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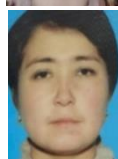
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Issue

Article



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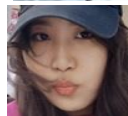
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## PROBLEMS OF LAND DESERTIFICATION IN THE TURKESTAN REGION AND AFFORESTATION AS A SOLUTION TO THE PROBLEM

*Abstract: Desertification is not only about deserts, and it is not only happening in Africa. Desertification is a process in which desert conditions develop as a result of degradation processes, mostly due to a significant decrease in soil productivity. The most vulnerable territories include regions with arid, subarid and dry climatic conditions,*

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which are very sensitive to human and animal activity, as well as to climate change. Soils become eroded and saline, they lose their ability to retain moisture, the groundwater level decreases, vegetation cover decreases or disappears altogether. Desertification leads to the fact that the land becomes infertile. Desertification, land degradation and drought (DLDD) are global problems. According to the UN, drylands occupy 30% of the earth's surface in more than 100 countries, and 2 billion people currently live on these lands. If the scenario proposed by the UN is confirmed, taking into account the current rate of desertification, by 2025 every fifth inhabitant of the Earth will live in a drought-prone area. At the moment, more than two billion hectares of productive land have been degraded worldwide, and we continue to degrade an additional 12 million hectares annually.

**Key words:** forest, trees, grass, flowers, ground, in-vitro, sun radiation, ecosystem, locality, agroforestry.

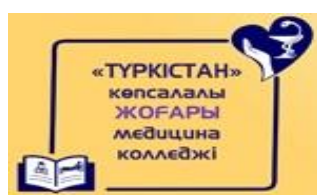
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## Introduction



По результатам технического задания грантового проекта КН МОН РК утвержденного приказом Председателя КН МОН РК от «2» марта 2022 года № 27-нж

Desertification is a silent, invisible crisis that destabilizes the global community. Desertification exacerbates economic, social and environmental problems such as poverty, poor health, food insecurity, loss of biodiversity, water scarcity, reduced resilience to climate change and forced migration. Poverty is a cause and consequence of desertification. Up to 90% of people living in arid areas are citizens of developing countries. People living in poverty and suffering from desertification at the same time may become even poorer due to the lack of sustainable land. Moreover, desertification, exacerbated by climate change, can lead to famine in the least developed countries. According to WHO, the potential impact of desertification is the risk of malnutrition due to a decrease in food and water supplies, clean water, the risk of respiratory diseases caused by atmospheric dust from wind erosion, the risk of the spread of infectious diseases during forced migration due to desertification. Desertification has a direct impact on food security: we cannot continue land degradation if there is a target to increase food production by 70% by 2050 to ensure global food security. Desertification has a negative impact on biodiversity as a result of loss of species diversity, reduced ecosystem functionality, invasion of new species, as well as changes in biomass production. DLDD have a negative impact on the availability, quantity and quality of water resources, which lead to water scarcity. - The loss of productive land encourages people to make risky life decisions. In rural areas, where people depend on scarce productive land resources, land degradation is the driving force

behind forced migration. It is projected that by 2045, about 135 million people may be forced to migrate as a result of desertification. United Nations Convention to Combat Desertification (UNCCD) As a global platform, adopted on June 17, 1994, the BWC is the only legally binding international agreement linking environment and development with sustainable land management. The Convention specifically addresses arid, semi-arid and dry sub-humid areas, known as arid areas, where some of the most vulnerable ecosystems can be found. The ten-year strategy of the UNCCD states the main goal - "to create a global partnership to prevent desertification, land degradation and mitigate the effects of drought in affected areas in order to support poverty reduction and ensure environmental sustainability." The objectives of the UNCCD include providing a global platform to support national and regional strategies, scientific and technical knowledge, informing the general public, lobbying and resource mobilization. The executive institutions and bodies of the BWC are the Conference of the Parties, the Committee for the Review of the Implementation of the Convention, the Committee on Science and Technology, the Global Mechanism responsible for Finance, and the BWC Secretariat responsible for organizational matters. Issues on achieving a neutral balance of land degradation, as well as issues related to the strategic implementation of the Convention, the Secretariat's work plan and other tasks will be considered during the 13th session of the Conference of the Parties in Ordos.

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№	ИРН	Наименование	Заявитель	Научный руководитель	Период реализации	Группа объектов ГНТЭ	Статус	Готовность	Создать
1	AP09561600	Лесопроектирование: конструкция уникального образца лесного массива по системе in-vitro	Частное учреждение "Шымкентский университет"	Битемиров Кайрат Турлыбаевич	2022 - 2024	Конкурс на грантовое финансирование исследований молодых ученых по проекту «Жас галым» на 2022-2024 годы	Создано	100%	Действие

Pic.1

## II. RESEARCH METHODOLOGY AND ETHICAL QUESTIONS.

As a statement of clarity of the scientific research question, it is possible to identify the question according to which the interdisciplinary norms of rational monitoring of green technologies through applied forest design will have a positive impact on the environmental, economic and social situation in the region. This formulation clearly reflects the purpose, question, assumptions and hypotheses of the research plan, justifying their degree of scientific significance systematically and systematically. To answer this question, an attempt was made to justify the present using three hypotheses, the realism of which is associated with the goal and expected results of the research plan. The primary hypothesis assumes that interdisciplinary norms of rational monitoring of green technologies through applied forest design have a positive impact on the ecological situation in the region, since a large number of deciduous trees emit a sufficiently large amount of oxygen, a large number of coniferous trees a large number of phytoncites, and mountain air is an excellent wind tunnel for correct propagation. The secondary hypothesis suggests that interdisciplinary norms of rational monitoring of green technologies through applied forest design have a positive impact on the economic situation in the region, since in the future nearby villages will be able to collect and sell such berries as blackberries, raspberries, blueberries, cranberries, blueberries, sea buckthorn, as well as nuts, mulberries and pine nuts, not counting the organization of tourist centers and shops where tourists can buy. The tertiary hypothesis assumes that interdisciplinary norms of rational monitoring of green technologies through applied forest design have a positive impact on the social situation in the region, since it will immediately provide a large number of jobs, organize the infrastructure of service personnel, and other favorable changes for the region. To prove the hypotheses, an attempt was made to justify them using research strategies and approaches that are supposed to be used in the program and descriptive, correlation, and experimental studies depending on the periodicity of tasks, the sequence of which varies depending on a particular stage of the program implementation. The study has a clear planned achievement of the goal through specific actions for a systematic transition

from one task to another. In addition to a certain periodicity, this report also illustrates how the resources, timing, and content of the work performed correspond to the goals, objectives, methodology, and expected results of the study. As a research strategy, this can be defined by the use of one methodological tool in one task, the use of other techniques in the second, and the use of other techniques in the third task. Research approaches in research are experimental in nature, where project participants try various methodological tools in accordance with the results obtained. A number of approaches have been developed, as indicated in this section, for which sequences will be defined. These approaches in the framework of the research plan include experiments that are completely new and have not previously been used in such studies. Due to the urgency of the need for such an experiment, it can be considered quite modern. All experiments are planned with a certain frequency and systematics, encoded in a certain algorithm, which justifies the correctness of the design of experiments for its subsequent statistical data processing.

## III. RESULTS.

Central Asia is a classic example of an arid and subarid region characterized by serious transboundary desertification problems. According to the GTZ publication, there is currently nowhere an entire region with an area of more than four million square kilometers that faces a greater threat from desertification than the region between the Caspian Sea and the Pamir Mountains (1). At the moment, more than 2/3 of the territory of Central Asia is arid lands. For example, in Kazakhstan, according to World Bank estimates, 66% of the country's territory is subject to desertification (2). The consequences of desertification are exacerbated by climate change and increasing anthropogenic pressures. Central Asia is one of the regions most vulnerable to climate change. According to climate forecasts, a noticeable increase in temperature (up to 2-4 degrees), uneven precipitation distribution, intensive melting of glaciers (currently 46 glaciers in the region are subject to melting) - all this will lead to an increase in the desertification process in the long term (3). Improper use of land during the Soviet Union, including intensive irrigation, overgrazing of steppes and

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deforestation of mountain forests in a vast dry zone with limited ecological tolerance, caused numerous environmental consequences. Further economic growth led to increased anthropogenic pressures and, as a result, to land degradation. It is estimated that 4-10% of cultivated areas, 27-68% of pastures and 1-8% of forests are significantly degraded in Central Asia at present (4). The causes of land degradation are numerous, complex and vary from country to country, but are generally associated with abuse and overexploitation of the natural resource base, in particular with improper and unsustainable agricultural practices, excessive grazing of pastures, deforestation, forest degradation and natural disasters (5). As in the whole world, in the countries of Central Asia, DLDD is not only a serious environmental, but also an economic and social problem. According to the FAO report, the economies of Central Asia are still largely based on agriculture, which accounts for 10-38% of GDP and provides 18-65% of employment, which makes the economies of these countries vulnerable to droughts by reducing agricultural production, negatively affects food prices, trade, market access and it leads to a decrease in farmers' incomes and unemployment. DLDD directly affects the livelihoods of rural populations, reducing the productivity of land resources and having a negative impact on the stability and functioning of natural systems, as well as services dependent on these systems (6). According to reports, agricultural yields in the region have decreased by 20-30% since these countries gained independence, which leads to annual losses of agricultural production in the amount of \$ 2 billion (7). Unfortunately, weak institutional infrastructure, low technical, administrative and financial capacity of countries, insufficient information exchange and imperfect hydrometeorological monitoring - all this does not contribute to combating desertification and reducing disaster risk (8). Regional cooperation on combating desertification. Realizing that desertification and drought are cross-border problems requiring joint action, and guided by the mechanisms laid down in the UNCCD, the Central Asian countries agreed and adopted the Subregional Action Program of the Central Asian Countries to Combat Desertification in the context of the UNCCD in 2003 (9). The objectives of this program were the coordination of subregional interests, the exchange of information and experience, the involvement of donors in the implementation of the BWC, synergy in the implementation of environmental conventions in the subregion, the development and implementation of joint programs, and the improvement of socio-economic conditions. In the future, this program served as a platform for launching the Central Asian Countries' Land Management Initiative (ISCAUSR) (10). Despite the existing criticism, the creation of the SLMIS can be considered an interesting example of regional

cooperation in combating desertification: cooperation took place between countries, between donors, as well as between countries and donor organizations. During the first phase (2006-2011), 4 regional and 7 national projects were implemented in the field of pasture and agricultural land improvement (11). The main goal of the second phase (2018-2022) is to strengthen integrated management of natural resources on drought-prone and saline agricultural production lands in Central Asia and Turkey. Another example of regional cooperation is the analytical project "Economics of Land Degradation in Central Asian Countries (2014-2016), implemented to ensure understanding and awareness of stakeholders about the economic value of productive land based on market and non-market values. The project was implemented under the auspices of the UNCCD with the participation of GIZ, ICARDA, the governments of the countries of the region and the Regional Environmental Center of Central Asia. According to the publication, the results of the project revealed that in case of inaction, we will have 53 billion in costs to combat land degradation and 288 billion in losses due to inaction over a 30-year horizon. Nevertheless, investments in restoration are profitable - for \$ 1 spent on land restoration - \$ 5 return. The UNCCD secretariat is currently working on a Regional Initiative to develop drought risk management strategies for Central Asia (12). The objectives of the initiative are to develop a common strategic program for drought management and drought resilience, strengthen the political initiative on drought preparedness and resilience, identify specific needs and exchange successful experiences in the region and the possibility of cooperation (13).

## IV. DISCUSSION.

### National measures in Kazakhstan

Kazakhstan ratified the UN BWC in 1997. In the same year, the Government of the Republic of Kazakhstan adopted a National Action Plan to Combat desertification. In January 2005, the Government of the Republic of Kazakhstan approved a program to combat desertification in the Republic of Kazakhstan for 2005-2015. In 2008, due to the optimization of the number of sectoral Government programs, this program was abolished, and only certain activities of this program were included in the government's medium-term environmental protection program in the "Zhasyl Damu" Program for 2010-2014 (14). The concept of transition of the Republic of Kazakhstan to a "green economy" confirms the seriousness of the problem of desertification and suggests adhering to the principles of "green" agriculture such as: a) prevention of land degradation and restoration of degraded lands; b) prevention of further dislocation of pastures; c) efficient use of water; d) rational use of resources; e) minimization and reuse waste; f) carbon dioxide capture. Within the framework of the GEF-

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UNDP project "Support in updating the National Action Plan, as well as in the process of reporting and reviewing the performance of activities within the framework of the implementation of the UN Convention to Combat Desertification in Kazakhstan", the document "Strategic measures to combat desertification in the Republic of Kazakhstan until 2025" was prepared (15).

### National measures in Kyrgyzstan

Kyrgyzstan has been a party to the UNCCD since 1997. The Government adopted the National Action Program to Combat Desertification in 2000 and the National Framework Program for Sustainable Land Management for 2006-2016. These programs are aimed at developing sustainable land use, increasing the productivity of arable land and reducing poverty in rural areas. Despite the successful implementation of many pilot projects in the field of sustainable land use and best practices in agriculture in 2000-2007, weak changes are slowed down by the processes of land degradation, a decrease in agricultural production and an increase in poverty in rural areas (16). Kyrgyzstan should strengthen its actions for the full implementation of the above-mentioned programs. In July 2017, with the support of the UNDP-GEF project "Strengthening institutional and legal capacity to ensure the improvement of the national environmental information management and monitoring system", the fifth meeting of the interdepartmental expert group on the implementation of the UN Convention to Combat Desertification was held in Kyrgyzstan. The participants of the expert group discussed the implementation and implementation of the initiative to establish the goals of neutral balance of land degradation (17).

### National measures in Tajikistan

Tajikistan joined the UN BWC in 1997. In 2001, the National Action Program to Combat Desertification was adopted, aimed at combating environmental degradation and irrational land use. To implement the Convention, the Government has adopted a Program of economic transformation of the agro-industrial complex and a Program on environmental education and upbringing of the population for the period up to 2010 (18). The draft Strategy for the Development of the Private Sector in Tajikistan (2007-2010) paid special attention to ensuring environmentally sustainable growth and promoting the rational use of land. Tajikistan is one of the most economically vulnerable countries to the consequences of desertification in Central Asia, as the socio-economic consequences of desertification threaten a great disaster for residents who may become environmental refugees (19). In this regard, the country recognizes the need to develop specific pilot projects to combat erosion and desertification.

### National measures in Turkmenistan

Turkmenistan was one of the first to ratify the UNCCD in 1996, starting a year later to implement the

national action plan, the main aspects of which were rational use of pastures, forestry development, consolidation and afforestation of mobile sands, improvement of irrigated lands, applied research. In Turkmenistan, deserts occupy 80 percent of the territory, and both cultivated and natural lands are subject to desertification to varying degrees. Special attention is paid to the problem of degradation of desert and foothill pastures and irrigated lands (20). The National Institute of Deserts, Flora and Fauna (NIPRWM) operates in the country. The State Committee for Environmental Protection and Land Resources of Turkmenistan. The National Forest Program and the National Climate Change Strategy are being implemented, the Law on Pastures has been introduced, the Water Code has been revised, the Land Code has been amended, the National Climate Change Program has been adopted and the National Action Program to combat desertification has been revised. Rational use and protection of land resources is one of the priorities in the economic policy of the state, which is reflected in the Strategy 2030 (21).

### National measures in Uzbekistan

Uzbekistan was one of the first to ratify the BWC. A National Strategy to Combat Desertification was developed in 1999. Currently, a draft of the Second National Strategy has been prepared (22). This Program, as well as the National Strategy for Sustainable Development, are the dominant strategies for combating desertification. In recent years, two state programs on the Aral Sea have been adopted (23). Programs aimed at combating desertification, water resources management, as well as a forest resources management program are being implemented. The fight against DLDD in Uzbekistan is carried out through concrete measures to improve the land reclamation condition within the framework of the reclamation program, the use of experience and best practices for the balanced use of land for ecology and consumption, the introduction of new innovative resource-saving technologies in the land use system; attracting investments in the practice of sustainable land management to ensure, develop, create and maintain sustainable systems power supply. Uzhydromet is an institution responsible for activities under the United Nations Framework Convention on Climate Change (UNFCCC) (24), including obligations under the UNFCCC and the UNCCD. Recently, projects such as the GEF/UNDP Project "Reducing the burden on the use of natural resources as a result of competing exploitation of non-irrigated arid lands in mountainous, semi-desert and desert landscapes of Uzbekistan" (2014-2018), the GEF/World Bank Project "Sustainable Agriculture and mitigation of climate change", including 1.2 million Dollars to combat desertification, the GEF/FAO Project (25) "Capacity building and support for solutions to promote and disseminate SLM

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and combat desertification, land degradation and drought" (2014-2016)..

### V. ACKNOWLEDGEMENTS.

This study was carried out on the basis of a private institution "Higher Multidisciplinary Medical College "Turkestan"", which has a certain room and equipment for conducting research. It is also necessary to note the high level of involvement of the staff of the college, who have made a significant contribution to the development of this topic. As for the student potential, there were many activists who agreed to take part in the research in various positions listed below. These positions include data and positions from the table below. Thus, as a legal experiment, the research group planned a study with the participation of 16 full-time students in the specialty of nursing. So 8 students participated in an experiment where each of them was given the role of an active stalker and a passive stalker, as well as an active victim and a passive victim. Four students monitored and four students supervised each group of tests.

### VI. CONCLUSION.

In conclusion it is actual to identify that, despite the measures taken at the national and regional level, all Central Asian countries are experiencing certain difficulties related to the implementation of

conventions, including the UN BWC. At many regional events previously held by CAREC, the lack of appropriate institutional, financial and technical capabilities at the national level to fulfill obligations, the need for technical and methodological support for reporting, involvement of a wide range of stakeholders, insufficient interdepartmental cooperation at the national and regional levels and the lack of a single "voice of the region" on international platforms were emphasized. As part of the work with environmental conventions, the Regional Environmental Center plans to analyze and identify the full range of problems and identify the needs of countries for the implementation of conventions in the region through a survey among representatives of the Convention Secretariats and directly decision makers at the national level.

### VII. RECOMMENDATION

As a recommendation, more importance should be given to grant financing, since it is the sector of scientific research that has more versatile tools for monitoring, forest design and adaptation of samples of deciduous and coniferous crops to any conditions. The present is, in principle, possible, given the international obligations of the Republic of Kazakhstan, to direct a certain percentage of industrial facilities that they charge for ecology from industrial enterprises to increase the area of forests.

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