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«ORUKU-SHYNAA» CLUSTER OF THE «UBSUNURSKAYA KOTLOVINA» (UBSUNUR HOLLOW) RESERVE (THE REPUBLIC OF TYVA, RUSSIA): SOIL CONDITIONS AND VEGETATION COVER

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Abstract. The article presents the results of studying soils and vegetation cover of the Oruku-Shynaa cluster, a natural feature of the Ubsunur Hollow Biosphere Reserve, which is an acquisition of the UNESCO heritage. The Ubsunur Basin, the northernmost of the inland basins of Northwestern Mongolia, is the destination of Inner Asia, where nature preserves an exceptional "parade of landscapes" of unusual diversity, which predetermines the creation of biosphere reserves in Russia and Mongolia by a cluster approach. Nine clusters have been created on the territory of the Republic of Tuva (Russia). One of them is Oruku-Shynaa. The purpose of creating the Oruku-Shynaa cluster is to study natural complexes and objects, preserve biodiversity, and carry out long-term environmental monitoring of the reference territories of the Ubsunur basin. The complete descriptions of soil sections were made on six sample sites and fifty geobotanical homogeneous sites in different years. The background soils are brown desert-steppe soils, which have local hydromorphic manifestations of meadow, saline, and solonetsous soils. The study of the temperature of soils in the middle of summer showed that the most mobile dynamics of soil temperature is

observed at a depth of 5 cm from the surface. The reaction of meadow-peaty soil is neutral, in solonchak soils it is strongly alkaline, the humus content in solonchak soil is negligible (0.42), and in meadow-peaty-humus soil it is quite high (9.24). There is quite a lot of magnesium in saline soils (up to 29 mmol/100 g of soil), and nitrogen (1.10%) in meadow-peat-humus soil. But there is a lack of phosphorus in all soils. The cluster is characterized by a high complexity of vegetation cover, expressed in a combination of phytocenoses of real (glycophytic), saline (halophytic) meadows, steppes, reed beds and woody shrub vegetation.
Keywords: brown meadow-desert-steppe soils, phytomass reserves, "Oruku-Shynaa" cluster, floodplain, soils of the "Ubsunurskaya Kotlovina" (Ubsunur Hollow) Reserve, vegetation of the "Ubsunurskaya Kotlovina" (Ubsunur Hollow) Reserve.

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Introduction

The "Oruku-Shynaa" cluster of the state Natural Biosphere Reserve "Ubsunur Basin" is one of the representative areas of the reserve, located in the floodplain of the valley of the Tes-Khem River, between the riverbeds — Oruku-Shynaa and Kosh-Terek, the sources of which are formed due to underground exits from the cones of the outflow of a number of rivers flowing from the southern slopes of the East Tannu-Ola ridge (Klopova, 1957) and flowing into the lake Ubsu-Nur. The total area of the cluster is 28 750 hectares.

It is known that river floodplains are characterized by heterogeneity of soil and vegetation cover, which causes a high diversity of biotopes. In this regard, one of the most interesting natural objects is the Oruku-Shynaa cluster.

The works of N. F. Deeva et al. (1995), S. S. Kurbatskaya et al. (1989, 1995, 1998), S. S. Kurbatskaya et al. (2012) are devoted to the characteristics of soils of the state natural biosphere reserve "Ubsunur Basin", including the cluster "Oruku-Shynaa". The composition of the flora of vascular plants in the whole reserve "Ubsunur basin", including the cluster "Oruku-Shynaa" was studied by D. N. Shaulo (2004). However, the soil cover and vegetation of the floodplain-channel complexes of this site has not yet been the subject of special research, their high mosaic is obvious, due to the presence of ancient riverbeds and the meandering of the valley. In this regard, the purpose of the work was the soil-phytocenotic characteristics of the natural environment of the study area.

Materials and methods

Study of soils, vegetation and the stock biomass and productivity of phytocenoses cluster "Oruku-Shynaa" within transects laid to the South (geographical coordinates:

50°35'51,9" N; 93°46'13,9" E) — North (geographical coordinates: 50°39'55,3" N; 93°46'30,9" E).

On test sites was carried out a field survey of soil cover with a description of soil profiles according to standard methods (1976) and was measured in the temperature regime of the soil at different depths crankshaft thermometers Savinova.

The description of the vegetation cover was carried out on sites of 100 m^2 for herbaceous vegetation and 200 m^2 for forest communities according to the methodology given in the monograph "Field Geobotany" (1964, 1972), while taking into account the full species composition of communities and the abundance of all species on the Drude scale. The Latin names of the species are given according to the summary "Conspectus florae Rossiae Asiaticae: plantae vasculares" (2012).

On the reference section, we took the slope of the aboveground phytomass from the 50×50 cm site, disassembled into fractions by plant species for the green part (this year's products), rags (the dead part of the plants remaining on the root) and litter (litter). The root mass was taken to a depth of up to 20 cm from the surface with a volume of 10 × 10 × 10 cm, washed from the soil, dried to an air-dry state. Then all plant samples are dried to a completely dry state in a thermostat at a constant temperature of 70–80 °C for 4 hours. All work on sampling and processing was carried out according to the methodology proposed by A. A. Titlyanova (1988).

Results and discussion

Soil conditions

The territory of the cluster according to the geobotanical zoning scheme belongs to the Ubsunuur plain desert-steppe province [Vegetation cover, 1985], is located on very gentle lower parts of the foothill proluvial-deluvial plumes, gradually passing into the general ancient alluvial plain of the delta of the river Tes–Hem and the terraces of Ubsu–Nuur lake. In these relief conditions, the parent rocks of brown desert-steppe soils, which have a wider geography in the Mongolian part of the Ubsunuur basin, are poorly sorted gravelly deposits widespread in the Tuvan basins with a low — power loose light loamy or sandy loam cover horizon not exceeding 50 cm, less often — alluvial pebbles with even more low-power (up to 30 cm) light loamy or sandy loam cover [Nosin, 1963].

Brown desert-steppe soils are the extreme link in the series of zonal plain soils of Tuva, if the latter are arranged in the order of increasing xeromorphism. The fact of the existence of fairly large areas of brown desert-steppe soils in Tuva was first determined by V. A. Nosin (1963) in studies of 1952–1955. They are characteristic of the driest and hottest, lowered in absolute level of the western part of the foothill plain, extending from the southern side of the Tannu-Ola ridge in the region Ubsu–Nuurlake.

On the vast leveled spaces between the rivers Oruku–Shynaa and Kosh–Terek, hydromorphic variants are common — brown meadow-desert-steppe soils that occupy significant areas. They differ in the peculiarities of the water regime, consisting either in sporadic and short-term, sometimes quite abundant moistening of the surface horizons with rainwater draining into relatively low weak points, or in periodic weak capillary feeding of the soil with moisture of the intra-soil lateral runoff wedging along the relief ("saz mode"). Thus, the sources of increased moisture in brown meadow-desert-steppe soils are essentially the same as those typical of meadow-chestnut soils (Nosin, 1963).

Saline genera and varieties of meadow-desert-steppe soils are common in the lake-delta plain — saline, saline (Table 1), formed under conditions of weak and unstable capillary feeding with moisture of the intra-soil runoff, with sporadic additional surface moistening. They are characterized by a weakened ("sluggish") and intermittent effusion water regime, leading to some accumulation of easily soluble salts within the soil profile [Nosin, 1963].

A characteristic feature of the kind of soils under consideration is that there is almost no apparent salinity in the vertical soil profile, except for the presence of salt pans and in places weak salt fades on exposed areas of the soil surface, which is usually covered with a crust of the same type as on non-saline meadow-brown soils. Just as in the latter, the humus horizon in the uppermost part is usually somewhat lightened and has a slightly layered structure.

The microrelief is uneven, phytobugeous, formed by basal elevations of granary, reed and interbug depressions. The soil section is located on a wheatfalse-plantain-reed halophyte steppe meadow. Vegetation is not continuous, interspersed with areas with saline fading, the projective coverage is about 40 %.

The salt marsh crust is thin, porous, boils violently from 10 % HCl. Ground water appears at a depth of 115 cm.

Table 1

Description of saline varieties of meadow-desert-steppe soils

Brown meadow-desert-steppe saline-crusty-saline dusty-sandy loam soil on lake-alluvial sandy deposits (OSH-1/18)		
К	0–0.2 cm	salt crust of gray-brown color, finely porous-layered, boils violently
Асн	0.2–5(15) cm	gray-brown color, solidly lumpy structure, very dense, dry, permeated with living roots, the transition is clear
AB	5(15)–22(25) cm	brown, sandy loam, moist, compacted, there are large reed roots
B	22(25)–45 cm	non-uniform color, brown with gray spots, moist, single thin roots, gradual transition
BC	45–115 cm	gray-brown sand, homogeneous, wet, ground water with 115 cm

The development of a clarified crust on the soil surface is most likely associated with a short-term stagnation in the flattest places of water after heavy rains. There are no obvious signs of salinization inside the soil along the vertical profile.

Closer to the riverbeds, especially to the Kosh-Terek River, located further south in the depths of the valley, vegetation becomes more dense, rich grass-grass communities appear in the middle of the bushes, under which types of meadow soils are already developed (Table 2). The terrain is a poorly paved leveled area overgrown with grassy meadow vegetation among willow-shrub pea thickets. The section is laid on a grass-sedge-bluegrass floodplain meadow with 100 % projective coverage. Species encountered: kentucky bluegrass, bent, feathered simple, sedge without veins, cinquefoil cut-lraved and others.

Under the thickets of meadow grasses lies a dense litter of browned herbaceous vegetation, behind this layer lies a small but very dense detached layer, then

a heterogeneous intermittent humus-humus horizon is already observed, dark-colored layers are interspersed with light, heavy medium-loamy granulometric composition with signs of gluing. Slight visible salinity is observed in the upper part of the horizon, boiling from the soil surface.

Table 2

Description of meadow soil types under grass-grass communities

Meadow-peat-humus heavy loamy soil on river alluvium (OSH-2/18)		
Ao	0–1.5 cm	Litter of dead plant parts
Ат	1.5–3 cm	Dark brown detached layer, dense, permeated with roots, moist, clear transition
AB	1.5–18(20) cm	The color is heterogeneous dark gray, interspersed with light tones, large dark pockets enter the underlying horizon and reach 40–45 cm of the gravel-gravel layer, moist, loose, permeated with roots, the granulometric composition is medium loamy, in the lower part of the horizon — clay, there is a gluing. Boiling is only in the upper part of the horizon
BC	45–66 cm	Alluvial sand with pebble-gravel inclusions, wet, ground water appears from 66 cm

Table 3

Physico-chemical composition of the soils of the cluster "Oruku–Shynaa"

Soil	Horizon, depth, cm	Humus, %	K_2O	P_2O_5	N, %	pH	Humidity, %	Gran. comp. %	Ca	Mg	Na
			mg/kg						mmol per 100 g of soil		
OSH-1/18	Salt crust	-	-	-	-	9.5			32.0	12.0	132
	A-0-5	0.42	1362	38	0.10	9.2	0.97	7.52	34.0	19.0	16.9
	B-10-20	0.16	909	9	0.05	8.8	1.40	6.12	46.0	29.0	4.84
OSH-2/18	5-15	9.24	213	24	1.10	7.2	3.40		72.0	13.0	0.92

The chemical composition is determined only in the upper horizons of soils. The reaction of salt extraction in meadow-peat soil is neutral and reaches highly alkaline in salt marsh. The humus content in saline soil is negligible, the sample was taken from the bare part of the surface of the soil cover, and in meadow-peat-humus it is quite high, reaches 9.2 % of the absorbed cations, a very high content of absorbed calcium is noted in meadow-peat soil and in salt marsh is also high. There is quite a lot of magnesium in the salt marsh, absorbed sodium reaches 132 mmol per 100 g of soil. The high content of total nitrogen is associated with a high content of humus in meadow-peat-humus soil. There is a lack of phosphorus in soils (Table 3).

Observations of the soil temperature regime measured by Savinov's cranked thermometers for two days from June 20 to June 22, 2018 showed the following results (Tables 3, 4).

Table 4

Daily temperature dynamics of meadow-peat soil (20.06–22.06)

Depth	Temperature change (in °C) of the soil by date and time						
	20.06	21.06	21.06	21.06	21.06	22.06	22.06
	9 pm	6 am	9 am	2 pm	5 pm	7 am	10 am
5 cm	10 º	9 º	10 º	16,5 º	15,5 º	9,5 º	11,5 º
10 cm	-	-	-	-	-	-	-
15 cm	10	8	8	9	9.5	8.5	8.5
20 cm	8.5	7.0	7.0	7.0	7.5	7.5	7.5

Measuring the temperature of meadow-peat soil up to 20 cm deep, at a temperature of 38.6 °C on the soil surface during the day, showed the following dynamics: the most mobile dynamics of soil temperature at a depth of 5 cm from the surface: during the day it heats up to 16.5 °C, by 17 o'clock it drops by one degree, at 6 o'clock in the morning, and at sunrise 9–9.5 °C, in the evening by 21 o'clock it reaches 10 °C. The temperature decreases with depth, at a depth of 20 cm it varies from 7.0 to 8.5 °C. In the chestnut soils of the steppes of the Ubsunuur basin in June, under the same conditions, the soil temperature is 5–7 °C higher (dry soils heat up quickly and also give off heat quickly) [Kurbatskaya, Stebaev, 1989].

Vegetation cover

The Oruku–Shynaa river valley within the cluster is characterized by a complex vegetation cover and a combination of phytocenoses of real (glycophytic), saline (halophytic) meadows, steppes, reed beds and woody-shrub vegetation. The floodplain regime of humidification of habitats, as well as the arid climate, determine the widespread distribution of salt marsh vegetation.

Real small-grain steppes (formation: *Stipakrylovii* Roshev.).

Within the limits of the laid transect, the feather grass (*Stipakrylovii)* dry steppes are marked in more open areas among the willow thickets. One association was noted — the cinquefoil-feather grass (*Stipakrylovii — Potentilla bifurca*) steppe. The herbage is sparse, with a total projective coverage (further in the text TPC) of 60 % and poor species composition (10 species by 10×10 m). The following types are recorded: *Glycyrrhizasoongorica* Grankina, *Artemisia glauca* Pall. ex Willd., *Artemisia anethifolia* Web., *Thermopsis mongolica* Czefr., *Artemisia frigida* Willd., *Dasystephana decumbens* (L.f.) Zuev, *Plantago salsa* Pall., *Potentilla multifida* L.

Real glycophytic meadows (formation: *Poa pratensis* L.).

Bluegrass meadows. The average species saturation is 17 species per 100 m^2. The TPC is 100 %. Dominates *Poa pratensis* L. (projective coverage — 70 %, height — 35 cm), sodominate *Thalictrum petaloideum* L., *Galium boreale* L., accompanied by

Equisetum arvense L., *Galatella dahurica* DC., *Medicago falcata* L., *Elytrigia repens* (L.) Nevski, etc. Communities of bluegrass meadows are represented by two associations — meadow-rue — bedstraw and meadow-rue (*Thalictrum petaloideum — Galium boreale* and *Thalictrum petaloideum*).

Swampy meadows (formation: *Carex cespitosa* L., *Carex atherodes* Spreng, and *Eleocharis quinqueflora* (F. X. Hartm.) O. Schwarz.).

According to the depressions of the floodplain, where excessive, sometimes stagnant moisture, sedge marshy meadows are characteristic. The dominant of these communities are *Carex cespitosa* L., *Carex atherodes* Spreng. The herbage is dense with a TPC of 100 %. *Calamagrostis neglecta* (Ehrh.) is involved in the addition of the cenosis Gaertn., Mey et Scherb., *Poa palustris* L., *Potentilla anserina* L.

In the riverbed terrace in the floodplain of the Oruku–Shynaa River, in open clearings among the surrounding willow-birch thickets, there are monodominant boggy marshy meadows from *Eleocharisquinque flora* (F.X. Hartm.) O. Schwarz. Communities with a total projective cover of 70 %, sedges rarely come across from other species.

Halophytic plant communities are a common component of floodplain ecosystems in the valley. They were mostly described within the boundaries of their natural contours (individual "spots").

We have assigned halophyte communities to 4 groups:

1. Saz salt steppes (formations: *Achnatherum splendens* (Trin.) Nevski), *Leymus paboanus* (Claus) Pilg., *Psathyrostachys juncea* (Fisch.) Nevski).

Herbage of tip cenoses with a TPC of up to 60 %. On an average plot of 100 m^2 there are 11 plant species. In addition to the main dominant of the brilliant tea (*Achnatherum splendens* (Trin.) Nevski), *Limonium coralloides* (Tausch) Lincz., *Lepidium latifolium* L. subsp. sibiricum, *Asparagus pallasii* Miscz., *Thermopsis mongolica* Czefr., *Atraphaxis pungens* (Bieb.) Jaub. et Spach and others. Represented by monodominant associations.

Saz steppes dominated by *Leymus paboanus* (Claus) Pilg. they are marked by small areas, often in contact with cheevniki. The herbage is homogeneous, with an average height of 40 cm, a TPC of 60–65 %. The sodominants are *Poa angustifolia* L., *Artemisia scoparia* Waldst. et Kit., *Lepidium densiflorum* Schrad., *Lactuca tatarica* (L.) C. A. Mey, *Astragalus adsurgens* Pall., *Medicago falcata* L., *Chenopodium hybridum* L., etc. An average of 12 species are found on an area of 100 m^2.

The formation of the saz steppes by *Psathyrostachysjuncea* (Fisch.) Nevski is represented by one *Phragmites australis — Psathyrostachys juncea* association. The total projective coverage is 50 %. *Psathyrostachys juncea* (Fisch.) Nevski dominates (projective coverage — 35 %, average height — 50 cm), sodomizes *Phragmites australis* (Cav.) Trin. ex Steud. Accompanied by *Plantago salsa* Pall., *Artemisia anethifolia* Web., *Agrostis mongolica* Roshev., *Sphaerophy sasalsula* (Pall.) DC., *Atriplex sibirica* L., *Saussurea amara* (L.) DC. and others. On an average plot of 100 m^2, there are 14 plant species.

2. Halophyte meadows (formations: *Hordeum brevisubulatum* (Trin.) Link, *Carex reptabunda* (Trautv.) V. Krecz.).

Barley meadows. The average species saturation is 12 species per 100 m^2. The TPC is 80 %. *Hordeum brevisubulatum* dominates (projective coverage — 60 %, average height — 45 cm), *Thalictrum petaloideum* L., *Primula longiscapa* Ledeb., accompany

Astragalus tibetanus Benth, *Artemisia vulgaris* L., *Valeriana rossica* P. Smirn., *Seneciodubitabilis* C. Jeffrey et Y. L. Chen, etc. Communities of barley meadows are represented by two associations — heteroherboso-Thalictrumpetaloideum, monodominant barley.

Sedge meadows. The average species saturation is 7 species per 100 m^2. The TPC is 95 %. *Carex reptabunda* (Trautv.) V. Krecz. dominates (projective coverage — 60 %, height — 32 cm), sodomizes *Elytrigiarepens* (L.) Nevski, accompanied by *Artemisia vulgaris* L., *Thalictrum petaloideum* L., *Inula britannica* L. and others. Communities of sedge meadows are represented by one association — wheatgrass-sedge.

3. Halophytic communities of wet salt marshes (formations: *Suaeda prostrata* Pall., *Salicornia perennans* Willd.).

Halophytic Suaeda communities. The species composition is extremely poor — 6 species per 100 m^2. The TPC is 20 %. *Suaeda prostrata* Pall. dominates, *Puccinellia tenuiflora* (Griseb.) Scribn. et Merr. Accompanied by *Plantago salsa* Pall., *Phragmites australis* (Cav.) Trin. ex Steud., *Saussurea amara* (L.) DC, *Artemisia anethyfolia* Web. It is represented by one association — the Puccinelliatenuiflora-Suaedaprostrata community.

Halophytic Salicornia communities. Just like the previous communities, they differ in sparse herbage (TPC 15 %) and poor species composition — 7 species per 100 m^2. Dominates *Salicornia perennans* Willd., sodominate *Phragmites australis* (Cav.) Trin. ex Steud., *Plantago salsa* Pall. Accompanied by *Leymus angustus* (Trin.) Pilg., *Artemisia dracunculus* L., *Puccinelliatenuiflora* (Griseb.) Scribn. et Merr., *Limonium coralloides* (Tausch) Lincz. One association was noted — the Plantago salsa-Phragmitesaustralis-Salicorniaperennans community.

During wet periods, the above biotopes are dense communities of annual succulents, but in drier seasons, a salt crust forms on the soil surface, and the community is thinned.

4. Communities of reed beds are also characteristic of the cluster territory. The dominant is a large hygrogalophytic grass — southern cane (*Phragmites australis* (Cav.) Trin. ex Steud.), which more often forms monocenoses. We noted two associations of reed communities — horsetail-reed and sedge-reed. The TPC of communities is from 80 to 100 %, the height of the reed is from 55 to 112 cm. Sodominants — *Equisetum arvense* L., *Carex atherodes* Spreng.. There are *Ranunculus sceleratus* L., *Polygonum patulum* Bieb., *Rumex aquaticus* L., *Scirpus validus* Vahl., *Alismaplantago aquatica* L.

Woody-shrubby uremic vegetation.

We attributed three formations to this type of vegetation — *Betula microphylla* Bunge, *Salix viminalis* L. and *Hippophae rhamnoides* L.

Birch (*Betula microphylla* Bunge) floodplain forest has a closeness of 0.4–0.5 crowns, an undergrowth of medium density, composed of *Salix ledebouriana* Trautv. The grass layer is thick with a TPC of 100 %, the height of the herbage is up to 75 cm. *Calamagrostismacilenta* (Griseb.) Litv., *Poa pratensis* L., *Phleum pratense* L. and others. One association was noted — the shorthear-willow stand-birch forest (*Calamagrostis macilenta — Salix ledebouriana — Betula microphylla*).

Willow species (*Salix viminalis* L. — dominated and *Salix ledebouriana* Trautv. — accompanies) and sea buckthorn (*Hippophae rhamnoides* L.), forming a separate type

of vegetation of shrub communities do not have a tree-like life form and do not give the community a typical forest appearance.

Willow shrub communities are widespread, sometimes forming dense thickets, the dominant is *Salix viminalis* L. They form a three-tiered community: The I tier consists of willows 190–200 cm high, the closeness of the crowns is from 0.4 to 0.8. The II tier is represented by thickets of *Caragana spinosa* DC. with a height of 110–130 cm bushes, the third tier is grassy, with a TPC of up to 90 % and with a height of 80–90 cm of herbage. The permanent species are *Hordeum brevisubulatum* (Trin.) Link, *Elytrigia repens* (L.) Nevski, *Asparagus pallasii* Miscz., *Glycyrrhiza soongorica* Grankina, *Astragalus austrosibiricus* Schischk, etc. There are 15 species in total.

Sea buckthorn shrub communities on the territory of the cluster in open areas are distributed in fragments, and along riverbeds in longitudinal dense massifs. Sea buckthorn communities have a three-tiered structure: I tier — *Hippophae rhamnoides* L. — of different ages, the maximum height of the bushes is 200 cm, the minimum height is 85 cm; II tier — *Caragana spinosa* DC. — height of bushes — 150–160 cm; III tier — grassy tier with a height of no more than 100 cm, TPC 80 %. Actively participate in their composition: *Equisetum arvense* L., *Calamagrostis neglecta* (Ehrh.) Gaertn., Mey. et Scherb., *Galium verum* L., *Thalictrum simplex* L., *Sanguisorba officinalis* L., *Vicia cracca* L., etc.

Structure of plant matter and phytomass reserves

The structure and stock of phytomass were studied on two representative sample plots of the Oruku-Shynaa cluster, differing in soil cover, moisture regime, species composition and the general projective cover of communities.

Trial plot No. 1 (OSH-1/18) is a settled salt meadow.

Trial site No. 2 (OSH-2/18) is a real glycophytic bluegrass meadow.

On grassy meadows, the aboveground plant mass of 719.8 g/m^2 exceeds that on settled salt marshes (OSH-1) by almost three times (Table 5). The green mass on the two plots is almost equal in quantity, but qualitatively very different – on bluegrass meadows — cereals and sedges, on salt marshes — succulent halophytes. In bluegrass glycophytic meadow communities during the protected regime (since 1993), a large mortmass in the form of rags and litter has accumulated. Rags and litter exceed the living green mass by almost 5 times. On a settled meadow with an insignificant projective cover (40 %), the mortmass exceeds the live one by two times. Before the protected regime (1993), there were hayfields with annual mowing of grass, which did not contribute to the accumulation of dead mass. The dead mass completely covers the surface of the soil, the air does not penetrate into the lower root-inhabited layers, the meadow is waterlogged.

In the bluegrass meadow, the total underground phytomass (2 376.8) exceeds the aboveground (719.8) by almost three times, and in the settled meadow by two times. In the underground phytomass, the dead root mass everywhere exceeds live roots — in a bluegrass meadow by 2 times (live roots 558, dead 1 109 g/m^2), and in a settled meadow by 3 times (respectively 570 and 1 672). In the structure of underground phytomass, the excess of dead roots over living ones has a diagnostic character, showing the depressed state of the ecosystem.

Table 5

Distribution of phytomass reserves in salt marsh (OSH-1/18) and glycophyte (OSH-2/18) meadows

Aboveground phytomass				
Fractions	The mass of vegetable matter, g/m^2			
	OSH-1/18		OSH-2/18	
The green part	110.0		128.8	
Lastyear's grass	51.9		292.1	
Litter	133.4		298.9	
Total aboveground mass	295.3		719.8	
Underground phytomass				
Depth	Alive	Dead	Alive	Dead
0–10 cm	478.0	1396.0	471.0	729.0
10–20 cm	47.0	276.0	87.0	380.0
Tillering nodes and a shortened root	44.6	-	-	-
Total	569.6	1672.0	558.0	1109.0
Total underground mass	2241.6		1667.0	
Total mass of plant matter	2536.9		2376.8	

Conclusion

For the territory of the "Oruku–Shynaa" cluster of the Ubsunuur Basin Reserve, brown meadow-desert-steppe saline-crusty-saline soils formed on ancient lake-alluvial sandy deposits were described for the first time. Meadow-peat heavy loamy soils on river alluvium are developed closer to riverbeds with denser vegetation. These meadows, which were hayfields before the reserve, are currently not experiencing anthropogenic impact and the consequence of this is the accumulation of large mortmass in the structure of phytomass.

The study of the diversity of plant communities revealed the presence of real feather grass (*Stipakrylovii*) steppes, which have a slight distribution. The active process of soil salinization caused the formation of halophytic communities — saz salt steppes, barley and sedge halophytic meadows, Suaeda and Salicorniaphytocenoses. Along the banks of the riverbeds, woody and shrubby uremic vegetation is developed from small-leaved birch, Ledebur willow, buckthorn sea buckthorn. In places with excessive moisture, there are swampy, sedge swampy meadows and reed beds.

The described plots before the creation of the reserve (1993) belonged to the state land fund and meadows were actively used for hayfields, and sea buckthorn grew on the settled areas. After the introduction of the protected regime on the territory of the cluster, economic activity was completely stopped. After 30 years, signs of waterlogging are observed in meadow communities, there is a drift in the upper horizon of the soil profile. In the structure of plant matter in meadows, there is a restructuring towards an increase in the mort mass, in a settled meadow, the vegetation cover is thinned, an active salinization process is underway in the soil cover.

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ПОЧВЕННЫЕ УСЛОВИЯ И РАСТИТЕЛЬНЫЙ ПОКРОВ КЛАСТЕРА «ОРУКУ-ШЫНАА» ЗАПОВЕДНИКА «УБСУНУРСКАЯ КОТЛОВИНА» (РЕСПУБЛИКА ТЫВА, РОССИЯ)

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Аннотация. В статье представлены результаты изучения почв и растительного покрова кластера Оруку-Шынаа — природного объекта биосферного заповедника «Убсунурская котловина», объекта Всемирного природного наследия ЮНЕСКО. Убсунурская котловина — самая северная из входящих в область бессточных котловин Северо-Западной Монголии, — является уникальным местом Внутренней Азии, где природа создала своеобразный «парад ландшафтов», отличающихся необычайным разнообразием, которое предопределило создание биосферных заповедников на территории России и Монголии на основе кластерного подхода. На территории Республики Тыва (Россия) создано девять кластеров, один из них — Оруку-Шинаа, целью создания которого является изучение природных комплексов и объектов, сохранение биоразнообразия, а также проведение долгосрочного экологического мониторинга эталонных территорий Убсунурской котловины. Полное описание почвенных разрезов выполнено на шести пробных площадках и пятидесяти геоботанических однородных участках в разные годы. Фоновые почвы — бурые пустынно-степные, имеющие локальные гидроморфные проявления олуговелости, солончаковатости и солонцеватости. Изучение температурного режима почв в середине лета показало, что наиболее подвижная динамика температуры почвы наблюдается на глубине 5 см от поверхности. Реакция лугово-торфянистой почвы нейтральная, солончаковой — сильнощелочная, содержание гумуса в солончаковой почве незначительное (0,42%), а в лугово-торфянисто-перегнойной — довольно высокое (9,24%). В солончаковых почвах довольно много магния (до 29 ммоль/100 г почвы), а в лугово-торфянисто-перегнойной почве — азота (1,10%). Во всех почвах наблюдается недостаток фосфора. Для кластера характерна высокая сложность растительного покрова, выражающаяся в сочетании фитоценозов настоящих (гликофитных), солонцеватых (галофитных) лугов, степей, тростниковых зарослей и древесно-кустарниковой растительности.
Ключевые слова: бурые лугово-пустынно-степные почвы, запасы фитомассы, кластер «Оруку-Шынаа», пойма, почвы заповедника «Убсунурская котловина» озерно-аллювиальные отложения, растительность заповедника «Убсунурская котловина».

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