

Brief information about the project

Name of the project	AP09058590 – Monitoring of land degradation and desertification processes in Talas district of Zhambyl region using GIS and RS data for sustainable land use.
Relevance	<p>According to the UN, drylands occupy 30% of the earth's surface in more than 100 countries, and these lands are currently home to 2 billion people. If the scenario proposed by the United Nations is confirmed, given the current rate of desertification, by 2025 one in five people on Earth will live in a drought-prone area. To date, more than two billion hectares of productive land have been degraded around the world, and we continue to degrade an additional 12 million hectares annually.</p> <p>Most of the territory of Kazakhstan is in the arid zone and about 75% of the territory is subject to the processes of desertification and land degradation to varying degrees. Of the 273.5 million hectares of the republic's territory, about 191.1 million hectares are subject to desertification. More than 100 thousand hectares are subject to secondary salinization. Kazakhstan loses almost 100 billion tenge annually due to land degradation. Most of the deflated lands are located: in Almaty, Atyrau, Turkestan, Kyzylorda and Zhambyl regions. Thus, continuous monitoring of agricultural land in desert conditions is the most important component of the use of land in the arid zone of Kazakhstan for agriculture.</p>
Purpose	To identify the conditions and factors of the degradation process of irrigated lands in the desert and semi-desert zones, to develop a geographic information system (GIS) for monitoring land degradation based on modern geoinformation technologies and remote sensing data for solving practical problems in land management.
Objectives	<ul style="list-style-type: none"> - to identify the patterns of formation of natural complexes (geosystems) and agrolandscapes of the study area by classical methods (methods of landscape studies and agrolandscape studies) and the history of physical and geographical studies of desert sand landscapes in the arid zone; - clarify research methods and the reliability of their application through a systematic approach; - compile a landscape map and give a description of the object of study on a scale of 1: 200,000 based on physical-geographical, soil, geomorphological, hydrographic and soil-geomorphological maps using GIS technologies and Earth remote sensing data; - analysis of desert land use monitoring systems; - determine the degree and forms of land degradation of the object of study with the study of the degradation processes of arable, pasture and hayfields agrolandscapes; - create a system for monitoring the lands of the irrigated zone of sand deserts in the conditions of a permanent and temporary surface water flow; - prepare recommendations on the use of land monitoring results for sustainable land use;

	<p>- based on the monitoring results, scientifically substantiate approaches to the rational use of land and the prevention of negative processes.</p>
Expected and achieved results	<p>The result of the project will be mechanisms and a set of measures to develop an agricultural land monitoring system to prevent and improve the productivity of saline degraded agro-landscapes for the rational use of pastures and hayfields for their restoration in peasant and/or farming households.</p>
Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles	<p>Laiskhanov Sh.U. - Scientific Supervisor, Senior Researcher, Ph.D., Acting Associate Professor ResearcherID: GSI-4939-2022 ORCID: 000-0002-3353-9681 Scopus Author ID: 56983077100</p> <p>Assylbekova A.A. - Senior Researcher, Ph.D. ResearcherID: DVY-3008-2022 ORCID: 0000-0002-8609-3855 Scopus Author ID: 56584674300</p> <p>Taukebayev O.Zh. - Researcher, Ph.D. Candidate, responsible executor. ResearcherID: ZE-4278-2022 ORCID: 0000-0002-7959-1434 Scopus Author ID: 57347268200</p> <p>Zulpykharov K.B. - Researcher, Ph.D. Candidate ResearcherID: HLG-0490-2023 ORCID: 0000-0002-0275-2463 Scopus Author ID: 56584674300</p> <p>Kudaibergenov M.K. - Researcher, Ph.D. Candidate ResearcherID: N-4316-2014 ORCID: 0000-0001-8316-8949</p> <p>Seitkazy M.M. - Junior Researcher, Master of Science, specialty “Cartography” ORCID: 0000-0002-3291-4152</p> <p>Turymtayev Zh.B. - Junior Researcher, Master of Science, speciality ‘Geography’</p>
List of publications with links to them	<p>Articles in journals recommended by CQASHE MSHE RK:</p> <p>1. <u>O.Zh. Taukebayev, K.B. Zulpykharov, A.A. Assylbekova, S.M. Duisenbayev, M.M. Seitkazy</u>. Technical condition of irrigation systems and its impact on the dynamics of irrigated lands (Talas district, Zhambyl region). Bulletin of KazNU. Geographical series. №2 (65) 2022 ISSN 1563-0234, eISSN 2663-0397 https://doi.org/10.26577/JGEM.2022.v65.i2.02, in Kazakh (published)</p> <p>2. <u>A.S. Nyssanbayeva, N.Abayev, S.M. Duisenbayev, A.A. Assylbekova, O.Zh. Taukebayev, K. Zulpykharov</u>. Dynamics of the main climatic indicators in monitoring the degradation and</p>

desertification processes of the land in Talas region of the Zhambyl region. Bulletin of Kyzylorda University named after Korkyt Ata. Soil science and agrochemistry. No. 3-1 (66), 2023 ISSN 2958-8367 <https://doi.org/10.52081/bkaku.2023.v66.i3.085>, in Russian ([published](#))

3. R.T. Bexeitova, L.K. Veselova, S.M. Duisenbayev, O.Zh. Taukebayev, A.A. Assylbekova, E.S. Sarybaev, N.E. Zhengissova, Geomorphological mapping of the territory of the Talas district of Zhambyl region. Scientific journal “Izdenister, natizheler – Research, results” of the Kazakh National Agrarian Research University. No. 2, 2024, in Russian ([published](#))

Articles in Scopus database journals:

1. Moldir Rakhimova, Kanat Zulpykharov, Aizhan Assylbekova, Zhengissova Nazym, and Omirzhan Taukebayev. The use of RUSLE and GCMs (CMIP6) to predict potential soil erosion associated with climate change in the Talas district, Kazakhstan. MDPI Sustainability. <https://doi.org/10.3390/su16020574> Q1 ([published](#))

2. Zhassulan Smanov, Salavat Duisenbayev, Omirzhan Taukebayev, Kanat Zulpykharov, Shakhislam Laiskhanov, Edil Sarybaev and Zhanarys Turymtaev The risk of soil salinization and its impact on the degradation of natural and agricultural landscapes of the Talas district, Kazakhstan. Soil and Water Research. Q2 ([submitted, status: review](#))

3. Moldir Seitkazy, Nail Beisekenov, Omirzhan Taukebayev, Kanat Zulpykhanov, Aigul Tokbergenova, Salavat Duisenbayev, Edil Sarybaev, Zhanarys Turymtayev Land Use and Land Cover Changes in the Talas District, Kazakhstan: 2000-2020. International Journal of Environment and Sustainable Development. Q1 ([accepted for publication](#))

4. Salavat Duisenbayev, Omirzhan Taukebayev, Geoffrey M. Henebry, Kanat Zulpykharov, Moldir Seitkazy, Aizhan Assylbekova, Shakhislam Laiskhanov, and Azamat Kaldybayev. Monitoring of Land Degradation and Desertification Processes: Temperate Dry-lands of Southern Kazakhstan. Arid Land Research & Management. Q2 ([prepared](#))

Approbation of the obtained research results: information about participation in international scientific-practical conferences, seminars, round tables:

1. Seminar on ‘Land Cover and Land Use Changes in the Talas District: 2000-2020’. Speaker: M.M. Seitkazy, 10 October 2023, School of Civil, Environmental and Land Management Engineering, Politecnico di Milano, Milan, Italy ([report](#))

2. Scientific seminar at the Faculty of Geography and Environmental Sciences on the theme: ‘Desertification processes in the context of climate change’ under the project AP09058590 within the promotion of SDG 15 ‘Conservation of terrestrial ecosystems’. Speaker: Taukebayev O.Zh., 24 October 2023. ([report](#))

	<p>3. <u>Zulpykharov K.B., Taukebayev O.Zh., Duisenbaev S.M.</u> Dynamics of changes in natural tugai communities in the delta and pre-delta parts of the Talas River. International scientific and practical conference “Geographical foundations of sustainable development”, which was held on November 23-24, 2023, in Kazakh. (published, report)</p> <p>4. Duisenbayev S.M., Assylbekova A.A., Taukebayev O.Zh., Zulpykharov K.B., <u>Zhengissova N.</u>, Modern methods for compiling differentiated maps of landscape units. First International Geographical Congress of the Turkic World., Speaker: Assylbekova A.A., Turkestan, April 18-20, 2024. (report)</p> <p>5. <u>Taukebayev O., Zulpykharov K., Duisenbayev S., Seitkazy M., Assylbekova A., Laiskhanov Sh., Kudaibergenov M., Turymtayev Zh., Rakhimova M., Zhengissova N.</u> Monitoring of land degradation and desertification processes in Talas district of Zhambyl region using GIS and RS data for sustainable land use. First International Geographical Congress of the Turkic World, Turkestan, April 18-20, 2024 (poster presentation)</p> <p>Collective monograph:</p> <p>1. <u>Taukebayev O.Zh., Duysenbayev S.M., Zulpykharov K.B., Seitkazy M.M., Assylbekova A.A., Laiskhanov Sh.U.</u> Landscapes of the Talas region of the Zhambyl region under the conditions of climate change. Results of research work. Publishing House "Kazakh University". Al-Farabi Kazakh National University, in Kazakh (in print)</p>
Patents	<p>1. Certificate of entry of information into the state register of rights to objects protected by copyright (object of copyright: photographic work). No. 28235 dated August 11, 2022 “Photos of the field expedition (summer, 2021)” / <u>Taukebayev O.Zh., Seitkazy M.M., Zulpykharov K.B., Duisenbayev S.M., Assylbekova A.A., Laiskhanov Sh.U.</u></p> <p>2. Certificate of entry of information into the state register of rights to objects protected by copyright (object of copyright: photographic work). “Photos of the field expedition (April, 2022)” / <u>Taukebayev O.Zh., Seitkazy M.M., Zulpykharov K.B., Duisenbayev S.M., Assylbekova A.A., Kudaibergenov M.K., Laiskhanov Sh. U.</u></p> <p>3. Certificate of entry of information into the state register of rights to objects protected by copyright (object of copyright: photographic work). “Photos of the field expedition (July, 2022)” / <u>Taukebayev O.Zh., Seitkazy M.M., Zulpykharov K.B., Duisenbayev S.M., Assylbekova A.A., Sarybaev E.S.</u></p> <p>4. Certificate of entry of information into the state register of rights to objects protected by copyright (object of copyright: maps related to geography, topography and other sciences). “Geomorphological map of the Talas district of Zhambyl region” / <u>Assylbekova A.A., Taukebayev O.Zh., Bexeitova R.T.</u></p> <p>5. Certificate of entry of information into the state register of rights to objects protected by copyright (object of copyright: maps related to geography, topography and other sciences). “Map of surface waters and irrigation systems of the</p>

	<p>Talas district of Zhambyl region” / <u>Taukebayev Zh.A.</u>, <u>Taukebayev O.Zh.</u>, <u>Assylbekova A.A.</u>, <u>Seitkazy M.M.</u>, <u>Laiskhanov Sh. U.</u></p> <p>6. Certificate of entry of information into the state register of rights to objects protected by copyright (object of copyright: maps related to geography, topography and other sciences). “Phytocenotic diversity and mapping of vegetation of the Talas district (Zhambyl region, Kazakhstan)” / <u>Taukebayev O.Zh.</u>, <u>Osmonali B.B.</u>, <u>Duisenbayev S.M.</u>, <u>Zhengissova N.E.</u>, <u>Zulpykharov K.B.</u></p>
<p>Act of implementation in the educational process</p>	<p>1. Discipline: Technology of digital maps creation. Speciality ‘6B07301 - Geodesy and Cartography’, 3rd year, Kazakh department, 2023-2024 academic year.</p> <p>2. Discipline: Geography of agricultural development. Speciality ‘6B05205 - Geography’, 3rd year, Kazakh Department, 2023-2024 academic year.</p>









