

## ECOLOGICAL CONDITION OF VEGETATION COMMUNITIES IN THE WEST KAZAKHSTAN

Baitlesova Laura\* and Kenessarina Kunsaya

West Kazakhstan Innovation and Technological University, 44\1 Ikhsanova, 090000, Uralsk Kazakhstan

\*Corresponding author: [saule-ra@mail.ru](mailto:saule-ra@mail.ru)

### Abstract

Forest plantings in vicinity of Uralsk city are vulnerable to negative impacts of the development of agriculture, transport, industry, energy and tourism. The problem of forest communities is now one of the most urgent. Therefore, the research is devoted to conduct the investigation of the contemporary state of forest communities near Uralsk city, Kazakhstan.

*Keywords:* forest, tree, herbaceous plants, species, phytocoenology

### INTRODUCTION

Forests are ecosystems in which the major ecological characteristics reflect the dominance of ecosystem conditions and processes by trees. Ecological systems have the attributes of structure, function, interaction of the component parts, complexity (that reflects the structure, function and interactions) and change over time. Forest ecosystems are continually changing. This change, initiated by external disturbance factors but largely determined by internal ecosystem processes, is vital for the maintenance of many aspects of biological diversity (Kimmins, 2009). As a research object, the forest communities in the region of Borly tau (Chalk hills) near Uralsk city, Kazakhstan, were taken. The main goal of the study was to evaluate the ecological state and vegetation community of the near urban forest.

### MATERIALS AND METHODS

As a research object, the forest communities in the region of Borly tau (Chalk hills) near Uralsk city were taken. In the vegetation cover of the tree association there are 4 tiers of semishrubs and herbaceous plants:

I tier – family of willow: *Populus alba* (L.) and *Populus nigra* (L.), II tier – *Ulmus laevis* (L.) and *Quercus robur* (L.). III tier – white and goat willow (*Salix triandra* L. and *S. caprea* L.). IV tier - shrubs: *Prunus spinosa* (L.), *Rhamnus cathartica* (L.) and *Rosa canina* (L.). The tier of semishrub consists of Dewberry (*Rubus caesius* L.).

The following species compose the herbaceous plant: *Lycopus exaltatus* (L.) fil., *Fritillaria meleagris* (L.), *Linaria vulgaris* Mill. (L.), *Veronica longifolia* (L.), *Lithospérmum officinale* (L.),

*Symphytum officinale* (L.), *Lythrum virgatum* (L.), *Aristolochia clematitis* (L.), *Thalictrum minus* (L.), *Arctium lappa* (L.), *Convolvulus arvensis* (L.) (Darbayeva, 2003).

## RESULTS AND DISCUSSION

The taxonomic analysis shows the distribution of species from 20 families in the studied region. Among them, the most representatives is the family of *Asteraceae*, *Salixaceae*, from grasses *Poaceae* and *Rosaceae* (Table 1).

**Table 1.** The Families with an advantage over the number of species

№	Families	Number of kinds	Number in percents (%)
1	<i>Asteraceae</i> (L.)	5	12
2	<i>Salixaceae</i> (L.)	5	12
3	<i>Poaceae</i> (L.)	4	9
4	<i>Rosaceae</i> (L.)	4	9
5	<i>Fabaceae</i> (L.)	3	7
6	<i>Lamiaceae (Labiatae)</i> (L.)	2	5
7	<i>Scrophulariaceae</i> (L.)	2	5
8	<i>Boraginaceae</i> (L.)	2	5
9	<i>Polygonaceae</i> (L.)	1	3
10	<i>Ulmaceae</i> (L.)	1	3
11	<i>Liliaceae</i> (L.)	1	3
12	<i>Rhamnaceae</i> (L.)	1	3
13	<i>Aristolochiaceae</i> (L.)	1	3
14	<i>Fagaceae</i> (L.)	1	3
15	<i>Solanaceae</i> (L.)	1	3
16	<i>Lythraceae</i> (L.)	1	3
17	<i>Urticaceae</i> (L.)	1	3
18	<i>Ranunculaceae</i> (L.)	1	3
19	<i>Chenopodiaceae</i> (L.)	1	3
20	<i>Convolvulaceae</i> (L.)	1	3
	Total	39	100

According to the biomorphological analysis, 11 forms are recorded in the vegetation cover of the study area. Among them, the dominant plants are long-stemmed (20%), trees (15%), shrubs (15%) and sternocorn (15%) (Table 2) (Darbayeva, 2002).

Long-stemmed plants are presented by *Calamagrostis epigeios* (L.), *Glycyrrhiza glabra* (L.) and *Elytrigia repens* (L.). Trees are presented by *Porulus nigra* (L.), *Porulus alba* (L.) and *Quercus robur* (L.). Shrubs are presented by *Prunus spinosa* (L.), *Rosa canina* (L.) and *Artemisia abrotanum* (L.). Sternocorn plants include *Rumex confertus* (L.), *Lanaria vulgaris* (L.) and *Lithospermum officinale kiredi* (L.) (Table 2).

**Table 2.** Biomorphological spectrum of the vegetation cover of the studied region

No.	Biomorphology	Number of kinds	Number in percents (%)
1	Annual	3	7,7
2	Root-clotting	2	5,2
3	Short-stemmed	4	10,2
4	Biennial	1	2,5
5	Shrubs	6	15,4
6	Semishrubs	1	2,5
7	Long-rooting	8	20,7
8	Club-forming	1	2,5
9	Bulbous	1	2,5
10	Trees	6	15,4
11	Sternocorns	6	15,4
Total		39	100

The 32% of the studied area flora is presented by Eurasian species such as *Thalictrum minus* (L.), *Rhamnus cathartica* (L.) and *Porulus nigra* (L.) (Table 3). The second place is occupied by European species (20%), which include *Fritillaria meleagris* (L.), *Symphytum officinale* (L.) and *Quercus robur* (L.). The holarctic species on the third place and include *Urtica dioica* (L.), *Senecio jacobaea* (L.) and *Arctium lappa* (L.) (Table 3).

**Table 3.** Geographic analysis of the vegetation cover of the studied region

No.	Geographical elements	Number	Number in percents (%)
1	Ancient Mediterranean Sea	1	2,6
2	Pontic	1	2,6
3	Eurosibirsk	4	10,2
4	Euro-Asian	13	33,3
5	Pli-regional	3	7,7
6	Middle Simeomens	3	7,7
7	Holarctic	5	12,8
8	European	9	20,5
Total		39	100

Phytocenological analysis of the studied region shows that in the given region among the 10 phytocoenotic groups (37%) the forest species occupy a large number (Table 4). Forest species include *Rubus caesius* (L.), *Porulus alba* (L.), *Symphytum officinale* (L.). The second place is occupied by meadow species (20%), which include *Veronica longifolia* L., *Rumex confertus* (L.), *Glycyrrhiza glabra* (L.) (Table 4).

Analysis of the vegetation cover of the study area showed that according to the Raunkier system the hemicryptophytes predominate (20 species, 50%), followed by the phanerophyta (10 species, 26%). The terrophytes form presented by 3 species (8%), the geophytes by 3 species (8%), and the chamefite by 3 species (8%).

**Table 4.** Phytocenotic analysis of the vegetation cover of the studied region

No.	Phytocenoses	Number	Number in percents (%)
1	Steppe	3	7,7
2	Forest-steppe	3	7,7
3	Meadow-steppe	3	7,7
4	Saline	2	5,1
5	Meadow	8	20,5
6	Coastal	1	2,6
7	Litoral	2	5,1
8	Steppe-semidesert	1	2,5
9	Forest	15	38,5
Total		39	100

The ecological analysis revealed that mesophytic species were presented in the investigated area by 19,48%, followed by the xeromesophytes that occupy 9,23% of the area and hygromesophytes occupying 3,8% of the area. In the studied region, a small area is covered with eumézophytes (2,5%), mesoxerophytes (2,5%) and hygrophytts (2,5%). The least presented are mesohygrophytes (1,3%) and xerophytes (1,3%) (Ivanov, 1964).

## CONCLUSIONS

Analysis of the vegetation cover of the studied region, revealed that the largest area is occupied by medicinal species (12 species, 30%). These include species such as *Lycopus exaltatus* (L.) fil., *Fritillaria meleagris*, *Lithospérmum officinále* (L.), *Symphytum officinále* (L.). The second place is occupied by the ornamental species (6 species, 15%) (*Populus alba* L., *Quercus robur* L. and *Veronica longifolia* L.). An economic important species is on the third place and presented by honey-bearing (5 species, 13%) and fodder species (5 species, 13%). Among the medicinal plants are *Lythrum virgatum* (L.), *Phlomoides tuberosa* (L.) Moench., *Sanguisorba officinalis* (L.), and the fodder species presented by *Lathyrus tuberosus* (L.), *Calamagrostis epigeios* (L.) Roth, *Bromopsis inermis* (Leys.), Holub *Bromus inermis* (Leyss.). The 39 species are attached to the forest poplar communities. From the floral point of view, a rare occurrence of oak draws attention. The cover of artisanal and herbaceous plants is well preserved (hazel grouse-*Fritillaria meleagris*), mainly forest and meadow species are distributed. Contamination of the forest with species as *Artemísia abrotanum* (L.), *Goebelia alopecuroides* Bunge (*Vexibia alopecuroides* L. Bunge), *Solanum dulcamara* (L.), *Lithospérmum officinále* (L.), *Urtica dioica* (L.), *Chenopodium album* (L.), *Convolvulus arvensis* (L.) was recorded.

## REFERENCES

- Darbayeva TE. 2003: Flora of the West Kazakhstan region. (Eds.) TE Darbayeva, AU Otaubaeva, TI Tsygankova. Uralsk city, 69 p. (in Russian)
- Darbayeva TE. 2002: Abstract of the flora of the Cretaceous Uplands of North-West Kazakhstan. (Ed) TE Darbayeva, Uralsk city, 134 p. (in Russian)
- Ivanov VV. 1964: The determinant of the families of the Northern Caspian region. *In: Materials on the flora and vegetation of the Northern Caspian region.* (Ed) VV Ivanov, Leningrad, pp.188-215 p. (in Russian)
- Kimmins, J.P. (Hamish). 2009: Forest Ecology, Vol. I, pp. 213-247 *In: Forests and Forest Plants* (Eds.) JN Ownes and HG Lund, ISBN: 978-1-905839-38-4 (eBook).