

NJSC AL-FARABI KAZAKH NATIONAL UNIVERSITY

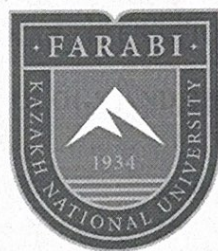
FACULTY OF BIOLOGY AND BIOTECHNOLOGY

APPROVED

Member of the Board – Vice-Rector for
scientific and innovative activities

NJSC Al-Farabi KazNU

« _____ Zh.N. Artzhanova 2024



**University policy for identifying, monitoring and protecting of any species
listed in the IUCN Red List and species on national conservation lists**

Almaty 2024

GLOBAL CONTEXT

The territory of Kazakhstan has a unique set of landscape complexes: from deserts to highlands and inland sea ecosystems. Arid and sub-humid lands occupy more than 75% of the territory of the Republic of Kazakhstan. They contain more than 40% species composition of all biological diversity. According to a number of estimates, the flora of Kazakhstan includes more than 13 thousand species, including more than 5754 species of higher vascular plants, about 5,000 fungi, 485 lichens, more than 2,000 algae, about 500 – bryophytes. The most complete inventory was made of species of fungi and higher plants. Among plants, 14% of species are endemic. In their There are many relics among them. In Kazakhstan there are centers of flora endemism (Karatau Mountains, Western Tien Shan), unique natural complexes – pine forests on the sands (Katon -Karagay, Naurzum); forest and steppe complexes of the lowlands of Central Kazakhstan ; desert communities of Betpak - Dala with original floral composition , Southern Pribalkhashye , Ili Basin; a set of forest, shrub and steppe communities of the Southern Altai, Kalbinsky Mountains and Tarbagatai, the middle mountains of the Dzungarian Alatau and Tien Shan with coniferous spruce forests and fragments of apple forests ; wetland ecosystems of the lower reaches of the Urals, the Torgai depression, and lakes Tengiz and Alakol ; floodplain forests (tugai) of the Syrdarya, Ili, Charyn .

Kazakhstan has a concentration of unique genetic resources of plant agrobiodiversity (ABD) of global significance. They include 194 plant species, determining the genetic potential of 24 agricultural crops. A number of them is of considerable value both for the development of agriculture and for expansion of export potential. Fruit ABR has received worldwide recognition, especially that of wild apple and apricot. ordinary. Great, primarily economic, prospects are also characterized by Kazakhstani genetic resources of pistachio, common almond and wine grapes. The development of natural agrobiodiversity has great prospects flower and ornamental plants.

The fauna of Kazakhstan is represented by a variety of species, both strictly protected and widely used for commercial and economic purposes. There are 835 species living here vertebrates, including mammals – 178, birds – 489 (of which 396 nesting), reptiles - 49, amphibians - 12, fish 104 and cyclostomes - 3 species. The objects of hunting are 34 species of mammals and 59 species of birds.

Agrobiodiversity of the animal world (wild relatives of domestic animals) Kazakhstan has not been sufficiently studied and is currently practically not used in selection work. The territory of the republic is home to vertebrate species that are considered wild ancestors. domestic animals. Among mammals, these are mouflon, mountain sheep, wild boar, kulan, jackal, wolf, spotted cat and a number of others. Among birds, these are, first of all, ducks and chicken. It should be noted that a number of wild animals of the republic are used without breeding agricultural breeds, since they have the necessary consumer properties, do not require zoning and adaptation to Kazakhstani conditions and can reproduce in captivity. One of the most successful examples of this is artificial breeding of marals in the conditions of Eastern and Central Kazakhstan. A variety of wild fur-bearing animals are actively used, some of which have long been successfully bred in captivity: minks, sables, foxes. Promising use selection and genetic potential of other species living on the territory of Kazakhstan valuable wild fur animals: ermine, marmot, muskrat, otter, processes the domestication of which is proceeding quite successfully.

Of the entire species diversity of fish and cyclostomes (about 140 species) at present About 5-8 forms are grown artificially, including hybrids. This sturgeon in the Caspian, whitefish in Northern and Eastern Kazakhstan, Far Eastern herbivores (grass carp and silver carp) mainly in the southern regions, almost everywhere - carp (actually a mixture of wild and domestic forms of carp), and so the same series of hybrids.

Among amphibians and reptiles, the most important as a genetic resource are the species of poisonous snakes, as well as species used in traditional Eastern medicine: Semirechensky goat frog , oriental boa , etc.

the herpetofauna species provides the possibility of its breeding and export as an exotic plant. Kazakhstan, due to its geographical location in the center of the Eurasian continent and a unique combination of natural complexes of steppes, deserts, mountains, large inland water bodies with rivers flowing into them and vast deltas characterized by a wide variety of ecosystems and their corresponding types vegetation.

Kazakhstan offers a full range of subzonal options vegetation of the steppes, deserts and mountain belts characteristic of Central Asia The ecological situation in the Republic of Kazakhstan is characterized to a significant extent by degradation natural systems, which leads to the destabilization of the biosphere, the loss of its ability maintain the quality of the environment necessary for the functioning of society. It is an acute problem the problem of its desertification. The critical state of biodiversity is associated with economic activity, environmental pollution and natural disasters disasters, as well as the small area of protected

ecosystems. It is noted depletion of biodiversity and degradation of ecosystems on 66% of the republic's area, especially in desert and steppe zones, when plowing land and overgrazing . The situation regarding the issue of ensuring protection of forests from fires and illegal logging on the territory of the state forest fund.

The Red Book of Kazakhstan is the main document containing a set of information on the status of rare, declining and endangered the disappearance of plant and animal species on the territory of the republic. At the beginning of 1988, the “Red Book of the Kazakh SSR, Part 2. Plants” was published. It 303 rare and endangered plant species were included. A new edition of the Red Book of Plants is currently being prepared for publication. Kazakhstan. Approved by the Decree of the Government of the Republic of Kazakhstan dated October 31, 2006 No. 1034 "List of rare and endangered plant species" contains 387 species of plants. Given the global nature of the problem of biological diversity, it is very important is the protection of not only individual species, but also the protection of a whole range of unique plant communities, their diversity and stability are the most important conditions optimality of the environment in biological productivity.

A small part of communities to one degree or another protected in reserves or sanctuaries , but there is no general list reference list of endangered and rare plant communities, the protection of which is extremely important for the future. In the planned "Red Book of the Republic of Kazakhstan. Volume 2, Part 2. Plants communities. First edition." ("Green Book") will include rare plant natural communities in need of protection. In the Red Book of Kazakhstan (Volume 1. Animals. Part 1. Vertebrates. 3rd edition, 1996) 125 species and subspecies of vertebrate animals are listed. Resolution of the Government of the Republic of Kazakhstan dated 04.07. 2004 No. 622 approved the second part of the Red Book of Kazakhstan (Volume 1. Animals. Part 2. Invertebrates), which includes 96 species of invertebrates . The list of rare and endangered animals was approved by the Decree of the Government of the Republic of Kazakhstan dated 31.10.2006 No. 1034. endangered animal species: mammals - 40, birds -57, reptiles - 10, amphibians - 3, aquatic animals - 18, annelids - 2, mollusks – 6, crustaceans -1, arachnids -2, insects – 85.

The diversity of natural conditions in Kazakhstan has determined the richness and variety of its biological resources. The country's biological resources are vital necessary for its economic and social development. Biological Diversity is an asset of great value to present and future people generations. The reduction of biodiversity components can be caused by natural or anthropogenic impacts.

MAIN TASKS

- ✓ To provide quality biological education to students.
- ✓ To organize effective dissemination of information and exchange of knowledge on issues of protection of rare and endangered species of living organisms.
- ✓ Create living laboratories on campus (biocenter , greenhouse, winter garden), where students and teachers will engage in research and educational activities.
- ✓ To promote biological and environmental literacy and responsible attitude towards nature.
- ✓ Promote the conservation of biodiversity and the restoration of environmental objects.
- ✓ To develop scientific research aimed at assessing the current state of rare and endangered species of flora and fauna.
- ✓ Participate in the preparation and implementation of proposals for special measures to protect rare and endangered species of plants and animals.
- ✓ Create platforms for the development of international cooperation in the field of environmental protection.

ACTIONS UNIVERSITY

The contribution of Al-Farabi KazNU to achieving this goal is reflected in two main directions:

1. Training of highly qualified specialists: biologists, geobotanists, zoologists of the levels training bachelor's , master's degrees And doctoral studies, competitive on domestic And international market labor, What suggests integration research activities and training in the educational process, implementation educational process By credit technologies training on basis principles of interdisciplinarity And competence-based approach.

2. Conducting research works V areas rational use natural resources V etc. combat desertification, halt and reverse land degradation and halt the loss of biodiversity.

Training of highly qualified specialists:

IN world practice Preparation specialists botanical profiles determined tasks scientific And production activities And economic needs countries. IN KazNU name Al-Farabi, except recommendations domestic And foreign specialists based on from experience training of specialists in the field of geobotany, selection of directions and list disciplines is compiled taking into account the requests of the main employers for specialists and priority research V areas geobotany, defined National Academy sciences And Ministry education And sciences RK for the future and educational plans foreign countries.

Preparation specialists V areas botanists V Kazakhstan is carried out since 1934 at the Kazakh National University named after al-Farabi, on the basis of one of the oldest departments of the university, which does not lose its significance and relevance to this day. Specialists Geobotanists are in demand in akimats, in organizations, activity which connected With organization monitoring biological diversity of plants, in the system of the Ministries of Ecology and Health; research fellows in academic and industry scientific, ecological and nature conservation institutions, design organizations of biological and agricultural profile, in nature reserves, oil producing companies, in NGOs as design experts, agricultural melioration systems, utilities services And services engaged issues of preventing and combating desertification. IN their number RGP on PVC "Institute of Botany and Phytointroduction" of the Committee of Forestry and Wildlife of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan - basic customer, founder And direct active participant implementations highly qualified specialists.

In addition, the following scientific organizations are interested in geobotanist graduates: – Institute of Plant Biology and Biotechnology, Institute of Plant Protection and Quarantine, National Parks, Botanical Gardens, Akimats all levels And etc. For over 80 years period preparations botanists, geobotanists, department has proven itself myself V quality reliable partner data organizations, introducing changes V training plan preparations specialists, according to requirements time And recommended employers specializations, And has huge authority V Kazakhstan And abroad.

The educational programs of all specialties of the faculty provide for the study of academic disciplines such as "Bioresources of Kazakhstan", "Biodiversity of plants and animals", "Monitoring the environment", "Indication geobotany", etc. Where students, master's students and doctoral students study the state of the population of red-listed species and their distribution on the territory of the Republic of Kazakhstan, as well as issues of their conservation.

The main courses and educational programs aimed at studying rare species listed in the IUCN Red Book:

No.	Course Title	Speciality	Stage of training
1	Vertebrate zoology and higher plants	6B05102 - Biology	bachelor's degree
2	Invertebrate Zoology and Lower Plants	6B05102 - Biology	bachelor's degree
3	Bioresources of Kazakhstan	6B05102 - Biology	bachelor's degree
4	Environmental Ethics and the Impact of Physical Fields on Living Organisms	6B05102 - Biology	bachelor's degree
5	Biology and ecology of insects	6B05102 - Biology	bachelor's degree
6	Biology and ecology of mammals	6B05102 - Biology	bachelor's degree
7	Fish biology	6B05102 - Biology	bachelor's degree
8	Plant introduction	6B05102 - Biology	bachelor's degree
9	Ecology of aquatic organisms	6B08402 – Aquaculture and aquatic biological resources	bachelor's degree

10	Morphology and systematics of fish	6B08402 – Aquaculture and aquatic biological resources	bachelor's degree
11	Intensive aquaculture technologies	6B08402 – Aquaculture and aquatic biological resources	bachelor's degree
12	Fisheries legislation and industrial fishing	6B08402 – Aquaculture and aquatic biological resources	bachelor's degree
13	Assessment of the state of aquatic bioresources	6B08402 – Aquaculture and aquatic biological resources	bachelor's degree
14	Ichthyology	6B08401 – Fisheries and industrial fishing	bachelor's degree
15	Hydrobiology	6B08401 – Fisheries and industrial fishing	bachelor's degree
16	Monitoring of water bodies	6B08401 – Fisheries and industrial fishing	bachelor's degree
17	Sustainable management of aquatic bioresources	7M08402 – Aquaculture and aquatic biological resources	Master's degree
18	Problems of rational use of aquatic biological resources of Kazakhstan	7M08401 – Fisheries and industrial fishing	Master's degree
19	Conservation of biodiversity and rational use of vegetation	7M05112 - Geobotany	Master's degree
20	Environmental monitoring	7M05112 - Geobotany	Master's degree
21	Indicative Geobotany	7M05112 - Geobotany	Master's degree
22	Forest vegetation	7M05112 - Geobotany	Master's degree
23	Modern problems of evolution of systematics and geography of fishes	8D08401 – Fisheries and industrial fishing	doctoral studies
24	Modern problems of population ecology	8D 05101 - Biology	doctoral studies
25	Comparative ecomorphology of vertebrates	8D 05101 - Biology	doctoral studies
26	Monitoring the population of vertebrate animals in Kazakhstan	8D 05101 - Biology	doctoral studies
27	Protection of rare and endangered plant species	8D 05108 - Geobotany	doctoral studies
28	Regional flora	8D 05108 - Geobotany	doctoral studies
30	Assessment of the state of vegetation in modern conditions of nature management	8D 05108 - Geobotany	doctoral studies
31	Biogeocenology	8D 05108 - Geobotany	doctoral studies

There are 3 centers operating at the Faculty of Biology and Biotechnology of the Al-Farabi Kazakh National University: " Center for Breeding Ornamental Fish and Plant Species ", "Molecular Biology and Genetics" and " Biotechnologist ". The centers train teachers of universities and colleges, managers, specialists of enterprises and organizations under the advanced training program. **There are advanced training courses** in the areas of "Genetics and Plant Breeding", "Molecular Biology and Genetic Engineering ", " Biostatistics " and "Biotechnology" for breeders and farmers, the course "Methods of Fisheries Research" for fish farmers, etc.

Name of the center	Duration of training	Form of study	Tuition fees	Contact details
"Molecular Biology and Genetics"	optional, 72 hours, 112 hours	Online+offline	Depending on the duration of training, from 30 thousand tenge	+77011212812, Shynar.Yrgynbayeva@kaznu.edu.kz
"Center for breeding ornamental fish and plants",	optional, 72 hours, 112 hours	Online+offline	Depending on the duration of training, from 30 thousand tenge	+702 235 16 63, Gulnar.Kegenova@kaznu.edu.kz
"Biotechnologist"	optional, 72 hours, 112 hours	Online+offline	Depending on the duration of training, from 30 thousand tenge	+707 478 70 95, Gulzira.Yernazarova@kaznu.edu.kz

In addition, the training of highly qualified specialists includes the organization and **holding** of various summer and winter schools. Thus, in the summer of 2023, a summer environmental school **"Fauna and Flora of the Western Tien Shan Foothills"** was held jointly with the Institute of Zoology of the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan with the financial support of DAAD (Mamilov N.Sh.)

<https://www.chokpak.kz/daad-go-east-summer-schools/>. All data obtained by students during the summer school on the diversity and properties of wild animals and plants were considered from the point of view of biocentrism and ecosystem services. Therefore, this field practice is of great interest to ecologists, zoologists and botanists, as well as to students with a wider range of interests. During field classes, the principle of "do no harm" is observed, which is important for the formation of environmental awareness and understanding of young people. Thus, students learn information in two stages: theoretical analysis of the natural characteristics of the territory and the formation of practical skills. The content of the first stage is the assimilation by students of terms and concepts expressing the essence and certain patterns of interaction between man and nature. The second stage is associated with the use of the aforementioned terms and concepts in practical actions in the natural environment - excursions and individual classes. The proposed approach allows not only to gain new knowledge, but also to strengthen cultural ties between different peoples. In 2023, we received 36 applications. We selected 15 participants whose specialty best matched the topic of our summer school. Of the 15 selected students, only 13 were able to take part in the summer school. All students arrived at the campus of Al-Farabi KazNU on August 16, then we conducted a tour of the zoological museum and an introductory lecture on the diversity of landscapes and fauna of Kazakhstan. From August 17 to 29, the summer school was held at the ornithological station of the Institute of Zoology on the Chokpak pass (western Tien Shan). This pass is located between the Talas Alatau and Karatau mountain ranges, so birds are forced to make spring and autumn migrations here. At the ornithological station, students gained knowledge about the diversity of ecosystems, flora and fauna of the Western Tien Shan, mastered the skills of setting traps for birds and studying their morphological and biological features. The general direction of the summer school was to introduce the animal and plant world, landscape features of the region, cultural values and mentality of the Kazakh people. In addition to lectures given by specialists from the university and the Institute of Zoology, a large share was made up of excursion and practical classes. However, the specifics of the station and its working environment presented the students with ornithological information in the greatest volume. After catching, the birds were delivered to the station, where, under the guidance of specialists, the students ringed them, determined their species, sex and age, and then measured their wing length, weight, and assessed their fat reserves. Separate lectures were given on the ringing station in general, on birds of prey, bee-eaters and pigeons, and the species diversity of birds in Kazakhstan. The practical - ornithological part included: bird identification, observation, capture and ringing. Bird observations were carried out during routes, on the pass itself, where they mainly monitored the flight of birds of prey, as well as on the Ters-Ashibulak reservoir, where the main

object of observation was waterfowl and near-water birds. As a result, in two weeks about 1000 birds were caught and 53 species from 32 genera, 22 families and 9 orders were identified. The botanical part consisted of collecting and identifying plants typical of the steppes and foothills of Southern Kazakhstan.

Organization of scientific research activities

Main directions scientific activities V areas Geobotanists are:

- Conservation of biodiversity and rational use of vegetation
- Protection of rare and endangered plant species
- Assessment of the state of vegetation in the context of modern nature management
- Plant ecology;
- Ecomorphology of plants;
- Rhizology ;
- Applied botany;
- Medicinal plants.

Under the guidance of leading researchers at the Department of Biodiversity and Bioresources will be held the following scientific projects:

"ASSESSMENT OF THE ECOLOGICAL STATE OF UNIQUE SODA AND SALT ECOSYSTEMS OF KAZAKHSTAN" scientific supervisor PhD, Associate Professor Inelova Z.A.

Target project - assessment of the ecological state of soda and salt lakes of the Republic of Kazakhstan. Within the framework of biomonitoring, the state of the aquatic ecosystem of soda and salt lakes was assessed for hydrobionts and microorganisms, as well as for higher aquatic and coastal-aquatic plants and waterfowl. Within the framework of the project, employees of the Department of Biodiversity and Bioresources collaborated with the Alakol State Nature Reserve to conduct joint research work.



And also, with the staff of the reserve " Yrgyz-Torgay " to conduct research work in the Aktobe region.



Received results:

- An assessment of the ecological state of salt and soda lakes in Almaty and Aktobe regions was carried out.
- Samples of water, higher aquatic and coastal aquatic plants were taken for analysis;
- The species biodiversity of aquatic, coastal aquatic flora, algal flora of soda and salt lakes of Almaty and Aktobe regions was studied;
- An analysis of selected water samples, biodiversity of higher aquatic, coastal-aquatic plants, and algal flora was carried out for an environmental assessment of the Almaty and Aktobe regions;
- The communities of waterfowl of soda and salt lakes of Almaty and Aktobe regions were studied;
- The ecosystem functions of waterfowl in various types of soda and salt water ecosystems of the Almaty and Aktobe regions were determined ;
- 2 articles and/or reviews have been published in peer-reviewed scientific journals in the scientific direction of the project, included in the 1st (first), 2nd (second) or 3rd (third) quartiles in the Web database of Science and (or) having a CiteScore percentile in the Scopus database of at least 50 (fifty).

Currently, scientists from the Faculty of Biology and Biotechnology are implementing the project “Innovative multi-spatial integrated approach to biomonitoring of salt ecosystems of Lake Alakol”, scientific supervisor PhD, Associate Professor Inelova Z.A. The aim of the project is to develop an innovative approach to biomonitoring by combining macroecological methods with remote sensing methods and GIS databases in the most important saline ecosystems of Lake Alakol . This project is being carried out at the department jointly with Professor Emil Boros , Institute of Aquatic Ecology, Centre for Environmental Research, Hungary, Budapest.

Within the framework of the project " **INTRODUCTION OF PERENNIAL WHEAT INTO AGRICULTURE TO CONSERVE BIODIVERSITY AND SOIL FERTILITY IN THE SOUTH AND SOUTHEAST OF KAZAKHSTAN** " (Head Doctor of Biological Sciences, Professor Kurmanbaeva M.S.), research is being conducted to develop agrobiological foundations for introducing perennial wheat into the agricultural culture of the south and southeast of Kazakhstan and to study its role in increasing the productivity of arable land, reducing greenhouse gas emissions, maintaining soil fertility and improving the environment. . To determine the phenology of perennial wheat development, the features of growth and development of perennial wheat in the greenhouses of Al-Farabi Kazakh National University and M. Auezov South Kazakhstan State University , in various agroecological zones of the south in the city of Shymkent and in the Almaty region of the Karasai district of the southeast of Kazakhstan were studied. Seed germination was

determined in laboratory, greenhouse and field conditions. The date of the beginning and full onset of the main phases of development in field conditions was determined. The morphological and anatomical features of perennial wheat were studied . Optimal terms, methods and rates of sowing perennial wheat were developed. In the course of studying the features of yield formation and grain quality of perennial wheat, the productivity of perennial wheat was determined. The protein and gluten content in grain was determined. Based on the results obtained, a method for cultivating perennial wheat in Kazakhstan was developed.



Perennial wheat in the flowering phase, A, B - greenhouse of the Kazakh National University named after Al-Farabi, C - greenhouse of the South Kazakhstan University named after Mukhtar Auezov.



Development of perennial wheat in field conditions.



Measuring ears of perennial wheat, see



In the project "**COMPLEX STUDY OF BIORESOURCES OF COMMON REED (PRAGMITES AUSTRALIS), ITS ECOSYSTEM SIGNIFICANCE AND POTENTIAL FOR SUSTAINABLE USE IN BIOECONOMICS**" (Head - Doctor of Biological Sciences, Professor S.T. Nurtazin), the research is aimed at achieving SDG 12 "Responsible Consumption and Production" and SDG 15 "Conservation of Terrestrial Ecosystems". Based on the negative consequences of global economic growth on the environment, new approaches to obtaining materials and energy sources using renewable natural biological resources have been especially actively developed in recent decades. This direction, based on the use of renewable biomass as a raw material for production purposes, including feed for farm animals and poultry, biogas, etc., is called " bioeconomics ", the goals of which are the maximum preservation of the natural environment, ecosystems, biodiversity while simultaneously ensuring economic growth and employment of the population. The object of the research was the phytocenoses of the common reed (*Phragmites australis*), which has a high potential for biomass growth in the warm season (on average 5-10 t/ha, and sometimes up to 30 t/ha). At the same time, reed usually grows in river floodplains , on soils with a high level of groundwater, in wetlands unsuitable or of little use for agricultural crops. It should be noted that Kazakhstan is one of the countries richest in natural resources of common reed in the world. Traditionally, a wide range of economic use of reed has recently expanded significantly. In particular, reed stems are used for the production of cardboard, chipboard, paper and packaging materials, in the synthetic and textile industries, as well as in the production of rugs, fences, thatched roofs and building materials. The leaves of young shoots are useful feed for livestock, as they contain 18-22% crude protein. Reeds have also been successfully used for phytoremediation in aquatic ecosystems

and for the treatment of wastewater systems, hydroponic systems and wetlands. In recent years, many applications of common reed have emerged as various innovative composite building materials, raw materials for the production of cellulose and naturally degradable bioplastics, standardized solid fuel briquettes, pharmaceuticals and food additives, livestock feed pellets, etc. In addition to the above, reed beds provide a wide range of ecosystem services, such as carbon storage, water quality regulation, flood buffering, etc. Currently, reed thickets occupy about 3 million hectares in Kazakhstan. Particularly large areas are noted on the rivers Ile, Shu, Irtysh, Syr Darya, Zhaiyk , as well as on lakes Balkhash , Tengiz, Zaysan, Sarykopa . Ecosystems based on reeds in Kazakhstan provide the greatest biodiversity. We have developed five types of feed concentrate based on common reed (*Phragmites australis*). The main ingredients in our feed concentrates were alfalfa, wheat, corn, sunflower cake, soybean meal, etc. The resulting feed concentrates had different indicators of edibility for animals (cattle, small cattle), nutritional value and cost price. A patent was obtained for compound feed pellets based on reed. Work continues on fine-tuning the technology of silaging reed in combination with various root crops and various types of dry reed mass for the manufacture of fuel pellets and disposable tableware (Fig. 3).



Reed ecosystems



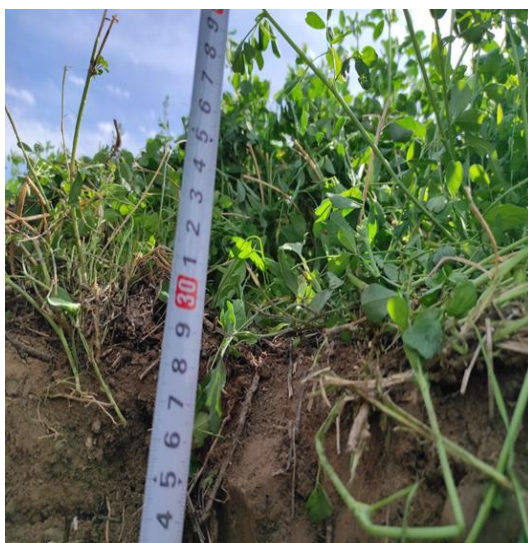
Fuel pellets and disposable cane tableware

The productivity of the planet's green cover, on the resources of which the entire "food pyramid" of the biosphere is built, depends on the condition and fertility of the soils. Their quality is of particular importance for agricultural lands, which provide food for the growing population of the planet. The problem of protection and rational use of soils has two main directions: protection of fertility and preservation of productive territories for the needs of agricultural production. The population of the Earth is growing rapidly, and the satisfaction of food needs can be ensured either by increasing crop yields or by expanding agricultural territories. The reserve of lands suitable for agricultural development is almost exhausted. Expansion of arable land is possible mainly at the expense of lands located in the risk zone, where not only biological communities but also soils are easily destroyed. The effect of involving these lands in economic circulation is small, these lands are short-lived, they easily degrade, losing their natural fertility.

Project "**ASSESSMENT INFLUENCES TECHNOGENIC WASTE ON PROPERTIES SOIL POKROV AND DEVELOPMENT METHOD OF REHABILITATION ECOLOGICALLY UNFAVORABLE INDUSTRIALLANDS**"

(**Head - Doctor of Biological Sciences, Professor Yesimsiitova Z. B.**) is aimed at developing a domestic fertilizers «EcoSoil» vegetable origin of the received from rice husks, characterized by low density additions. And high adsorptionability. The project plans to conduct an analysis of the ecology of the soil cover, assess the current physical and chemical state, problems and ways to solve them in the East Kazakhstan, North Kazakhstan and Zhambyl regions. Conducting research in the field of protecting rare and endangered plant species, including medicinal plants, is one of the priority tasks in implementing SDG 15.

As a result of regular anthropogenic impact, negative processes are developing in soils in many areas of the Republic of Kazakhstan, affecting the disturbance of the soil cover, compaction, chemical and biological pollution, and reduction of biodiversity. The increase in the man-made load on the environment leads to the emergence of zones with a critical environmental situation. These problems require the implementation of comprehensive monitoring of the state of the natural environment, conducting research that allows not only to identify and assess the danger of pollution, but also to establish trends and the rate of changes.



The importance of the problem of soil pollution with chemical elements is that soils are a natural accumulator of heavy metals in the environment and the main source of pollution. The study on the use of biochar from rice husk for the rehabilitation of soil covers is relevant in and a new direction of the field increasing crop productivity and obtaining environmentally friendly products at significantly lower costs.

Biochar based on rice husks, obtained by carbonization, has a more developed structure with a larger specific surface and porosity, which will increase its sorption properties. Due to its high porosity in combination with other physical and chemical properties, biochar helps to retain moisture and useful nutrients in the soil.

The hypothesis of the study is that biochar obtained by the optimized method is a new bio- based porous material for the effective removal of heavy metals from soil cover, which helps to achieve sustainable development goals and improve circular economy policies.

Project Zhas galym on the topic " **STUDY OF THE STATE OF POPULATIONS AND INTRASPECIFIC PHENOTYPIC VARIABILITY OF RARE SPECIES OF MEDICINAL PLANTS FROM THE GENUS ADONIS L. IN NORTHERN KAZAKHSTAN** " (Project Manager PhD , Zhumagul M.Zh.) is aimed at and studying current state populations And intraspecific anatomical and morphological variability of rare species medicinal plants from genus *Adonis* in flora Northern Kazakhstan and development events By their conservation. As a result of processing the material of field studies, herbarium funds and literary sources, it was established that on the territory of Northern and Central Kazakhstan there is growth of 3 independent species of adonis in the volume accepted according to the international POWO database: *Adonis vernalis* L., *Adonis volgensis* Steven ex DC . and *Adonis villa Ledeb* . Populations of *Adonis* were first studied villa Ledeb . and *Adonis vernalis* L. At present, a critical revision of herbarium collections has been carried out in large domestic and foreign herbarium funds, including: Herbarium of the Institute of Botany and Phytointroduction ; Herbarium

of the International Scientific and Production Holding " Phytochemistry ", Herbarium of the Astana Botanical Garden , Depository of Living Systems of Moscow State University "Noah's Ark" (MW) (Seregin , 2020 , Masaryk Herbarium University .



The obtained data allowed us to establish the species diversity and distribution of Adonis in Northern and Central Kazakhstan. Thus, 308 Adonis habitats in these regions were identified. The most common species in the region under study is Adonis volgensis Steven ex DC – 210 locations, Adonis is relatively less common villa Ledeb . – 80 locations. Adonis is very rare in the region under study. vernalis L. – 27 locations.

also conducts research work to study the state of populations of rare endangered species (plants and animals) as part of the dissertation work of doctoral students.

The department held preliminary hearings of the results of the doctoral dissertations of the following doctoral students of the department:

1. **Kegenova Gulnar Bolatkyzy** passed the preliminary approval of the dissertation work in the specialty "8 D 08401 - Fisheries and industrial fishing", on the topic: "Study of species diversity and taxonomic status of small reservoirs of South-Eastern Kazakhstan"
2. **Shadmanova Laura Sharbatovna** in the specialty " 6 D 061300 - Geobotany " " Study of new clone varieties of *Malus sieversii* (Ledeb.) M. Roem of the Dzungarian population under *in-situ* and *ex-situ* conditions ";
3. **Bizhanova Nazerke Alimkyzy** passed the preliminary approval of the dissertation work in the specialty "8 D 05101 - Biology" on the topic: Distribution and taxonomic status of the Turkestan lynx (*Links Links isabellinus* Blyth 1847) in the Northern Tien Shan. The dissertation defense will take place on November 7, 2023.

In 2023, the department defended 1 doctoral dissertation PhD Sayat Ermukhanbetovich Sharakhmetov on the topic: "**Fish communities and the state of their populations in the Alakol basin**" in the specialty "8D08401 - Fisheries and industrial fishing" . The dissertation considers issues of preserving some rare native fish species that require constant monitoring and protection.

<https://www.kaznu.kz/content/files/pages/folder17928/%D0%94%D0%B8%D1%81%D1%81%D0%B5%D1%80%D1%82%D0%B0%D1%86%D0%B8%D1%8F%20%D0%A8%D0%B0%D1%80%D0%B0%D1%85%D0%BC%D0%B5%D1%82%D0%BE%D0%B2%20C.E..pdf>

<https://www.youtube.com/watch?v=bbgsk5e6MLs>

COMMITMENTS

As part of a global community, we are working towards a solution problems of preserving terrestrial ecosystems within the framework our contribution to all Goals V areas of sustainability development.

Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, including forests, wetlands, mountains and drylands, in accordance with obligations under international agreements

Education. All our students are studying module, connected With disciplines By study conservation of rare and endangered species, rational usage, goals sustainable development, regardless from areas of the educational program or level of study. We strive develop awareness And skills For solutions these problems. Costs note, What 90 % students have opportunity study ecologically rational approach at use natural resources, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world How Part their course; there is row interdisciplinary modules, which offer students opportunity get significant experience V areas sustainable development, V volume number positive interaction With community.

Research. The scientific research of the university scientists is related to global And regional changes modern conservation of terrestrial ecosystems; conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits essential for sustainable development; combating desertification, restoring degraded land and soil, including land affected by desertification, drought and floods; utilizing genetic resources and promoting adequate access to such resources, as internationally agreed; measures to prevent the introduction of invasive alien species and to significantly reduce their impact on terrestrial and aquatic ecosystems.

Results research professorial and teaching composition, young scientists annually are published V monographs And scientific high rated publications, indexed in Scopus databases And Web of Science .