ANNOTATION

dissertation work of Gasanova Gulnara Gidayatovna on the topic:
"Development of scientific, practical and computer -informational bases for the conservation and rational use of plants of the natural flora of the regions of Western Kazakhstan in ex-situ Mangistau ", 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. The preservation 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, in the regions of Kazakhstan, a large number of foreign species, varieties and forms of plants with low resistance to local soil and climatic conditions are used, which reduces the possibility of their practical application for mass replication, creation of nurseries and implementation in practical activities.

Western Kazakhstan is an important ecoregion with unique flora and diverse ecosystems, including steppes and deserts. This region, despite its environmental 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 preserving flora, biodiversity and rational use of natural resources relevant. These problems require a systematic approach in the field of ecology aimed at preserving natural ecosystems and rational use of natural resources.

1. The uniqueness of the region's flora and ecosystems

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

Scientific research into flora not only helps protect species, but also provides a deeper understanding of the mechanisms that support the sustainability of regional ecosystems, which is essential for developing effective conservation strategies.

2. The threat of climate change

Western Kazakhstan is already feeling the impact of climate change, which manifests itself 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 region's vegetation, its structure, and productivity. Some species may disappear, while others migrate to more suitable conditions.

The study of flora and its adaptations to changing climatic conditions is critical for predicting the impacts of climate change and developing adaptive strategies in natural resource management.

3. Preservation of biodiversity

The biodiversity of Western Kazakhstan is under threat from intensive anthropogenic activities: agriculture, mining, industry, urbanization and land degradation. Depletion of pastures, pollution of water bodies and soils, as well as changes in the water regime entail 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 changes affect biodiversity and how these changes can affect other levels of the ecosystem, including wildlife and human activity.

4. Rational use of natural resources

Western Kazakhstan, like many other regions, faces the need to find a balance between economic activity and environmental protection. Agriculture, pastoral livestock farming, mining, and the use of water resources, including for irrigation, require the region to take a rational approach to natural resource management. Effective management of natural resources requires the introduction of environmentally sustainable technologies, environmentally friendly agricultural practices, and rational use of resources.

Studying the flora and ecosystems of a region allows for the development of sustainable methods of using local resources, introducing local plant species into agriculture (e.g. drought-resistant crops) and using plants to restore degraded lands.

5. Land degradation issues

Land degradation (sand storms, 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 deterioration of pastures, decreased soil fertility and deterioration of the environmental situation as a whole.

Scientific research on flora helps identify the most effective species for restoring degraded lands, which helps not only prevent further degradation but also restore ecosystem services such as soil regeneration and water supply.

6. Ecosystem

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

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

7. International cooperation and importance

Western Kazakhstan is part of Central Asia, and changes occurring in this region may have an impact on neighboring countries. International efforts are important to address common environmental issues, including through participation in programs to protect biodiversity, adapt to climate change, and manage natural resources. Studying the flora of the region helps improve coordination between Central Asian countries in matters of nature conservation and the joint use of transboundary natural resources.

The relevance of the 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 context of global environmental changes, such as climate change and deterioration of ecosystems, these studies help not only to preserve rare and endangered species, but also to develop strategies for the sustainable use of natural resources, restoration of ecosystems and improvement of the quality of human life. Rational nature management 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 the practical use of biodiversity at regional levels.

The research is devoted to the study of floras of the regions of Western Kazakhstan, including useful, rare and endangered plant species, with the receipt of a complete description, including a study of ecology, bioecology , geobotany, assessment of the possibility of introduction, which is an integral part of the development program of Kazakhstan and has the most important socio-economic and scientific significance.

The studies are 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 the Plant World", which provides for an assessment of the current state of flora as the basis for its rational use, conservation of species diversity and monitoring of ongoing changes. National project "Technological Leapforward through Digitalization, Science and Innovation" dated October 15, 2021. Direction IX. Objective 1. Growing the contribution of science to the development of the country; The 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 Commercialization Ecosystem of the Russian Scientific and Technical Complex; The Law of the Republic of Kazakhstan "On the Plant World" dated 02.01.2023 No. 183-VII ЗРК, Chapter 9 Use of the Plant World, the Law of the Republic of Kazakhstan "On Specially Protected Natural Areas". Art. 29. paragraph 1. The Convention on Biological Diversity (Rio de Janeiro, 1992), the purpose of which is the conservation of biological diversity, sustainable use of its components and the fair and equitable sharing of benefits arising from the utilization of genetic resources, including by providing the necessary access to genetic resources and the appropriate transfer of relevant technologies, taking into account all rights to such resources and technologies. The formation of an electronic database of regional floras makes it possible to implement the Resolution 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 research is to study valuable plant species of the natural flora of the Mangistau and Atyrau regions for conservation and rational use based on the use of computer and information technologies .

Tasks:

1) Ecological assessment of the current state of valuable plants of the flora of the Mangistau and Atyrau regions.

2) Study of valuable plants of Mangistau and Atyrau regions.

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

4) Development of recommendations for the creation of new specially protected natural areas taking into account IUCN recommendations.

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

The subject of the study is both wild plants and cultivated plants of the natural flora of the Mangistau and Atyrau regions with an emphasis on the ecological state of their habitats .

The dissertation work was completed:

1. within the framework of the scientific and technical program of the IRN BR05236506 "Development of scientific, practical and computer-information bases for the creation of landscape-collection and garden-park plantings in the desert zone of Mangistau for the conservation and rational use of plant biodiversity" for targeted financing (agreement No. 343 dated 03.04.2018)
2. within the framework of the scientific project for grant funding No. AP08856698 “Study of biological characteristics, habitats, raw material reserves of medicinal plants of the Atyrau region and assessment of the possibility of their practical use” (agreement No. 228 dated 11/12/2020)

The scientific novelty lies in the fact that, based on the obtained research results, the current state was assessed and for the first time an electronic database of plants of the natural flora of the Mangystau and Atyrau regions was formed , with complete information about them .

The practical significance of the work lies in the possibility of applying the 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 of participation in both field and laboratory research, the formation of a computer information database, and the development of recommendations and a formula for herbal tea (Appendix G, Figure G.1) .

Scientific provisions submitted for defense

- ecological characteristics of valuable plants of the flora of the Mangistau and Atyrau regions;
- floristic finds in Mangistau ;
- results of the study of *Alhagi populations pseudoalhagi* in Atyrau region ;
- studies of bioecological characteristics of rare and endangered plants during introduction in ex-situ conditions of Mangistau ;
- database of plants of the natural flora of Western Kazakhstan;
- recommendations for the creation of new specially protected natural areas in the Mangistau and Atyrau regions, taking into account the IUCN recommendations.

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

Testing the work. The results of the research were published in the proceedings of international scientific and practical conferences: the International scientific and practical conference “I International Yesenov Readings” held within the framework of the Program for the Modernization of Public Consciousness “Orientation to the Future: Rouhani zhangyru ", (Aktau, 2018), Abstracts of the All-Russian Conference Plant Diversity: Status, Trends, Conservation Concept, (Novosibirsk, 2020), All-Russian Scientific Conference with International Participation Dedicated to the 120th Anniversary of N.V. Tsitsin "The Legacy of Academician N.V. Tsitsin. Current State and Development Prospects" (Moscow, 2019), International Scientific and Practical Conference "Study, Conservation and Rational Use of the Flora of Eurasia" (Almaty, 2022), International Scientific and Practical Conference "Introduction, Conservation of Biodiversity and Green Building in the Context of a Changing Climate and Anthropogenic Impact" (Aktau, 2022), International Scientific Environmental Conference Dedicated to the 100th Anniversary of KubSAU "Environmental Protection - the Basis of Country Security" (Krasnodar, 2022).

Publication. Based on the dissertation materials, 22 scientific papers were published, of which : 3 articles in journals included in the Scopus database , 8 articles were published in journals recommended by the Committee on Quality Assurance of Higher Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan, 2 articles in the Higher Attestation Commission journal, the remaining articles were published in collections of international scientific and scientific-practical conferences.

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

Volume and structure of the work. The dissertation consists of an introduction, 5 chapters, a conclusion, a list of references from 178 titles. The work is presented on 159 pages of computer text, illustrated with 80 figures, 12 tables and appendices.