

Annotation

диссертационной работы Gassanova Gulnara Gidayatovna's dissertation on the topic: "Development of scientific, practical and computer-based information bases for the conservation and rational use of plants of the natural flora of the regions of Western Kazakhstan in ex-situ Mangystau", submitted for the degree of Doctor of Philosophy (PhD) in the educational program 6D060800-Ecology

Relevance: The deterioration of the ecological situation leads to the rapid, evolutionarily unjustified, disappearance of many species of wild nature and interesting cultivars. In order to preserve plant biodiversity, the current task is to attract, study and maintain the world and local flora in plant culture, including rare and endangered species, as well as to develop the basis for their conservation and rational use in order to expand and enrich the gardening range. Conservation and rational use of natural biological diversity is a factor that allows improving the ecology of regions.

The biological diversity of Kazakhstan is the basis for maintaining the ecological conditions of existence and economic development of human society, part of the world heritage, and is of vital importance for future generations.

Currently, a large number of non-regional plant species, varieties and forms with low resistance to local soil and climatic conditions are used in the regions of Kazakhstan, which reduces the possibility of their practical application for mass replication, creation of nurseries and introduction into practical activities.

Western Kazakhstan is an important ecoregion with a unique flora and diverse ecosystems, including steppes, semi-deserts and deserts. This region, despite its ecological vulnerability, plays a key role in maintaining the biological diversity of Central Asia. In recent decades, the region has faced a number of environmental challenges, such as climate change, land degradation and depletion of natural resources, which makes the issues of flora conservation, biodiversity and environmental management relevant. These problems require a systematic approach in the field of ecology, aimed at preserving natural ecosystems and rational use of natural resources.

1. Unique flora and ecosystems of the region

The flora of the region is a reflection of the diversity of ecosystems and conditions created by a special climate and geographical location. Many of these plants play an important role in maintaining ecosystem functions — they serve as food for animals, provide soil stability, and participate in water exchange processes.

Scientific research of flora allows not only to protect these species, but also to better understand the mechanisms of sustainability of the region's ecosystems, which is extremely important for developing effective conservation strategies.

2. The threat of climate change

Western Kazakhstan is already feeling the impact of climate change, which is manifested in rising temperatures, reduced precipitation, and an increase in the frequency of extreme weather events (droughts, sandstorms). These changes have a significant impact on the vegetation of the region, its structure and productivity. Some species may become extinct, while others may migrate to more suitable environments.

The study of flora and its adaptations to changing climate conditions is critical for predicting the effects of climate change and developing adaptive strategies in the management of natural resources. It will also help develop more sustainable agricultural systems that use native plant species that are more adapted to arid conditions.

3. Conservation of biodiversity

The biodiversity of Western Kazakhstan is under threat due to intensive anthropogenic activities: agriculture, mining, industry, urbanization and land degradation. Deforestation,

depletion of pastures, pollution of water bodies and soils, as well as changes in the water regime lead to the loss of valuable biodiversity.

Scientific study of flora helps to identify specially protected natural areas, formulate plans for the conservation of rare and endangered plant species. In addition, it is important to understand how ecosystem change affects biodiversity and how these changes may affect other levels of the ecosystem, including wildlife and human activities.

4. Environmental management

Western Kazakhstan, like many other regions, faces the need to find a balance between economic activity and nature protection. Agriculture, pasture farming, mining, and the use of water resources, including irrigation, require a rational approach to environmental management in the region. Effective management of natural resources requires the introduction of environmentally sustainable technologies, such as agroforestry, environmentally sound agricultural practices and rational use of water resources.

Studying the flora and ecosystems of the region allows us to develop sustainable methods of using local resources, such as introducing native plant species to agriculture (for example, drought-resistant crops) and using plants to restore degraded land.

5. Problems of land degradation

Land degradation (sandstorms, salinization, erosion) is one of the most acute environmental problems in the region. Many plant species that provide soil stabilization and water balance are disappearing or are under threat. This leads to a deterioration of pasture conditions, a decrease in land fertility and a deterioration of the ecological situation in general.

Scientific studies of flora allow us to identify the most effective species for restoring degraded land, which helps not only prevent further degradation, but also restore ecosystem services such as soil regeneration and water supply.

6. Ecosystem services for flora

The region's flora plays a key role in providing ecosystem services, such as maintaining water balance, protecting against erosion, cleaning air and water bodies, as well as agricultural and forestry productivity. These services have a high economic value and are the basis for sustainable development of the region.

Scientific research of ecosystem services of flora is important to include them in the economic assessment of the region's natural resources, which will allow for more efficient and reasonable management of natural resources, minimizing damage from human activities.

7. International cooperation and relevance

Western Kazakhstan is part of the Central Asian ecosystem, and changes occurring in this region can have an impact on neighboring countries. International efforts are important to address common environmental issues, including through participation in programmes for the protection of biodiversity, climate change adaptation and environmental management. The study of the flora of the region contributes to better coordination between the Central Asian countries in matters of nature protection and the sharing of transboundary natural resources.

The relevance of research lies in the need to preserve the unique ecosystems and natural resources of the region, as well as in the development of scientifically based methods for sustainable management of natural resources. In the face of global environmental changes, such as climate change and ecosystem degradation, these studies help not only preserve rare and endangered species, but also develop strategies for sustainable use of natural resources, ecosystem restoration, and improving the quality of human life. Rational use of natural resources based on deep knowledge of the flora and ecosystems of the region will help ensure environmental sustainability and sustainable development of Western Kazakhstan in the future.

Based on the above, there is a need to study and identify areas for practical use of biodiversity at regional levels.

The study is devoted to studying the flora of the regions of Western Kazakhstan, including useful, rare and endangered plant species, with obtaining a complete description, including the study of ecology, bioecology, geobotany, and assessment of the possibility of introduction,

which is an integral part of the development program of Kazakhstan and is of the most important socio-economic and scientific significance.

The research is in line with the main state directions and objectives in the field of environmental protection: the provisions of the ratified Convention "On Biological Diversity", the Environmental Code of the Republic of Kazakhstan, the Concept for the Conservation and Sustainable Use of Biological Diversity of the Republic of Kazakhstan, aimed at implementing priority areas such as "Conservation of biodiversity" and "Sustainable use of biodiversity" and the draft law " On plant world", which is supposed to assess the current state of the flora, as a basis for its rational use, conservation of species diversity and monitoring of changes. National project "Technological Breakthrough through digitalization, Science and Innovation" from October 15, 2021 . Direction IX. Task 1. Increasing the contribution of science to the country's development; Concept for the development of higher Education and Science in the Republic of Kazakhstan for 2023-2029 dated March 28, 2023 No. 248. Chapter 3. Paragraph 5. Development of applied science and the ecosystem of RNNTD commercialization; Law of the Republic of Kazakhstan " On the Plant World " of 02.01.2023 No. 183-VII ZRK, Chapter 9 Use of the plant world, Law of the Republic of Kazakhstan "On Specially Protected Natural Territories". Article 29. paragraph 1. Convention on Biological Diversity (RioRio de Janeiro, 1992), which aims to conserve biological diversity, sustainably use its components and share in a fair and equitable manner the benefits associated with the use of genetic resources, including by providing the necessary access to genetic resources and the appropriate transfer of appropriate technologies, taking into account all rights to such resources and technologies. The formation of an electronic database of regional flora allows implementing the Decree of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827. On approval of the State Program "Digital Kazakhstan".

The aim of the study is to study wild and cultivated plants of the natural flora of Mangystau and Atyrau regions in order to increase the efficiency of their use in the practice of green construction and phytomelioration based on the use of computer and information technologies in the extra-arid conditions of Mangystau.

Tasks:

1) Analysis of the flora of Mangystau and Atyrau regions based on available literature data, herbarium materials, and field research.

2) Ecological and phytocenotic assessment of populations and communities of valuable plants.

3) Study of bioecological features of valuable plants in Mangystau.

4) Formation of an electronic database in the computer program "BD-PLANT-KZ"

5) Development of recommendations for the creation of new specially protected natural areas in Mangystau and Atyrau oblasts, taking into account the IUCN recommendation.

To solve these problems, a comprehensive ecological and biological study of the most valuable and stable plant species of the natural flora of Western Kazakhstan is necessary.

The subject of the study is both wild plants and cultivated plants of the natural flora of Mangystau and Atyrau regions, with an emphasis on the ecological state of their growing areas.

Dissertation work completed:

1. within the framework of the scientific and technical program IRN BR05236506 "Development of scientific, practical and computer-based information bases for creating landscape-collection and garden-park plantings in the desert zone of Mangystau for the conservation and rational use of plant biodiversity" under targeted funding (contract No. 343 of 03.04.2018)

2. within the framework of the scientific project on grant financing No. AP08856698 " Research of biological features, areas, raw material reserves of medicinal plants of Atyrau region and assessment of the possibility of their practical use "(Contract No. 228 of 12.11.2020)

3. within the framework of the scientific and technical program IRN BR18574125 " Study of the current state of vascular plant species diversity in Kazakhstan using modern methods of botany, molecular genetics and bioinformatics "(Contract No. 03-2023 of the PCF dated 19.04.2023).

The scientific novelty lies in the fact that for the first time on the basis of the research results obtained, the most complete list of the natural flora Мангыстау of the Mangystau and Atyrau regions was compiled, and an electronic database with complete information about them was formed.

The practical significance of the work lies in the possibility of applying research results for the conservation of biodiversity at the national and international levels, as well as in increasing the use of the potential of electronic databases for the development of the "green economy" of the Republic, reducing environmental risks aimed at rational use and reducing anthropogenic impact on the vegetation cover of arid regions of the Republic of Kazakhstan.

The author's personal contribution consists in participating in both field and laboratory research, forming a computer-based information database, developing recommendations and herbal tea formulas.

Scientific provisions submitted for defense

- analysis of the flora of Mangystau and Atyrau regions by economically valuable groups;
- ecological and phytocenotic analysis of plant communities;
- geographical novelties in the flora of Mangystau;
- results of the study of *Alhagi pseudoalhagi* populations in the Atyrau region;
- research of bioecological features of rare and endangered plants introduced in ex-situ conditions of Mangystau;
- database of plants of the natural flora of Western Kazakhstan;
- recommendations for the creation of new specially protected natural areas in Mangystau and Atyrau oblasts, taking into account the IUCN recommendation.

Thus, the results of the study provide practical tools for improving environmental management and developing sustainable strategies for the development of biodiversity conservation.

Testing the work. The research results are published in the proceedings of international scientific and practical conferences: The International Scientific and Practical Conference "International Yesenov Readings" held within the framework of the Program of modernization of public consciousness "Orientation to the future: Rukhani Zhangyru", (Aktau, 2018), Abstracts of the All-Russian Conference Plant Diversity: state, trends, conservation concept, (Novosibirsk, 2020), All-Russian scientific conference with international participation dedicated to the 120th anniversary of N. V. Tsitsin "Legacy of Academician N. V. Tsitsin. Current state and prospects of development", (Moscow, 2019), International Scientific and Practical Conference "Study, conservation and rational use of the plant world of Eurasia", (Almaty, 2022), International Scientific and Practical Conference "Introduction, conservation of biodiversity and green building in a changing climate and anthropogenic impact", (Aktau 2022), International Scientific Environmental Conference dedicated to the 100th anniversary of Kuban State Agrarian University "Environmental protection-The Basis of national security" (Krasnodar, 2022).

Publication. Based on the materials of the dissertation, 22 scientific papers were published, including: 3 articles in journals included in the Scopus database, 8 articles were published in journals recommended by the Ministry of Education and Science of the Republic of Kazakhstan, 2 articles in the HAC journal, and the remaining articles in collections of international scientific and practical conferences.

Received 1 patent for a utility model and 3 certificates for objects protected by copyright.

Scope and structure of work. The dissertation consists of an introduction, 5 chapters, conclusion, and a list of references from 187 titles. The paper is presented on 166 pages of computer text, illustrated with 69 figures, 20 tables and appendices.