

ADVANCING CLIMATE EDUCATION IN UKRAINE THROUGH THE EU ERASMUS+ PROJECT: “MULTILEVEL LOCAL, NATIONAL, AND REGIONAL TRAINING IN CLIMATE SERVICES, ADAPTATION, AND MITIGATION (CLIMED)”

Inna Khomenko¹, Valeriya Ovcharuk¹, Hanna K. Lappalainen², Svyatoslav Tyuryakov^{2,3}, Alexander Mahura², Enric Aguilar^{4,5}, Jon Xavier Olano Pozo^{4,5}

¹Odesa I.I. Mechnikov National University, Odesa, Ukraine

²University of Helsinki, Institute for Atmospheric and Earth System Research, Helsinki, Finland

³Finnish Meteorological Institute, Helsinki, Finland

⁴Institut Universitari de Recerca en Sostenibilitat, Canvi Climàtic i Transició Energètica (IU-RESCAT), Universitat Rovira i Virgili, Tarragona, Spain

⁵Centre for Climate Change, C3, Geography Departament, Universitat Rovira i Virgili, Spain

Recent decades have witnessed unprecedented climate changes, posing significant threats to human well-being, ecosystems, and socio-economic stability. The increasing frequency and intensity of extreme weather events, rising sea levels, ecosystem degradation, and biodiversity loss – compounded by population growth, migration, and inadequate land use – have amplified societal vulnerability. International frameworks, including the UN Framework Convention on Climate Change, the Global Framework for Climate Services, and the European Parliament Resolution on Climate and Environment Emergency [1], underscore the urgent need for climate services to support informed decision-making and sustainable development.

In Ukraine, the development of climate services and related education has historically lagged due to political, economic, and structural factors, including the legacy of the Soviet educational system and limited funding for long-term strategic initiatives. To address these gaps, the EU Erasmus+ project “Multilevel Local,

National, and Regional Education and Training in Climate Services, Climate Change Adaptation and Mitigation – ClimEd” (619285-EPP-1-2020-1-FI-EPPKA2-CBHE-JP, <http://climed.network/>) has been implemented since 2020. The project is led by an international consortium comprising the University of Helsinki (Grant Coordinator), the University of Rovira i Virgili (Spain), the Estonian University of Life Sciences, six Ukrainian universities – Odesa I.I. Mechnikov National University (National Project Coordinator), Kyiv National University of Construction and Architecture, O.M. Beketov National University of Urban Economy in Kharkiv, Lviv Polytechnic National University, Bila Tserkva National Agrarian University, and Odessa National Medical University – and two ministries: the Ministry of Education and Science of Ukraine and the Ministry of Energy and Environmental Protection of Ukraine (which merged with the Ministry of Economy on 17 July 2025).

The project aims to establish a competence-based climate education system, offering Master’s and PhD programs, professional retraining, and advanced training for specialists in climate services and climate-dependent sectors. Core courses focus on climate risk assessment, adaptation strategies, and the economics of climate change, addressing the specific needs of sectors such as agriculture, energy, water management, healthcare, construction, municipal services, and environmental protection.

The project emphasizes an educational system grounded in direct interaction with diverse categories of climate information users, including stakeholders, industry representatives, universities, public organizations, and professional associations involved in decision-making. This approach fosters university autonomy and decentralization, enabling the development of curricula and courses tailored to labor market needs, while aligning with the principles and tools of the Bologna Process, such as closer cooperation between universities and businesses.

Special attention is also given to vocational education and training. Vocational courses for representatives of the Ukrainian Hydrometeorology Service and experts in climate-dependent economic sectors are being developed in line with the Bologna Process principle of preparing people for work and equipping citizens with skills to remain employable and responsive to evolving economic needs.

One of the key project objectives was to define a competency framework for climate services aligned with national and international standards, tailored to the needs of both providers of climate information and end-users in climate-dependent sectors. Seven sectors—healthcare, municipal services, water management, energy, agriculture, construction, and architecture—were studied through 297 interviews. The results were further refined through international transdisciplinary discussion panels, the International Scientific-Practical Conference “Climate Services: Science and Education” (<http://climateservices.odetu.edu.ua/>), and the Second All-Ukrainian Hydrometeorological Congress, ensuring alignment with both international and national standards. Interviews with 48 representatives of the Hydrometeorological Service of Ukraine, along with discussions with heads of regional Hydrometeorological Centers, provided additional guidance for developing the

competency framework in climate services and assessing the need for modernization of the National Meteorological Service.

As a result of identifying the learning needs of climate information providers and end-users, the Guidelines "On the Development of the Concept for the Development of Climate Services in Ukraine" were developed.

Within the project, seven training sessions were dedicated to enhancing the practical skills of university teaching staff in climate data processing, climate services application, and modern educational technologies, including blended learning and MOOCs.

The Guidelines for Developing Training Materials were created to provide a structured framework for competence-based climate education. They define principles of material creation, delivery modes, and learning strategies, and offer guidance on syllabus design, assessment methods, and the integration of modern tools such as blended learning and AI. The annexes include sample syllabi, storyboards, and competency frameworks for Master's and PhD programs, ensuring accessible, practice-oriented, and high-quality training in climate services.

Since January 2025, courses for PhD and Master programs in Climate Services, as well as a Master program in the field of Climate Change Adaptation and Mitigation, have been developed.

The PhD in Climate Services program focuses on advanced research and application in climate services, covering topics such as dataset management, climate product derivation, forecasting models, climate change impacts on sustainable development in Ukraine, climate policy, Earth system dynamics, communication strategies for climate adaptation, and pathways to sustainability under climate change.

The Master in Climate Services program provides a comprehensive understanding of global climate dynamics and modeling, climate data and products, climate risk assessment, gender and vulnerability considerations, communication skills, climate policy, and mitigation and adaptation strategies tailored to various sectors in Ukraine.

The Master in Climate Change Adaptation and Mitigation program emphasizes foundational climate science, projections and scenarios, risk and vulnerability assessments, climate change communication, law and international agreements, sector-specific case studies in mitigation and adaptation, and the economics of climate change, integrating practical examples and best practices.

In April 2025, the Second International Scientific-Practical Conference "Climate Services: Science and Education" (<https://cs2025.onu.edu.ua/>) was conducted, facilitating knowledge exchange and dissemination of project results.

Since 1 September 2025, these courses have been made available via the Moodle platform (<https://re.climed.network>), providing structured, interdisciplinary education for PhD and Master students in climate science in Ukraine. Blended and online courses enable collaborative, networked teaching across universities and platforms, ensuring accessibility, quality, and sustainability.

A multi-level quality control system and an Advisory Board, comprising local, national, and international stakeholders, oversee continuous monitoring and adaptation.

ClimEd strengthens Ukraine's climate services infrastructure, raises public awareness, supports informed policy-making, and promotes sustainable socio-economic development both nationally and across Europe. The relevance of the project has been further heightened due to the Russian aggression, which has caused irreparable damage to ecosystems and exacerbated the negative effects of climate change. These circumstances make the project particularly pertinent and necessitate rapid implementation. By addressing the needs of wartime conditions alongside ongoing climate change challenges, the project supports stabilization of the socio-economic situation in Ukraine. Moreover, successful implementation of this project will provide a replicable model for establishing climate service systems in other countries.

References:

1. European Parliament. *Resolution on the climate and environment emergency* (Resolution no. 2019/2930(RSP). (2019, November 28).