

Brief information about the project

Name of the project	A Comprehensive Environmental and Economic Assessment of Urban Lands for Sustainable Land Use (Using the Almaty Metropolitan Area as a Case Study)
Relevance	The relevance of this study stems from the intensification of urbanization processes in the Almaty metropolitan area, which leads to inefficient land use, environmental degradation, and an increase in anthropogenic pressure. Existing approaches do not sufficiently account for the complex interplay of environmental, economic, and social factors, which necessitates the development of an integrated environmental-economic assessment to ensure sustainable land use.
Purpose	The aim of this study is to conduct a comprehensive ecological and economic assessment of urban lands in the Almaty metropolitan area and to develop a practice-oriented model for rational urban land use to ensure the sustainable development of the urban environment.
Objectives	Task 1 (2025). Analysis of methodological approaches to the ecological and economic assessment of urban land, and the creation of an information and analytical database on land use and environmental indicators for the city of Almaty and its surrounding areas. A detailed review of methodological approaches used in previous studies on the ecological and economic assessment of urban lands and the sustainable development of urban and adjacent areas. Collection and systematization of data on current land use, the ecological condition of land, and socio-economic indicators. Analysis of data on air and water pollution, soil condition, demographic and economic indicators, and infrastructure in the study area. Task 2 (2026). Analysis of environmental, economic, and social factors influencing sustainable land use and the development of assessment and application maps of sustainable land use for effective land resource management Identification of key environmental and socio-economic indicators influencing the sustainability of land use in the Almaty metropolitan area. Identification of areas with high levels of anthropogenic impact, including areas with high population density, transportation hubs, and industrial facilities. Analysis of the impact of transportation infrastructure on the sustainability of land use and development of models to determine optimal functional zoning of urban areas. Development of assessment and application maps for sustainable land use, including ecological maps, maps of green areas and heat islands, maps of transportation and social infrastructure, as well as functional zoning maps. Task 3 (2027). Based on an assessment of environmental and economic risks, conduct zoning for sustainable land

	use in urban areas, and develop cartographic models and recommendations for land use management in the Almaty metropolitan area Determine the cadastral value of land in the agglomeration, taking into account environmental factors, land quality, and market value for land valuation zoning. Comprehensive environmental and economic assessment to identify key risks associated with the irrational use of land resources. Development of a sustainable land use model that optimizes the balance between environmental safety, economic efficiency, and social sustainability. Land-use zoning of the Almaty metropolitan area based on a comprehensive environmental and economic assessment of land for sustainable urban land use. Development of recommendations for sustainable land-use management in the metropolitan area.
Expected and achieved results	2025 – A review was conducted of methodological approaches to the environmental and economic assessment of urban and suburban lands and the sustainable development of territories. An information and analytical database on the Almaty agglomeration was created, including data on land use, environmental conditions, and socioeconomic indicators. Cadastral data and indicators of air, water, and soil pollution were systematized. An analysis of the agglomeration's demographic and economic indicators and infrastructure was conducted. 2026 – An analysis will be conducted of the environmental, economic, and social factors affecting sustainable land use in the Almaty agglomeration, using statistical data and Earth remote sensing (ERS) data. Key environmental and socio-economic indicators affecting the sustainability of land use will be identified, including air pollution, soil condition, water quality, and demographic and economic characteristics. Models will be developed to determine optimal functional zoning of urban areas. Assessment and application maps of sustainable land use will be created, including environmental maps, maps of green areas and heat islands, maps of transportation and social infrastructure, as well as functional zoning maps. 2027 – A comprehensive environmental and economic assessment of the land in the Almaty metropolitan area will be conducted to identify key risks associated with the unsustainable use of land resources. The cadastral value of the agglomeration's land will be determined, taking into account environmental characteristics, land quality, and market value for land valuation zoning. A sustainable land use model will be developed to optimize the balance between environmental safety, economic efficiency, and social sustainability of the agglomeration. Land valuation zoning of the Almaty agglomeration will be carried out based on a comprehensive ecological and economic assessment of land for sustainable urban land use. Practical recommendations will be developed for the sustainable

	management of land use in the agglomeration, aimed at reducing the risks of irrational land use, improving the environmental condition, and increasing the efficiency of economic activity.
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