of the basin in recent years have changed significantly under the influence of various types of anthropogenic factors. The entire territory of the basin, especially along the floodplain of the rivers is covered with a dense network of roads, numerous mines, quarries, rest homes, reservoirs and have significant demographic resources, i.e. the basin is the most dynamic area in the Western Tien Shan, where all types of desertification occur. In order to preserve the current phytocenotic diversity of all types of vegetation, in particular tugai communities, the task is to conduct a cartographic inventory based on space data. The results show that tugai vegetation in the basin is the most degraded and strongly changed in composition, structure and area, which is not only reduced in places gradually destroyed, i.e. replaced by cultivated lands.

1 Introduction

Tugai is a form of riparian vegetation and forest that occurs along large rivers in Central Asian deserts, such as the Tarim River, Syr Darya, and Amu Darya. In recent years, environmental protection, ecological balance, and rational use of natural resources have become an international global problem. This dictates the study of the current state of the vegetation cover of all altitudinal zones, in particular the tugai forests of the study area.

Information about tugai vegetation and its habitat conditions in Uzbekistan, in particular the Akhangaran River basin, can be found in the works of V.P. Drobov, 1956, E.P. Korovin, 1962, A. Bakhiev, 1970, A.U. Usmanov, 1953, A.A. Ashurova, 1965, M.M. Arifkhanova, 1961, N. Temirboev, 1969, Z.A. Maylun, 1973, V.N. Pavlov, 1980, A.A. Khanazarov, E.A. Butkov, 2002, and others [1,9].

Of great importance in the study of tugai forests of the Akhangaran River basin are the works of A. U. Usmanov (1953) and A. A. Khanazarov, E. A. Butkov (2002), which they serve as a benchmark for comparison with our data.

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In 2000-2010, for the first time in a separate form, a detailed comprehensive study of the floristic composition, biomorphological, phytocenotic, typological, ecological diversity and the current dynamic state of plant communities of all altitudinal zones, in particular the basin, was carried out by mapping them.

We call the tugai vegetation, as many researchers do (Usmanov, 1953, Temirbaev, 1969, Maylun, 1973), the entire plant complex of river valleys. In the Akhangaran River basin, tugai occupies a limited space, stretching in a narrow strip along the river flow, on the elements of the modern floodplain, flooded by spring - summer leashes [2,6,7].

2 Discussions

The Akhangaran River basin is located between the southwestern spurs of the Chatkal and northwestern slopes of the Kuramin ridges.

The total area of the basin according to our data is 6226 km2, and according to literary data 5260 km2. The relief of the basin is characterized by clearly expressed vertical zonality. Absolute heights here vary from 350 m above sea level along the Syr Darya, to 4062 m in the upper reaches of the Akhangaran River.

The Akhangaran River begins above the Kengas Pass (4062 m), where, in addition to the main channels to the Syr Darya River (350 m), it is 233 km to the confluence. Along numerous side tributaries: Karakiyasay, Shavgazsay, Larek, Lashkerek, Kamchik, Karabausai, Shavgazsay, etc., where along these side sais there is also a narrow strip of rare woody-shrubby tugai.

These thickets are spread in a narrow strip mainly on hard-to-reach steep rocky sides of river banks. Due to the large range of absolute heights and, accordingly, a wide range of ecological conditions, a large phytocenotic and floristic diversity of the biota of the ecosystems of this basin is concentrated here. Therefore, in botanical terms, the Akhangaran River basin, like the entire territory of the Western Tien Shan, in particular the tugai, is very interesting, unique and strongly transformed (disturbed).

The current state, structure, areas of vegetation, especially in tugai communities of the basin in recent years have changed significantly under the influence of various types of anthropogenic factors. The entire territory of the basin, especially along the floodplain of the rivers is covered with a dense network of roads, numerous mines, quarries, rest homes, reservoirs and have significant demographic resources, i.e. the basin is the most dynamic area in the Western Tien Shan, where all types of desertification occur. In order to preserve the current phytocenotic diversity of all types of vegetation, in particular tugai communities, the task is to conduct a cartographic inventory based on space data. Taking into account the above, in 2000-2010, a geobotanical, cartographic survey of the vegetation in all altitudinal belts, in particular tugai of the survey area, was conducted. As a result, it was established that tugai vegetation in the basin is the most degraded and strongly changed in composition, structure and area, which is not only reduced in places gradually destroyed, i.e. replaced by cultivated lands.

According to A.I. Usmanov (1953), “The total number of plant species that are often found and participate in the formation of tugai thickets is determined to be 146 species, united into 37 families, of which 34 species fall into the share of trees and shrubs. The remaining 112 species are herbaceous plants.”

The author described the following tugai thickets in the basin: gradually being destroyed, i.e. replaced by cultivated lands.

According to A.I. Usmanov (1953), "The total number of plant species that are frequently encountered and participate in the formation of tugai thickets is 146 species, grouped into 37 families, of which 34 species fall among trees and shrubs. The remaining 112 species are herbaceous plants."

The author described the following tugai thickets in the basin:
Populus-fraxinus
Populous-salix
Athraphaxis
Tamarix
Typha
Phragmites communities

The above-mentioned floristic and phytocenotic data are primary materials for comparing the current state of tugai vegetation in the basin.

As a result of the geobotanical and cartographic studies carried out in the tugai, 50 species were registered in the basin. Of these: 5 species are trees, 7 species are shrubs, 38 species are herbaceous plants (Table 1).

As can be seen from the table, the floristic composition has decreased to 68%. As a result of our work, it was revealed that of the above-mentioned tugai communities, tamarix and salix have survived, while the rest are found in a mixed form (table), i.e., the floristic and phytocoenotic diversity and area have also decreased to 60-70%.

Table 1. List of Tugai vegetation plants of the Akhangaran River basin

Association	Weed-alhagi-tamarix community	Fragmites-cynodon-salix comminity	Mixed-grassy-tamarix-mixed tugai community	Salsola-reed-mixed-woody-shrub	Height in cm
Plot No.	31	17	15	10	
Projective cover %	65	70	60	65	
Trees					
Salix olgae	-	Sp_2	Sp_1	-	300-400
S. songarica	-	Sp_3	-	Sp_1	300-400
S. wilhelmsiana	-	Sp_3	Sp_1	Sp_2	200-400
Elaegnus angustifolia	Sp_1	-	-	Sp_1	400-500
Populus pruinosa	-	Sp_2	-	Sp_2	350-400
Shrubs					
Tamarix leptostqchys	Sp_3	-	Sp_3	Sp_2	200
T. litvinovii	Sp_3	-	Sp_2	-	150-200
T.hohenackeri	Sp_3	-	-	-	150-200
T.pentandra	-	-	Sp_1	Sp_1	200
T. hispida	-	Sp_1	Sp_1	-	150
Rosa canina	Sp_2	-	Sp_2	Sp_2	150
R. beggeriana	-	-	-	Sp_2	150
Perennial herbs					
Acroptilon repens	Sp_1	-	Sp_2	Sp_2	60-80
Alhagi canescens	Sp_3		Sp_2	Sp_1	80
A. pseudalhagi	Sp_3		Sp_2	Sp_2	60-80
Aeluropus litoralis	Sp_1	-	Sp_1	Sp_1	200-300
Agropuron repens	-	Sp_1	Sp_2	-	75-85
Artemisia absinthium	Sp_2	Sp_2	Sp_2	-	25-40
Apocynum scabrum	-	-	Sp_1	-	150

Equisetum ramosissimum	Sp_1	-	Sp_1	Sp_1	20-25
Calustegia sepium	Sp_2	Sp_2	Sp_2	-	15-20
Calamagrostis dubia	Sp_2	Sp_1	Sp_2	-	80-90
Cirsium ochrolepideum	Sp_1		Sp_2	Sp_1	70
Centaurea squarrosa	Sp_2	-	Sp_1	Sp_1	60-80
Dodartia orientalis	-	Sp_1	-	Sp_1	30-35
Plantago lanceolata	-	-	Sp_2	-	15-20
Ilycyrrhisa dlabra	Sp_1	Sp_1	Sp_1	-	25-40
Phragmites australis	Sp_1	Sp_3	Sp_1	Sp_3	5-75
Rumex crispus	-	Sp_1	-	-	70
R. angreni	Sp_1	-	-	-	60-75
Mentha asiatica	Sp_1	Sp_1	-	-	40
Capparis spinosa	Sp_1	-	Sp_1	-	120
Circium ochrolepidium	-	Sp_2		Sp_1	75
Cynodon dactylon	-	Sp_3	Sp_1	-	20-25
Cyperus rotundus	-	Sp_2	-	-	15-20
Cichorium intybus	Sp_1	Sp_2	-	Sp_1	50-75
Herbs biennial and annual					
Medicago lupulina	-	Sp_1	Sp_1	-	20
Anagalis arvensis	-	Sp_1	-	Sp_1	10-15
Galium tricorne	Sp_2	-	Sp_2	-	20-30
Polyganum aviculare	Sp_1	Sp_1	Sp_1	-	15-25
Phleum panicylatum		Sp_1		Sp_2	15-20
Chenopodium album	-	-	Sp_2	-	35-45
Ch. Botrus	-	Sp_1	Sp_2	Sp_1	40-50
Carthamus turkestanica	Sp_2	Sp_2	-	Sp_1	35-45
C. oxyacantha	Sp_1	Sp_2	-	-	25-40
Onopordon acanthium	Sp_1	Sp_2	-	-	75-90
O. leptolepis (olgae)	-	Sp_2	-	Sp_2	100
Centaurea belangeriana	Sp_2	Sp_2	-	-	75-80
Salsola gemmasceans	-	Sp_1	-	-	15-20
S. carianata	-	-	Sp_1	-	-

This is confirmed by the data of A.A. Khanazarov, E.A. Butkov (2002), that in the Western Tien Shan within the Republic of Uzbekistan, in particular, the Akhangaran River basin, over the past 40 years, the area of forest lands, in particular tugai lands, has decreased from 215 thousand hectares to 112 thousand hectares, i.e. more than 41%.

As a result of the conducted geobotanical and survey work in all altitudinal zones, in particular tugai vegetation as a special phytocoenotic complex, which occupies a certain place in the national economy.

On the compiled “Map of the vegetation cover of the Akhangaran River basin” (Scale 1:200000), the following tugai-type associations are found in small narrow strips in the near-river part of the floodplain and on the slopes of the dam:

- *Weed – alhagi – tamarix community,*
- *tamarix –mixed tugai community,*
- *saltwort – reed – mixed tugai community,*
- *fragmites – tree – shrubs comminity.*

These river thickets have diverse significance in the economy of the study area. Wood tugai constitute an important object of forestry. The wood of populus, elaeagnus, salix is used

for fuel and as a building material in the construction of bridges and local housing. Grass tugai are a potential source of natural feed for the development of public livestock farming. These are mainly hayfields, which provide roughage before wintering of all types of livestock. In addition, another main significance of tugai forests is water regulation and coastal protection. But the reduction of their areas continues in all survey areas. Therefore, all existing full-fledged forest areas, in particular tugai ones, must be taken under control and inventory work must be carried out here by compiling thematic maps using modern cartographic methods. The compiled map "Vegetation" is a visual graphic model of vegetation cover, which reflects not only

The cartographic approach to the study of tugai communities makes it possible in the long term to use it rationally, predict negative processes and determine optimal methods of protecting the distribution patterns of mapped units, but also anthropogenic modifications, where the degree of their disturbance is shown on the map by indices A, B, B. from desertification of the studied type of vegetation cover.

Active development of river floodplains, activities in particular, the use of tugai plant resources pose an urgent task for forestry, botanical, and cartographic sciences to develop theoretical foundations for preserving the biodiversity of existing ecosystems and protecting the gene pool of tugai communities from irreversible unification and disappearance through cartographic inventory.

In recent years, the active development of new territories, the intensification of economic activity, in particular the use of plant, forest, tugai resources poses an urgent task for botanical, cartographic, forest science and the environmental movement as a whole to develop theoretical foundations for preserving the biodiversity of existing ecosystems and protecting the environment from irreversible unification (desertification) by determining optimal methods for combating desertification, as well as clarifying ways to restore rare, endangered species, plant communities and protect the gene pools of the study area.

3 Conclusion

1. As a result of the conducted research, 50 species were registered in tugai forests, their biomorphological spectra were determined - 5 tree species, 7 shrub species, and 38 herbaceous species.
2. Four associations were identified in tugai forests: - *weed-grass – alhagi – tamarix community, - tamarix – mixed tugai, - salsola – fragmites – mixed – tugai, - fragmites – wood – mixed –tugai.*
3. The obtained results can be used by planning bodies in the procurement of forest, pasture resources, reconstruction, determination of methods for combating the reduction of their areas and measures to protect the gene pool of the tugai type of the survey area

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