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Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

РОО «НАЦИОНАЛЬНОЙ
АКАДЕМИИ НАУК РЕСПУБЛИКИ
КАЗАХСТАН»
ЧФ «Халық»

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В 2016 году для развития и улучшения качества жизни казахстанцев был создан частный Благотворительный фонд «Халык». За годы своей деятельности на реализацию благотворительных проектов в областях образования и науки, социальной защиты, культуры, здравоохранения и спорта, Фонд выделил более 45 миллиардов тенге.

Особое внимание Благотворительный фонд «Халык» уделяет образовательным программам, считая это направление одним из ключевых в своей деятельности. Оказывая поддержку отечественному образованию, Фонд вносит свой посильный вклад в развитие качественного образования в Казахстане. Тем самым способствуя росту числа людей, способных менять жизнь в стране к лучшему – профессионалов в различных сферах, потенциальных лидеров и «великих умов». Одной из значимых инициатив фонда «Халык» в образовательной сфере стал проект Ozgeris powered by Halyk Fund – первый в стране бизнес-инкубатор для учащихся 9-11 классов, который помогает развивать необходимые в современном мире предпринимательские навыки. Так, на содействие малому бизнесу школьников было выделено более 200 грантов. Для поддержки талантливых и мотивированных детей Фонд неоднократно выделял гранты на обучение в Международной школе «Мирас» и в Astana IT University, а также помог казахстанским школьникам принять участие в престижном конкурсе «USTEM Robotics» в США. Авторские работы в рамках проекта «Тәлімгер», которому Фонд оказал поддержку, легли в основу учебной программы, учебников и учебно-методических книг по предмету «Основы предпринимательства и бизнеса», преподаваемого в 10-11 классах казахстанских школ и колледжей.

Помимо помощи школьникам, учащимся колледжей и студентам Фонд считает важным внести свой вклад в повышение квалификации педагогов, совершенствование их знаний и навыков, поскольку именно они являются проводниками знаний будущих поколений казахстанцев. При поддержке Фонда «Халык» в южной столице был организован ежегодный городской конкурс педагогов «Almaty Digital Ustaz.

Важной инициативой стал реализуемый проект по обучению основам финансовой грамотности преподавателей из восьми областей Казахстана, что должно оказать существенное влияние на воспитание финансовой грамотности и предпринимательского мышления у нового поколения граждан страны.

Необходимую помощь Фонд «Халык» оказывает и тем, кто особенно остро в ней нуждается. В рамках социальной защиты населения активно проводится работа по поддержке детей, оставшихся без родителей, детей и взрослых из социально уязвимых слоев населения, людей с ограниченными

возможностями, а также обеспечению нуждающихся социальным жильем, строительству социально важных объектов, таких как детские сады, детские площадки и физкультурно-оздоровительные комплексы.

В копилку добрых дел Фонда «Халык» можно добавить оказание помощи детскому спорту, куда относится поддержка в развитии детского футбола и карате в нашей стране. Жизненно важную помощь Благотворительный фонд «Халык» оказал нашим соотечественникам во время недавней пандемии COVID-19. Тогда, в разгар тяжелой борьбы с коронавирусной инфекцией Фонд выделил свыше 11 миллиардов тенге на приобретение необходимого медицинского оборудования и дорогостоящих медицинских препаратов, автомобилей скорой медицинской помощи и средств защиты, адресную материальную помощь социально уязвимым слоям населения и денежные выплаты медицинским работникам.

В 2023 году наряду с другими проектами, нацеленными на повышение благосостояния казахстанских граждан Фонд решил уделить особое внимание науке, поскольку она является частью общественной культуры, а уровень ее развития определяет уровень развития государства.

Поддержка Фондом выпуска журналов Национальной Академии наук Республики Казахстан, которые входят в международные фонды Scopus и Wos и в которых публикуются статьи отечественных ученых, докторантов и магистрантов, а также научных сотрудников высших учебных заведений и научно-исследовательских институтов нашей страны является не менее значимым вкладом Фонда в развитие казахстанского общества.

С уважением, Благотворительный Фонд «Халык»!

NAS RK is pleased to announce that News of NAS RK. Series of geology and technical sciences scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of News of NAS RK. Series of geology and technical sciences in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential content of geology and engineering sciences to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы «ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы» ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Webof Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді геология және техникалық ғылымдар бойынша контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Известия НАН РК. Серия геологии и технических наук» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Известия НАН РК. Серия геологии и технических наук в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному контенту по геологии и техническим наукам для нашего сообщества.

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STUDY OF THE VEGETATION COVER OF ECOSYSTEMS OF THE CHINGIRLAU DISTRICT OF THE WEST KAZAKHSTAN REGION BASED ON THE USE OF GIS TECHNOLOGIES

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Abstract. As a result of the research, the vegetation cover of the Chingirlau district of the West Kazakhstan region was studied, where geobotanical, floral and ecosystem studies were carried out in a complex on the territory of the Chingirlau district of the West Kazakhstan region using generally accepted techniques and GIS technologies. On the basis of ecosystem analysis and GIS technologies, a vegetation map has been compiled, boundaries have been defined, and recommendations aimed at restoring and preserving vegetation cover have been given. The study of plants was carried out at the sites by the route method in combination with stationary studies of key sites. During the expedition survey of the studied territory, material was collected for an inventory of the flora of higher plants, in the form of preliminary lists for all surveyed points and selected contours of the preliminary map, as well as herbarium material to clarify the taxonomic affiliation of groups difficult to determine in the field. In the plant composition, one has to observe phytocenoses composed of both typical inhabitants of the steppes and plants

located on the border of their range. Some consequences of anthropogenic impact are observed in the study area. Overgrazing takes place directly near settlements. Almost all types of economic activity lead to various violations of the spatial structure or organization of ecosystems. Recommendations for the conservation of biodiversity and restoration of disturbed ecosystems of the studied territory are given.

Keywords: vegetation cover, GIS technologies, biodiversity, flora, habitat, ecosystem, rural district

Conflict of interest: The authors declare that there is no conflict of interest.

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ГИС-ТЕХНОЛОГИЯЛАРЫН ҚОЛДАНУ НЕГІЗІНДЕ БАТЫС ҚАЗАҚСТАН ОБЛЫСЫ ШЫҢҒЫРЛАУ АУДАНЫ ЭКОЖҮЙЕЛЕРІНІҢ ӨСІМДІК ЖАМЫЛҒЫСЫН ЗЕРТТЕУ

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Аннотация. Зерттеудің нәтижесінде Батыс Қазақстан облысы Шыңғырлау ауданының өсімдік жамылғысы зерттелді, онда геоботаникалық, флористикалық және экожүйелік зерттеулер Батыс Қазақстан облысы Шыңғырлау ауданы аумағындағы кешенде жалпы қабылданған әдістері мен ГАЖ технологиялары арқылы жүргізілді. Экожүйені талдау және ГАЖ технологияларын қолдану негізінде өсімдіктер картасы құрастырылды, шекаралары анықталды, өсімдік жамылғысын қалпына келтіруге және сақтауға бағытталған ұсыныстар жасалды. Өсімдіктерді зерттеу аумағында негізгі учаскелерді стационарлық зерттеулермен бірге маршруттық әдіспен жүргізілді. Зерттелетін аумақты экспедициялық зерттеу барысында жоғары сатыдағы өсімдіктер флорасын түгендеу үшін материалдар жинақталды, барлық зерттелген нүктелер үшін алдын ала тізімдер

және алдын ала картаның таңдалған контурлары түрінде, сондай-ақ далада анықтау қиын топтардың таксономиялық тиістілігін нақтылау үшін гербарий материалы жиналды. Өсімдік құрамында даланың типтік мекендейтіндері ретінде құрылған фитоценоздарды, және олардың таралу ареал шекарасында орналасқан өсімдіктері зерттелген. Зерттелетін аумақта антропогендік әсердің кейбір салдары байқалады. Шамадан тыс мал жаю тікелей елді мекендерге жақын жерде жүреді. Шаруашылық жүргізу қызметтің барлық түрлері экожүйелердің кеңістіктік құрылымының немесе ұйымының белгілі бір бұзылуына әкеледі. Зерттелетін аумақта биоәртүрлілікті сақтау және бұзылған экожүйелерді қалпына келтіру бойынша ұсыныстар берілген.

Түйін сөздер: өсімдік жамылғысы, ГАЖ технологиялары, биоәртүрлілік, флора, тіршілік ету ортасы, экожүйе, ауылдық округі

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ИЗУЧЕНИЕ РАСТИТЕЛЬНОГО ПОКРОВА ЭКОСИСТЕМ ЧИНГИРЛАУСКОГО РАЙОНА ЗАПАДНО-КАЗАХСТАНСКОЙ ОБЛАСТИ НА ОСНОВЕ ПРИМЕНЕНИЯ ГИС-ТЕХНОЛОГИЙ

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Аннотация. В результате исследований был изучен растительный покров Чингирлауского района Западно-Казахстанской области, где в комплексе проведены геоботанические, флористические и экосистемные исследования на территории Чингирлауского района Западно-Казахстанской области с использованием общепринятых методик и ГИС-технологий. На основе экосистемного анализа и

ГИС-технологий составлена карта растительности, определены границы, даны рекомендации, направленные на восстановление и сохранение растительного покрова. Изучение растений проводилось на участках маршрутным методом в сочетании со стационарными исследованиями ключевых участков. Во время экспедиционного обследования исследуемой территории был собран материал для инвентаризации флоры высших растений, в виде предварительных списков по всем обследованным точкам и выделенным контурам предварительной карты, а также гербарного материала для уточнения таксономической принадлежности сложных в определении в полевых условиях групп. В растительном составе приходится наблюдать фитоценозы, сложенные как типичными обитателями степей, так и растениями, находящимися на границе своего ареала. На исследуемой территории наблюдаются некоторые последствия от антропогенного воздействия. Перевыпас скота имеет место непосредственно около населенных пунктов. Практически все виды хозяйственной деятельности приводят к тем или иным нарушениям пространственной структуры или организации экосистем. Даны рекомендации по сохранению биоразнообразия и восстановлению нарушенных экосистем исследуемой территории.

Ключевые слова: растительный покров, ГИС-технологий, биоразнообразие, флора, местообитание, экосистема, сельский округ

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Introduction

The issue of further improvement of the environmental protection system is relevant in the context of economic development and strengthening the use of natural resources. Such agreements determine the need for further development of the network of specially protected natural areas as an effective system of biodiversity conservation. To solve these tasks, the Government of the Republic of Kazakhstan approved the "Concept of development and placement of specially protected natural territories of the Republic of Kazakhstan until 2030". Its goal is to preserve the biodiversity of the main animal species, globally significant populations of steppes and semi – deserts, and to improve the network of interconnected and protected areas in Kazakhstan (Salikhov, 2020a).

This concept is also aimed at preserving biological diversity, preserving all forms of microorganisms, flora and fauna, as well as natural ecosystems and preventing their transformation as a result of economic and other activities (Salikhov, 2020b).

The creation of a modern cartographic basis by traditional land-based methods will require several decades and huge financial investments. The solution to this problem is the integration of the efforts of departments, one way or another related to the production of cartographic products. One of the components of reducing the time required to create a cartographic basis is the transition to new technologies in cartographic and geodetic production. This includes the transition to a geocentric coordinate system (to autonomous methods of satellite coordinate determination) and the creation of GIS using digital cartography (Salikhov, et al., 2020c).

Research materials and methods

The purpose of the study is to study the current state of vegetation cover in the territories of the Chingirlau district of the West Kazakhstan region.

Geobotanical, floristic and ecosystem studies were carried out in the complex on the territory of the Chingirlau district of the West Kazakhstan region using generally accepted methods (Alekhin, 1938; Methodological guidelines, 2007; Darbayeva et al., 2003; Petrenko et al., 1998; Salikhov, 2017a; Salikhov et al., 2017; Salikhov, 2020d; Salikhov et al., 2020f; Salikhov et al., 2022). The habitats of key plant species have been studied, and the impact of negative factors on biological diversity has been assessed.

During the expedition survey of the studied territory, material was collected for an inventory of the flora of higher plants, in the form of preliminary lists for all surveyed points and selected contours of the preliminary map, as well as herbarium material to clarify the taxonomic affiliation of groups difficult to determine in the field. During the period of desk processing, the herbarium was determined using the published largest botanical reports.

The nomenclature of species, genera and families is given in accordance with the latest summaries. In the article, for brevity, only Russian names are used in places.

It should be emphasized that the flora of higher plants of the studied territory of the Chingirlau district of the West Kazakhstan region has not been studied purposefully, therefore, in preparation for the expedition and in the cameral period, scattered data from various sources were used, mainly data from the Department of Botany of the M.Utemisov WKSU and their own field studies of various years were taken into account (Salikhov, 2020a; Darbayeva et al., 2003; Petrenko et al., 1998).

Results and discussion

Our field studies supplement the data with new factual material. Generally accepted and approved methods of geobotanical research were used during field work.

As a result of the expedition research (the routes of which covered the territory under study), during the field floristic research, we noted 67 species in May, and 116 species in June. Personal herbarium collections and field observations of the author became the material for research and generalization. After analyzing herbarium collections (the collection of the herbarium of the M. Utemisov West Kazakhstan State University was reviewed) and literary data on the flora of the studied territory, we identified 537 species of vascular plants belonging to 66 families and 265 genera. However, this amount, apparently, does not completely exhaust the entire species composition of the flora.

Steppe communities are distinguished by significant floral diversity. In their composition, one has to observe phytocenoses composed of both typical inhabitants of the steppes and plants located on the border of their range. Their vegetation cover has features characteristic of this subzone — it is dominated by sod cereals (*Stipa sarentana, Festuca valesiaca, Agropyron desertorum*), and semi-shrubs (*Artemisia lerchiana, Artemisia pauciflora, Kochia prostrata*) are found with great abundance (Salikhov et al., 2017; Salikhov, 2017a; Salikhov, 2020d).

In addition, the vegetation cover of the studied territory is characterized by the complexity of soils, and the spread of halophytic communities characterized by high diversity (Salikhov et al., 2022).

The territory of the vegetation cover of the Chingirlau district of the West Kazakhstan region is located in the steppe zone in the subzone of the northern deserts with a continental-arid climate and insufficient moisture. Uneven precipitation, low relative humidity, large temperature fluctuations, late frosts, strong wind activity — all this causes the formation of xerophilic plant groups (Salikhov et al., 2020f).

The territory is poorly dissected by a system of beams, ravines and their numerous screwdrivers. Gullies and ravines stretch from north to south and they are tributaries of the Chingirlau River. The soil-forming rocks belong to quaternary sediments of continental origin and are represented by yellow-brown carbonate clays and heavy loams. The soil-forming rocks along the bottoms of gullies and gullies are alluvial deposits (Petrenko et al., 1998).

Of the total flora of the West Kazakhstan region, 42.7 % of species (537), 54.4 % (265) genera and 56.4 % (66) families are represented in the studied territory of the Chingirlau district of the West Kazakhstan region. The richest in species are 3 families: composite flowers, represented by 95 (17.3%) species, cereals – 54 (9.8 %) species and haze — 42 species (7.6 %); a total of 191 (35 %) species (Table 1).

Table 1 - Leading plant families in the territory of Chingirlau district of West Kazakhstan region

Families	Number of		Fraction, %
	genus	species	
Compound flowers – *Asteraceae*	34	95	17,3
Cereals – *Poaceae*	26	54	9,8
Haze – *Chenopodiaceae*	16	42	7,6
Legumes – *Fabaceae*	14	31	5,6
Cruciferous – *Brassicaceae*	19	30	5,4
Carnations – *Caryophyllaceae*	7	25	4,5
Rosaceae – *Rosaceae*	13	23	4,2
Umbrella – *Apiaceae*	13	19	3,4
Labiaceae – *Lamiaceae*	12	18	3,2

The study of plants was carried out at the sites by the route method in combination with stationary studies of key sites for the most complete identification of flora. The selection of research routes and the location of key sites were carried out taking into account the completeness of coverage of various types of terrain and relief elements, the presence of typical vegetation cover, the degree of its preservation, taking into account agricultural activities.

The formation of the modern flora and vegetation of the studied territory was influenced by many factors: the relative youth of the territory, its fragmentation, the variety of landscapes, relief forms, composition and depth of groundwater, the continentality of the climate, the features of the soil cover (the spread of salt marshes), the presence of desalinated reservoirs, as well as human activity.

Figure 1 shows a geobotanical map of the Chingirlau district of the West Kazakhstan region, which we created using GIS technologies based on scanned geobotanical maps of the following rural districts; Akbulak, Aktau, Akshat, Almaznensky, Ardak, Aschysay, Karagash and Shyngyrlau.

The totality of information necessary for mapping vegetation cover structures and their quantitative assessment is described in GIS databases. Data integration is implemented through the spatial and attributive component in the form of: the results of topographic and thematic maps. At the same time, the creation of attribute GIS databases involves the digitization of thematic maps linked in a single cartographic projection (as such, a topographic map of 1:25000 scale served as such). As a result of the work, thematic maps and attribute databases of GIS were formed (Table 2).

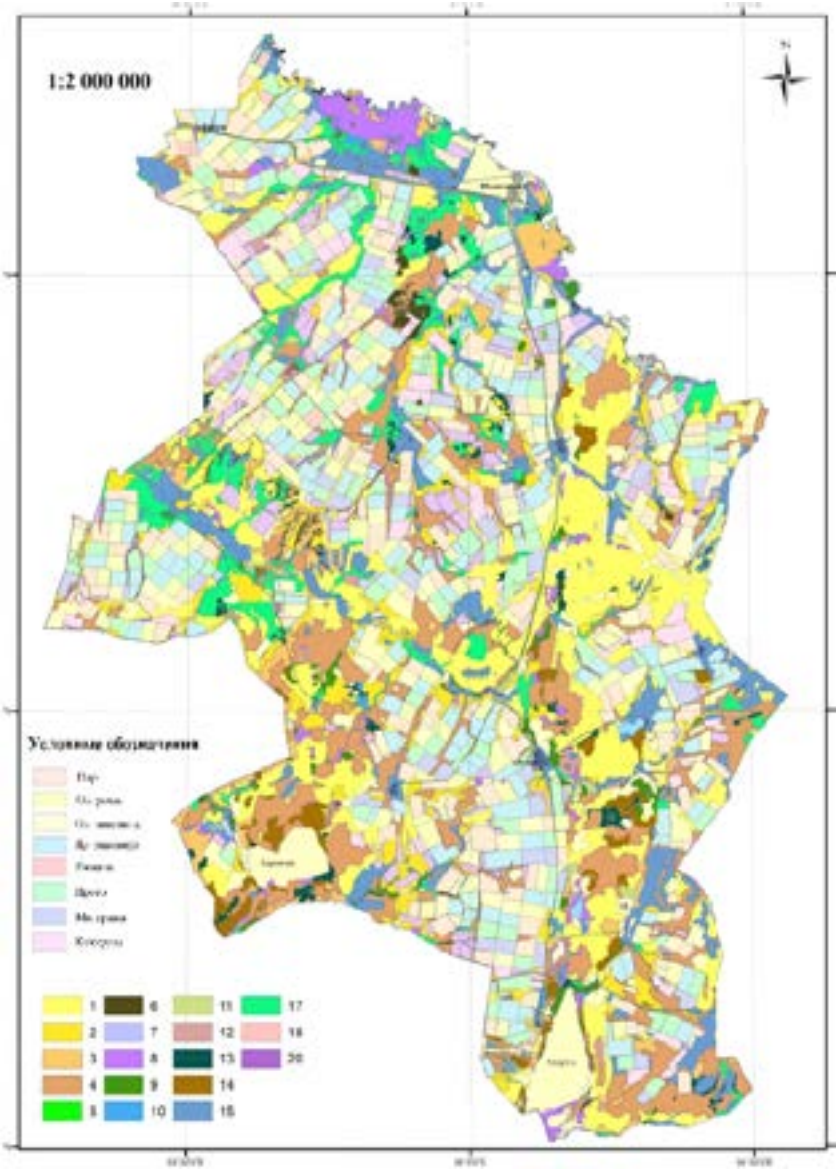

Fig. 1 – Geobotanical map of Chingirlau district of West Kazakhstan region

Table 2 – Legend to the geobotanical map of the Chingirlau district of the West Kazakhstan region

№	Plant associations
1	Mixed-grain, with a predominance of sandy (John), Lessing and hairy grass
2	Grass-grass-wormwood (euphorbia Segirrovskiy, yarrow small-flowered, Russian bedstraw, sandy immortelle, grasshoppers: sandy, hairy, Becker's fescue, brittle wheatgrass, wormwood: Austrian
3	Granary-cereal with a predominance of comb-shaped granary
4	Tyrsovo-cereal with a predominance of tipchak and Becker's oatmeal
5	Hayfields with a predominance of swamp
6	Shrub-grass-mixed grass with a predominance of caragana meadowsweet
7	Meadow-grass-grass
8	Cereal-mixed grass with a predominance of wheatgrass and rumps, sometimes of the east
9	Kovylno-chinozlakovaya-mixed grass with a predominance of volosnets, vostretsa and chiya
10	Swan with a predominance of kermek
11	Ephemeral, with a predominance of bluegrass, bulbous, volosnets
12	Steppe grass-grass sometimes with wormwood
13	Tyrsozlakovo-tavolgovaya
14	Wormwood, with a predominance of green wormwood, Marshal and chagyr
15	Wormwood, with a predominance of gray wormwood, Lerch and Austrian
16	Mixed wormwood, with a predominance of black wormwood (low-flowered)
17	Wormwood pasture with a predominance of solyanka and quinoa
18	Sandy-pollen-cereal with a predominance of motley grasses and milkweed

The vegetation of the studied territory is represented by cereal, wormwood, wormwood-cereal communities growing on open, flat plains (Fig.1 and Table 2). These communities form wheatgrass, sagebrush, yarrow, granaries and grasshoppers, flax and veronica. *Elytrigia repens (L.) Nevski*, *Artemisia lerchiana*, *Achillea millefolium*, *Agropyron*, *Stipa anomala*, *Linaria vulgaris* and *Veronica L.* Near lakes and rivers on chestnut saline soils, communities with a predominance of *Suaeda calceoliformis*, *Salsola australis* and *Salicornia europaea L.* are developing, and *Halocnemum strobilaceum* also grows in their composition. Along the depressions of estuaries, where there is higher moisture, there is meadow-steppe vegetation with a predominance of *Potentilla L.*, *Salvia officinalis*, *Adonis vernalis*, as well as *Rosa canina L.* and *Rhamnus cathartica L.* Typical wetland communities are spread over small areas, confined to brackish and artificial reservoirs and consist of *Phalaris arundinacea*, *Bolboschoenus planiculmis* and *Calamagrostis*.Woody-shrubby vegetation is found along depressions, in beams. The basis of such communities is *Populus deltoides* and *Ulmus glabra*. In the coastal strip of Lake Sorkol, vegetation is composed of *Salsola australis*, *Phalaris arundinacea* and other plants.

However, at present, most of the plants of the territory, especially endemic ones, have not been studied, so further screening of the flora should be continued and special attention should be paid not only to the quantitative content, but also to the quality of various substances and their biological properties.

The pasture factor has the most significant effect on the vegetation and soil cover of the areas of the studied territory. It should be noted that modern methods of driving

livestock often lead to overloading of pastures in some areas and underutilization of all pasture resources in others.

Within the study area, pasture lands are characterized by some clogging, which is expressed in an increased abundance of wormwood (*Artemisia austriaca Jacg.*), forked grass (*Potentilla bifurca L.*) and knotweed (*Polygonum aviculare L.s.*). In addition, the vegetation of pastures is distinguished by a low species diversity of various grasses and low participation in the composition of legume (*Fabaceae*) herbage, and also, participation in the addition of herbage of weed annuals (*Lepidium perfoliatum L., Descurainia Sophia (L.) Schur*. On these pastures, rare plants are distributed almost everywhere - the drooping tulip (*Tulipa patens Agardh et Schult. Et Schult. Fil.*), Andrzeevsky's carnation (*Dianthus Andrzejowskianus (Zapal.) Kulcz.*) and Schrenk's tulip (*Tulipa Schrenkii Rgl.*). Overgrazing takes place on the territory directly near the settlements of Akshat, Shyngyrlau, Akbulak, etc. The annual deterioration of the state of pastures of public lands around settlements is due to the fact that:

1) the number of private livestock is growing annually;

2) cattle graze on the same pastures almost all year round, which is due to the fact that two or three kilometers from the village the lands of peasant farms begin, which are the private property of farmers;

3) the pasture areas where the main number of cattle could be kept are either not watered, or are the private property of farmers;

4) uncontrolled felling of trees and shrubs.

The final stage of degradation of plant communities in pastures is expressed locally around wintering grounds, summer livestock camps and watering places.

Irrational use of pastures and their excessive exploitation take place in the study area. The reasons for this are, firstly, the lack of pasture turnover in agricultural formations and, secondly, the lack of provision for many pastures with watering holes, due to which the areas lying closer to rivers, wells and other water sources are systematically overgrazed. The same overgrazing explains the appearance of sites under various associations characteristic of the failure stage, confined to the remains of abandoned settlements, old camps, destroyed wells that have failed and abandoned wintering grounds. The type of such failures may vary depending on the habitat conditions and the composition of grazed animals, to a lesser extent - on the initial association, since often the same types of failures may occur in place of different plant groupings. This similarity of the final results of digression at different initial stages suggests that at its extreme stages a completely new, qualitatively different environment is created, which has a decisive influence on the formation of vegetation in such areas, regardless of the initial floral and other differences.

All types of slaughterhouses are extreme results of overgrazing, catastrophic in terms of changes in vegetation cover. The depth of the changes that have occurred in the habitat conditions is so great that all such failures are very persistent formations that require a long time to restore vegetation, at least remotely resembling the original one. Naturally, such excessively compacted grazing has been carried out and is being carried out on relatively small areas, near the foci of livestock accumulation, and therefore the

practical significance of these sites is very small; but they are important in that they clearly show the consequences that unregulated, insufficiently planned grazing can lead to.

The agricultural factor does not affect the soil and vegetation cover of the plots of the studied territory, since the plowing of land is the complete destruction of natural vegetation cover, it is not carried out on the plots due to improper organization of peasant farms, taking into account agroecological zoning, climatic factors, as well as an illiterate attitude to the suitability of land for agriculture.

Another type of anthropogenic impact is haymaking, as a result of which not only the annual primary production of photosynthetics is alienated, but also a significant part of the mortmass. Haymaking is carried out extensively, due to the area, without the use of haymaking and improving agrotechnical measures.

Conclusions

To prevent the negative consequences of the impact of all these factors, a number of environmental measures are proposed. These are specific measures for the conservation of biodiversity and restoration of disturbed ecosystems of the study area, listed below:

1. Provide protection to categories of vulnerable plant species and species with uncertain status for the region.

2. Prevention, timely detection and elimination of fires.

3. Provision of sanitary and epidemiological surveillance.

4. To carry out special work on the assessment of the current state of cultivated and fallow lands and the organization of a special thematic layer of maps on agricultural development of the territory. To carry out qualitative and quantitative accounting of disturbed lands with annual fixation of the changes taking place.

5. Based on the assessment of the ecological situation, it is proposed to develop a system of measures to improve the use of pastures. Livestock production can be expanded in all landscapes of the area, as it is favorable for grazing. It is recommended to regulate the pasture regime in the pasture system to preserve biodiversity.

6. To study the processes of restoring the vegetation cover of agricultural lands that have been decommissioned, to develop proposals for the ecological restoration of lands and the staging of experimental restoration work, as well as recommendations for turning the steppe from a zone of risky farming into a zone of harmonious combination of stable animal husbandry that spares the natural environment of agriculture.

7. In order to have an idea of the state of ecosystems and take timely measures to prevent negative factors, it is very important to monitor the state of the habitat and populations of the main representatives of the biodiversity of the territory.

All of the above activities will contribute to the conservation of the biodiversity of the study area.

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