

INTERNATIONAL CARPATHIAN SCHOOL IN KOSIV: EXPERIENCE
OF IMPLEMENTATION AND PERSPECTIVES OF DEVELOPMENT

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<https://doi.org/10.23939/ep2023.03.142>

Received: 17.07.2023

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Abstract. The International Carpathian School is an educational project aimed at disseminating the Sustainable Development concept among local communities in Ukrainian Carpathians. Currently, the School combines the educational resources of 30 universities, including six foreign ones from the Baltic region and Georgia. The School curricula highlight issues of climate change, biodiversity conservation, municipal waste management and tourism business. Partner universities of the Baltic Sea Region are sharing their best experience in overcoming their post-Soviet heritage. In the midst of a pandemic disaster and large-scale war, the School focuses on informal and vocational education in hybrid online and in-person format within the framework of the “third” mission of universities. The mixed form of education provides a deeper understanding of the Sustainable Development Goals of Ukraine-2030 and the achievement of goals defined by Goal 4 “Quality education” and Goal 11 “Sustainable development of cities and communities”. The combination of formal, informal and vocational education is on the agenda of the development of the Carpathian region and should be strengthened in the next program activities of the School. The relevance of educational activities and professional development of educators and local authorities is one of the key tasks that have been announced by the Cabinet of Ministers of Ukraine as one of the radical Ukrainian reforms. In view of this, the follow-up School activities are planned for training educators and local government specialists in the restoration of war-ravaged cities and infrastructure facilities, the revival of polluted

lands, and the introduction of energy-saving and resource-saving technologies based on the circular economy.

Keywords: Carpathian School, universities, Sustainable Development Goals, mountain region, non-formal education, trans-border environmental cooperation.

1. Introduction

Ukraine's independence in 1991 opened up a wide field for the development of statehood and outlined a number of promising directions for cooperation with EU countries. Among them is the International Agreement on the Protection and Sustainable Development of the Carpathians (Carpathian Convention), which aims to unite the efforts of the countries in the Carpathian region for the protection and sustainable development of the Carpathians. This agreement was initiated and signed in Kyiv during the 5th Meeting of environment ministers of the Environment for Europe process in 2003. However, the orientation towards the EU was hindered by opposition political forces, which eventually led to acts of civil disobedience and two Maidans in 2004 and 2014. The current stage of Ukraine's final departure from colonial dependence

reveals new opportunities for educating a new generation of Ukrainians on the principles of democracy and sustainable development. In this context, the Carpathian region presents a unique opportunity to integrate with the European space. The Carpathian region faces various shared challenges in the environmental, transport, economic, cultural, educational, and social spheres, which requires the development of cross-border and interregional cooperation.

With the signing of the Association Agreement with the EU, Ukraine is working on aligning its environmental policies with those of the EU countries.

It is understood that the ambitious Sustainable Development Goals of Ukraine (SDG in Ukraine) need to be supported by the appropriate human resources (Environmental Portrait, 2018; Khymynets, 2013). The Carpathian School is an educational project established in 2011 in the Kosiv community of the Ivano-Frankivsk region. The idea was initiated by representatives of local public associations, including members of the regional charitable organization “Centre of Public Initiatives,” and teachers from educational institutions in Kosiv district of the Ivano-Frankivsk region (Fig. 1).



Fig. 1. Circle of participants of the first thematic Carpathian school (July 2011, Kosiv)

Geographically, the School is located in a symbolic and iconic place – the Pokutsko-Bukovyna Carpathians, which is the northern branch of the alpine structures of the European Mediterranean with a rich historical and cultural heritage. Kosivshchyna serves as the administrative, commercial, cultural, artistic, and recreational center of Hutsulshchyna, a region that remained relatively unknown during Soviet times. It is a picturesque region of untouched nature, characterized by authentic wooden folk architecture and a vibrant atmosphere. The School's traditional seasonal sessions, held in the small resort town of Kosiv, reflect the four seasons.

The School's favorable geographical location in the heart of the Ukrainian Carpathians makes it an

attractive place for implementing educational programs and gaining practical experience for students specializing in “trans-border environmental cooperation,” “natural geography,” “geography of recreation and tourism” and “political geography and geopolitics” at the Faculty of Geography of Taras Shevchenko National University of Kyiv. The organizers have set themselves the noble goal of highlighting the ethnographic and cultural features of the Hutsul region, supporting the culture and traditions of the ethnic communities in the Ukrainian Carpathians, and promoting the expansion of formal and informal educational activities to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (SDG, Goal 4). These objectives are directly related to the

goals of Education for Sustainable Development (UNESCO, 2017), which leading universities have put on their agenda.

The Carpathian region presents a unique opportunity to leverage the potential of traditional geographical sciences, tap into the knowledge of local communities, and foster cross-border cooperation with neighboring countries. The implementation of such approaches is outlined in the Strategy of the Framework Convention on the Protection and Sustainable Development of the Carpathians (Strategy, 2007) and the accompanying documents (Carpathian Convention, 2007). The utilization of natural resources, socio-economic challenges, and the development of vulnerable mountainous regions are key topics within the educational disciplines for bachelor's and master's degrees in geography at the Faculty of Geography of KNU. This is why the department has conceived the idea of integrating formal educational programs for training specialists with the informal activities of the Carpathian School and drawing upon the experience of cross-border cooperation demonstrated by the countries of the Baltic region. Since 2012, the department has already gained experience in collaborating with Lithuanian colleagues through the international project acronym SWC-Env-Ind, JRP/IP: IZ73Z0_128178/1 (2009–2013).

According to the organizers' plan, cross-border cooperation will facilitate the establishment of a system for training, retraining, and advanced education of professionals engaged in providing environmental services to local communities. Such cooperation has been initiated during the winter sessions of the Carpathian School since 2017. The initial phase of the school's activities received support from the Center for Community Initiatives in the Kosiv region, as well as from students and teachers of Taras Shevchenko National University of Kyiv, Kosiv Institute of Applied and Decorative Arts, Ukraine, and teachers from Kaunas University of Technology, Lithuania.

Further development of the educational project revealed its weaknesses and strengths. For the organizers, embracing the concept of the “third” mission of universities – the support of scientists in meeting the societal demand for educational and developmental activities in urban communities – proved to be promising. This enabled them to gain support from student audiences and enhance the educational component of the project without relying on additional financial resources. Leveraging internal and external academic mobility within the university's structure

became a powerful asset. This approach has been successful in many European countries and is recognized as the “third” mission of universities, aiming to move scientists beyond the confines of “pure” academia and communicate the conceptual principles of long-term “sustainable” development to local communities.

In essence, this project supports academic circles in fostering democratic foundations in post-Soviet Ukraine, employing a strategy that starts from the bottom up and complements state-led education sector reform initiatives. Reforms are most effective when there is grassroots support. This understanding is well-embraced by leading higher education institutions, which have entered the international market of educational services and now face the challenge of survival amidst intense competition for student enrollment. During the relatively short period of its existence, the Carpathian School has gained recognition among teachers and researchers from both natural and social sciences disciplines at various types of higher education institutions. The driving force behind this recognition has been the alignment with Ukraine's Sustainable Development Goals for 2030, particularly Task 4.3 and 4.4 of SDG-4, Tasks 11.5 and 11.6 of TSR-11, as well as Goals 17, Tasks 17.6, and 17.7 (SDG in Ukraine).

2. Results and Discussion

2.1. Education and regional development

The directions of work and educational activities of the Carpathian School are diverse. The organizers take care of a rich, diverse program that allows taking into account the interests of the participants, making their suggestions and conducting presentations of creative work (Antonovych et al., 2014, 2018; Blyzniuk, 2017). Annual thematic sessions reveal the themes of ethnographic design, energy conservation and environmental protection. As part of the school, open lectures, round tables, master classes, ethnographic excursions, educational trips and meetings with masters of folk art of the Hutsul region are held. The participants get acquainted with the achievements of the folk masters of Kosiv, Verkhovyna, Kosmach, Yavorov, Kolomyia and Vyzhnytsia (Fig. 2).

Schoolchildren and students acquire moral and ethical values of local communities through excursions to National Natural Parks (NPPs), participation in folk arts and crafts workshops, visits to exhibitions showcasing

national cultural heritage, as well as visits to temples representing prominent religious denominations.

The initial steps in implementing international educational programs for high school students and teachers from local communities took place under the auspices of the Regional Environmental Center for Central and Eastern Europe (REC Sentendre, Hungary) in 2017–2018. These activities were carried out within the framework of two international technical assistance projects: “Local Initiatives for Sustainable Development in Ukraine” and “Local Action Plans in the Field of Environment and Energy,” with the support of the Ministry of Foreign Affairs of Norway. The initiatives

included the introduction of two multimedia educational platforms, “Step by Step” and an updated version of the “Green Package,” targeting junior and senior schoolchildren (Mykhaylenko et al., 2021).

The content of the training manuals was adapted to the Ukrainian audience and involved providing teachers with methodological materials that clarified the multi-disciplinary approach to teaching topics such as climate change, conservation of natural resources, ocean protection, waste management, etc. Experts from the International Organization “Green Dossier” in Ukraine assisted in conducting practical sessions with teachers on household waste management (Fig. 3).



Fig. 2. Carpathian Summer School of Ethnodesign (July 2018, Kosiv)



Fig. 3. Enhancing the qualifications of teachers at the Lyceum named after Ihor Pelypeiko, Kosiv, (LINK project, 2018)

The idea of implementing comprehensive environmental education, which involved engaging with the main social groups in the population, emerged during discussions on opportunities and prospects for further development. The discussion led to the development of a shared vision for integrating formal and informal education for young people and their teachers in the fields of nature management, preservation of mountain landscapes, waste management, and tourism development in the region. This decision matured through the collaboration of Ukrainian specialists with colleagues from Lithuania and Sweden, recognized as leading experts in resource recovery and the implementation of a circular economy in their respective countries.

Studying nature conservation sites is a typical component of educational programs at the Faculty of Geography of KNU, one of the co-organizers of the Carpathian School's winter session. Activities and events held in protected natural areas play a vital role in developing students' cognitive abilities. They are an integral part of the unified plan for nature conservation education and serve as the foundation for acquiring competencies in future geocologists. Therefore, cooperation with National Natural Parks as part of the nature reserve system plays a leading role in the environmental education of students. It is based on the study of local history materials, unique landscape features, and rare biotic components.

2.2. From a volunteer project to the “third” mission of universities

Education for sustainable development is a relatively new field of knowledge, skills, and abilities that is gradually making its way into the public space of Ukraine. Its essence, which involves the collaboration of authorities, businesses, and communities, faces significant barriers due to the complexity of explaining intricate systems. Formal education does not always adequately address these challenges, while informal education, which offers alternative forms and content of learning, helps local communities adapt to the challenges of globalization and societal transformations.

The concept of non-formal education is innovative within Ukrainian scientific thought, having been introduced to us through English-language literature as a result of testing and validating the

effectiveness of non-formal education in creating conditions for socioeconomic development and improving the socio-psychological well-being of specific population groups. Numerous publications, including those by researchers from the Institute of Geography of the National Academy of Sciences of Ukraine, highlight that national higher education institutions do not fully meet the public demand for the formation of competent professionals in the field of environmental protection (Rudenko et al., 2018; Oliynyk, 2016). While these institutions provide knowledge, they often fall short in imparting the necessary competencies, skills, and appropriate social behavior to recent graduates.

The main objective of the International Carpathian School is to foster thinking focused on a sustainable future (Mykhaylenko, Blyzniuk, 2022). Given that the 17 SDGs are interconnected, geographical sciences receive special attention during the winter sessions. Specifically, Goal 4, “Quality Education,” intersects with goals traditionally researched within geographical sciences. This includes Goal 6, “Clean Water and Sanitation”; Goal 7, “Affordable and Clean Energy”; Goal 13, “Climate Action”; Goal 14, “Life Below Water”; Goal 15, “Life on Land”; and Goal 11, “Sustainable Cities and Communities” (SDG in Ukraine).

Goal 17, “Partnerships for the Goals,” becomes especially significant for Ukraine in the context of the current martial law conditions, as it pertains to the restoration of infrastructure facilities damaged by Russia. Throughout the learning process, students should grasp the subject area of their future professional activities, comprehend Ukraine's role and position in the modern world, and understand and explain the strategies of sustainable development using examples of cross-border cooperation.

The Carpathian School introduces a new type of educational technology that can be classified as a scientific and educational cluster, with universities at its core (Piatnytska, 2016). The cluster model has the potential to overcome administrative barriers, incorporate public input, and facilitate the practical implementation and dissemination of innovations. The global experience of many countries, particularly those undergoing transition phases of development, demonstrates the effectiveness and regularity of the emergence of such models in education. Within the Ukrainian context, universities are most suitable for the role of educational clusters, transforming into research sites and scientific-

practical centers that are open to innovations and new educational technologies (Nytka, 2021).

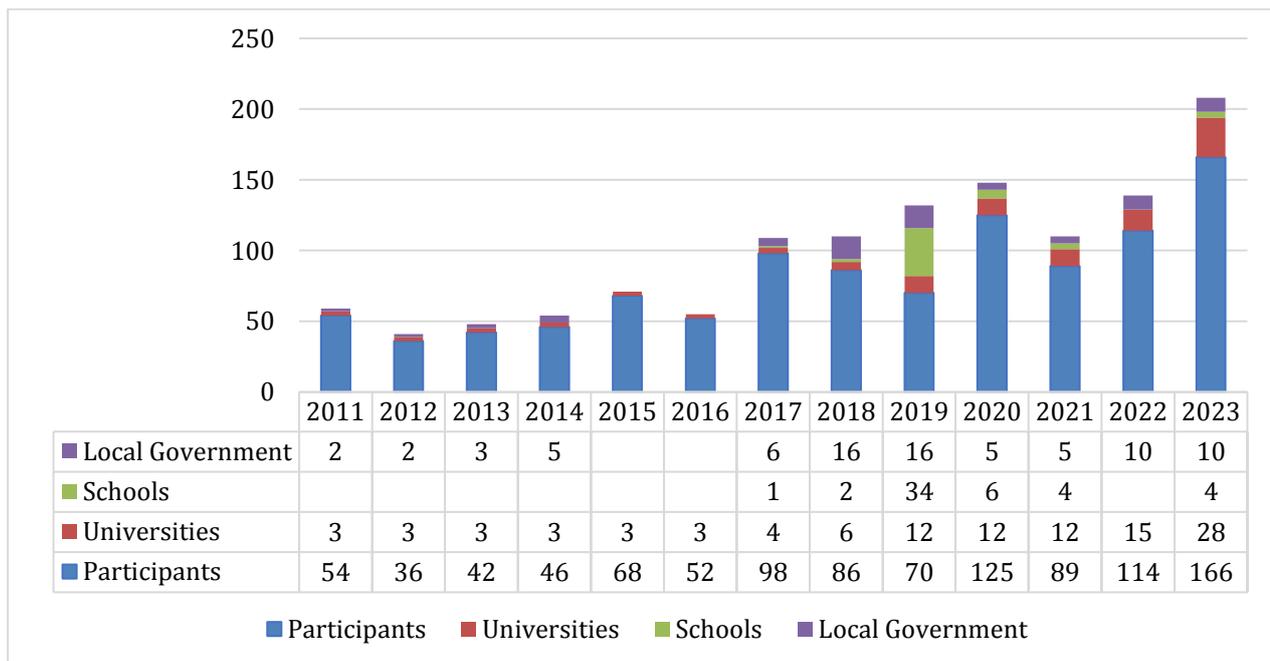
The global experience of developed and transitioning countries consistently proves the effectiveness of cluster models in education. The stages of forming the educational cluster of the Carpathian School are presented in Histogram 1. The example of the Carpathian School highlights the appeal of the cluster model in strengthening interdisciplinary parameters and consolidating the efforts of stakeholders in addressing complex issues. The educational cluster is a promising model for establishing a system for training, retraining, and advanced education of professionals, technology transfer, and the creation of a unified system for managing sustainable territories (Ukaz, 2019). An important aspect of the cluster approach is international cooperation in the field of education, enriching our country with experiences in forming educational clusters as part of the national personnel policies. An additional advantage of the cluster model is the opportunity to develop platforms for practical training and knowledge transfer, as well as to validate the results of scientific research in a professional context.

The Carpathian School currently combines the educational resources of 30 universities, including 24 Ukrainian universities and six universities from the Baltic countries and Georgia. Nine national universities are listed in the Top-10 rankings of classical, technical,

and pedagogical institutions. Five NPPs participate in the School’s activities as partners. The social component of interested parties is supplemented by All-Ukrainian and international public organizations (Table 1).

The real achievements of the School are the continuation of the academic career of graduates of the universities of Ukraine and Georgia in the partner educational institutions of Lithuania (Fig. 4). Graduates gain practical experience at research sites and laboratories in Sweden and Estonia, take an active part in international projects with the assistance of the Swedish Institute. The number of joint scientific reports at international conferences and publications in international professional journals tends to increase. Scientific reports published in the sections of the Carpathian School are recommended for publication in professional domestic and international journals.

The primary task of the School is to introduce graduate and undergraduate students to local decision-makers, potential employers and practitioners, as well as civic environmental organizations. The goals are realized at plenary and sectional meetings, reports of key experts, seminars, exhibitions, visits and excursions. Information about events is also shared through social media, where participants from different countries, different regions and different sectors can learn from each other.



Histogram 1. The dynamic of Carpathian School target audiences grow

Educational cluster of the International Carpathian School (2022–2023)

| | Universities of Ukraine | | Foreign universities |
|----|--|---|---|
| 1 | Taras Shevchenko National University of Kyiv* | 1 | Akakia Tsereteli State University, Kutaisi, Georgia (since 2018) |
| 2 | Yury Fedkovich Chernivtsi National University* | 2 | Yerevan State University, Armenia (since 2019) |
| 3 | National University of Kyiv-Mohyla Academy* | 3 | Estonian University of Life Sciences, Tartu, Estonia (since 2014) |
| 4 | Lviv Polytechnic National University** | 4 | Linnaean University, Kalmar, Sweden (since 2019) |
| 5 | National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”*** | 5 | Kaunas University of Technology, Kaunas, Lithuania (since 2016) |
| 6 | National Technical University Kharkiv Polytechnic University** | 6 | Eurac Research Institute for Regional Development, Italy (since 2023) |
| 7 | Odessa National Technological University** | | National natural parks (NNP) |
| 8 | Ivano-Frankivsk National Technical University of Oil and Gas** | 1 | NPP “Hutsulshchyna”, Kosiv, Ivano-Frankivsk region. (cooperation since 2019) |
| 9 | Poltava V.G. Korolenko National Pedagogical University*** | 2 | NPP “Vyzhnytskyi”, Vyzhnytsia, Chernivtsi region, Ukraine (since 2019) |
| 10 | State University of Infrastructure and Technologies, Kyiv | 3 | Carpathian National Nature Park, Ivano-Frankivsk region (since 2020) |
| 11 | Bukovinian State Medical University, Chernivtsi | 4 | Verkhovyna National Nature Park, Ivano-Frankivsk region (since 2023) |
| 12 | Lviv Forestry University of Ukraine | 6 | Carpathian Biosphere Reserve |
| 13 | Vinnitsia National Technical University | 7 | State historical and cultural reserve Takhtemiriv |
| 14 | Kyiv University of Law | | Secondary Schools |
| 15 | Institute of Geological Sciences of the NASU, Kyiv | 1 | Kosiv Lyceum named after Ihor Pelypeiko |
| 16 | Zhytomyr Ivan Franko State University | 2 | Small Academy of Sciences of Ukraine (MAN) |
| 17 | Ivan Bobersky Lviv State University of Physical Culture, Lviv | 3 | NVK" International Lyceum MAUP, Kyiv |
| 18 | Beketov National University of Urban Economy in Kharkiv | | Civil Society Organizations (CSO) |
| 19 | Polissia National University, Zhytomyr | 1 | ICO Information Center “Green Dossier” (since 2012) |
| 20 | Institute of Telecommunications and Global Information Space of the NAS of Ukraine, Kyiv | 2 | Regional Environmental Center for Central and Eastern Europe (REC Sentendre, Hungary) (2017–2019) |
| 21 | Lviv National Agrarian University | 3 | National Ecological Center of Ukraine (NECU), Kyiv (since 2019) |
| 22 | Central Ukrainian National Technical University | 4 | MBO “Ecology-Law-Human”, Lviv |
| 23 | King Danylo University | 5 | All-Ukrainian Environmental League (VEL), Kyiv |
| 24 | Institute of Public Administration and Research in Civil Protection, Kyiv | 6 | GS “Association of Environmental Professionals” |
| | Local authorities | 7 | MAMA-86, Yaremche branch |
| 1 | Ivano-Frankivsk State Administration | | Business institutions: |
| 2 | Chernivtsi Regional State Administration Department of Ecology and Natural Resources | 1 | Dumpster Rentals Depot, Vancouver, Canada (since 2018) |
| 3 | Office of the Prosecutor General of Ukraine | 2 | NEC “Ukrenergo” (since 2020) |

TOP-10 universities of Ukraine classic*, polytechnic** and pedagogic***. Source: <https://www.4icu.org/ua/>



Fig. 4. Professor Gintaras Denafas (third from left) with participants of Kaunas University of Technology, Lithuania. (Kosiv, February 2020)

The global trend of reforming universities, the so-called “third” mission includes the concept of providing educational services for the socialization of higher education. Organizers of the School – teachers of higher education institutions – the prospect of strengthening the ecological component of sustainable development with the tools of constructive geography and ecologically oriented technologies. This thesis is consistent with the concept of ESD announced at the Eighth Meeting of European Ministers on Environmental Protection “Environment for Europe” (Mykhaylenko et al., 2021).

Consistency of interests of different social groups – cluster approach – the basis of sustainable development of territorial communities. The Carpathian School helped combine the resources of universities, which are carriers of multidisciplinary knowledge,

with the activities of leading civil society organizations and employees of local self-government bodies to form competencies and skills, the social behaviour of university graduates (Table 1). The school aimed at strengthening the labour market with qualified personnel capable of meeting the community's demand for cooperation with employees of local self-government bodies, representatives of small businesses, and environmental specialists. It ensures the development of competencies of high school students, bachelors, masters and postgraduates – future specialists and young specialists. Training activities are also aimed at building key practitioners' skills in the green economy, resource conservation, waste management and landscape restoration.

A team of university professors conveying to the participants the basics of the concept of sustainable

development, showing the role of education and enlightenment for the main social groups, including student youth, high school students and their teachers and mentors. An additional advantage of the educational cluster is the involvement of practitioners and representatives of public organizations in cooperation. Our partners also are employees of National Natural Parks, All-Ukrainian and international environmental organizations, who ensure a high level of environmental literacy in local communities by virtue of their statutory activities.

The tangible achievements of the Carpathian School include the continuation of academic careers for graduates of Ukrainian and Georgian universities in partner educational institutions in Lithuania. Graduates gain practical experience at research sites and laboratories in Sweden and Estonia, actively participate in international projects with the support of the Swedish Institute. As a result, graduates from Ukrainian universities have established a tradition of pursuing a Doctor of Philosophy degree at Kaunas University of Technology and Lithuanian Energy Institute, Kaunas, Lithuania. The number of joint scientific reports presented at international conferences and publications in international professional journals is steadily increasing. Scientific reports presented at the Carpathian School's sessions are recommended for publication in domestic and international professional journals.

One of the main objectives of the School is to connect graduate and undergraduate students with local decision-makers, potential employers, practitioners, and environmental organizations. These goals are achieved through plenary and sectional meetings, presentations by key experts, seminars, exhibitions, visits, and excursions. Information about the events is also shared through social media platforms, facilitating knowledge exchange among participants from different countries, regions, and sectors.

The Carpathian School has facilitated the consolidation of university resources, which are carriers of multidisciplinary knowledge, with the activities of prominent civil society organizations and employees of local self-government bodies. This convergence has led to the development of competencies, skills, and social behavior of university graduates (Table 1). The alignment of interests among different social groups, based on the cluster approach, forms the foundation for the sustainable development of territorial communities. The School strives to reinforce the labor market with qualified personnel capable of

meeting the community's demand for collaboration with local self-government employees, representatives of small businesses, and environmental specialists. It aims to develop the competencies of high school students, bachelor's and master's degree students, and postgraduates who are the future specialists and young professionals. The training activities also focus on building essential skills for practitioners in areas such as green economy, resource conservation, waste management, and landscape restoration.

2.2.1. Thematic Dimensions

The Agenda of the International Carpathian School 2023 aims at fostering a deep understanding of the current state of the world, the development of geo-ecological thinking, and the acquisition of competencies to address complex issues related to environmental degradation. The program modules focused on developing a systemic perception of climate change mitigation, conservation of natural resources, biodiversity loss, water scarcity, and spreading waste and chemicals. Educational materials provide insights into the rational use of natural resources, drinking water, forest resources, waste management, and the hazards associated with waste disposal and the circulation of toxic compounds. The School encompasses various related disciplines related to human production and the relationship with nature. It emphasizes the complex problems of modern times and the ecological dangers associated with increasing anthropogenic pressures on the natural environment, particularly in vulnerable mountain regions. An important aspect of the School's work is the preservation of cultural and historical values, the protection of ethnic minorities, and the enhancement of the Carpathian region's attractiveness for tourism and recreation.

The functional block of the program aims to develop competencies such as the application of basic knowledge in natural sciences, independent research skills, analysis of elements of state environmental policy to address global environmental problems, public participation in decision-making processes, best practices for mitigating anthropogenic pressures on nature and approaches to achieving the Sustainable Development Goals in Ukraine. The program includes full-time and part-time learning, utilizing the resources of universities and public organizations for distance learning, the completion of technical assignments, and holding additional thematic sessions at the final stage, culminating in the issuance of Certificates of accomplishment (Fig. 5).



Fig. 5. Graduates of the Carpathian School 2019 (Kosiv)

2.2. Target Audience

The target audience of the Carpathian School includes students and postgraduates specializing in natural geography, earth sciences, international tourism and engineering ecology. It also encompasses employees of local communities and authorities, as well as civil servants involved in providing and supporting educational services in the field of sustainable development. Additionally, individuals practising in the conservation of natural resources and technologies for the reclamation of anthropogenically altered landscapes are also part of the target audience.

At its current stage, the Carpathian School serves as a diverse cluster involving national universities, CSO, NPP and practitioners. The international component of the project provided in English involves the participation of partner universities and civil society organizations from the EU, CEE, and Caucasus (Central Asia) countries. We do observe the participation of Chinese students within the two last years which sounds very optimistic. The organizing committee relies on a strong scientific potential, with experts actively engaged in research on natural resource conservation, circular economy, and the development of environmentally friendly technologies. The Baltic countries, which were formerly part of the USSR but have successfully adapted to the EU conditions, are ready to share their experiences in their respective professional fields.

2.3. International Cooperation

The Carpathian School serves as a convenient platform for discussing problematic issues with

international partners. Participants highlight the advantages of environmental cooperation for Ukraine and the Baltic countries at both the international and local levels. Scientific and technical cooperation focuses on the exchange of scientific and technical information and the joint implementation of environmental protection technologies. Examples of donor aid that Ukraine has received from Lithuania, Sweden, and Estonia are provided. In light of this, environmental cooperation at the regional and local levels emerges as a crucial component in the education of professional managers in Ukraine who are ready to implement technologies for the restoration of damaged areas and critical infrastructure facilities (Fig. 6). Strong relations with the Baltic states create a solid foundation for addressing environmental problems at the regional and local levels and can serve as a pilot model for environmental security.

2.3.1. Lithuania and Ukraine

Lithuania and Ukraine have historically shared close ties and a common cultural heritage. The need for cooperation between Ukraine and the Baltic states was first emphasized by the former president of Lithuania, A. Brazauskas, in 1997, after the collapse of the USSR. The enlargement of the EU on May 1, 2004 brought about significant political, geographical, and economic changes for both Ukraine and the EU. As immediate neighbours, Ukraine and the EU require a renewal of political, economic, and environmental cooperation. Therefore, Lithuania's experience in adapting to EU environmental requirements is highly relevant, and the cooperation between our countries is mutually

beneficial. In light of military operations in Ukraine and the prospects for EU expansion, scientific and educational contacts between Poland, Lithuania, and

Ukraine are also actively discussed. These mutual relations can create a new communication platform for researchers from these countries.



Fig. 6. Participants of the Carpathian School 2020 at NPP “Vyzhnytskyi”

As an EU member, Lithuania has gained both positive and negative experiences in modernizing its solid waste management system, which should be taken into account by Ukrainian colleagues. Alongside noticeable progress, there have been challenges and difficulties, typical for new EU members from Central and Eastern European countries. For instance, when Lithuanian domestic legislation was aligned with EU directives, a National Strategic Plan for Waste Management was developed, and numerous national and regional projects were launched. However, certain internal political issues have posed challenges in reducing the volume of food waste disposal and implementing mechanical, biological, and thermal processing methods.

The “Waste” sector is a prominent focus in the educational activities of the Carpathian School. Ukraine's scientific interests in household waste management have been actively discussed at joint events with Lithuanian, Swedish, and Estonian colleagues. The main objective of such meetings is to deepen international cooperation in solid waste management and involve the Ukrainian government, businesses, and public organizations in discussions on waste management strategies with experts from EU countries. It is worth considering the current state of scientific and educational contacts between state institutions and non-governmental organizations, developing specific proposals for establishing bilateral and multilateral relations and identifying potential joint projects.

The scientific contribution of Kaunas University of Technologies to the Winter Sessions of the Carpathian School has been recognized as a priority in the field of engineering research, leading to the signing of a bilateral agreement on scientific and technical cooperation between Taras Shevchenko Kyiv National University and Kaunas University of Technologies in the 2011 year. Over the course of 12 years, the parties have been able to implement the results of joint research and provide practical recommendations for the preservation of natural and restoration of urbanized landscapes, as well as promote the development of education in the field of environmental engineering and solid waste management.

The activities of the Carpathian School have had a positive impact on the development of student academic mobility. Within the framework of the winter sessions, joint research and academic mobility of Ukrainian students can be further expanded with a focus on improving methods of solid waste management. A promising direction is the utilization of energy and the formation of landfill gases based on the study of seasonal morphological changes in waste and its calorific value. The parties are working towards establishing a Consortium with the aim of promoting scientific research in the field of environmental engineering and management. Over the past three years, the organizing committee has established relationships with editors of professional journals in

Ukraine and Lithuania, and joint scientific conferences, guest lectures, and seminars are planned.

The complex and interdisciplinary nature of global problems necessitates the involvement of representatives from natural, social, and technical disciplines in finding solutions. Among these disciplines, the study of geography, as one of the fundamental sciences that investigates the territorial aspects of the interaction between society and nature, is of particular importance. Hence, geocology has a high potential for successful implementation of ESD. Through these efforts, the parties aim to facilitate the implementation of the project measures and practical recommendations focused on preserving natural and urbanized landscapes. Additionally, they seek to promote the training of scientific personnel in the field of environmental engineering and management with the scientific support of KTU. Scientific interests also extend to Latvia, Estonia, Sweden, Georgia and Armenia.

Cooperation with universities in the Baltic region and Georgia takes place within the framework of scientific research aimed at developing a comprehensive four-dimensional model of sustainable development. In 2019, participants from the project “Strengthening the network of universities in the Baltic region to ensure landscape sustainability and waste management” (acronym LASUWAMA), with the assistance of the Swedish Institute, were invited to participate in the winter session. The project aims at strengthening cooperation among European universities in the restoration of anthropogenically altered landscapes through the reclamation of solid waste landfills. Close international scientific ties are maintained with Linnaean University, Kalmar, Sweden; Kaunas University of Technology, Kaunas, Lithuania; Estonian University of Life Sciences in Tartu, Estonia; University of Latvia, Riga, Latvia; Lappeenranta University, Finland; Akaki Tsereteli State University, Kutaisi, Georgia and Yerevan State University, Armenia (Mykhaylenko, 2018).

2.4. Development prospects

The full-scale war with Russia has led to the deliberate destruction of industrial infrastructure, essential services, transportation links, and educational institutions. In response to this challenge, the Carpathian School focuses on disseminating the concept of sustainable development, transferring technology, and training qualified personnel. In the reconstruction of Ukraine, the experience gained by European countries during the restoration from the consequences of Soviet

influence is becoming increasingly important. It is evident that the post-war period in Ukraine will require significant restoration and rebuilding. “In Ukraine today, rethinking is happening at all levels. The industrial strength of Eastern Ukraine has been destroyed, and the fields in Mykolaiv Oblast, Kherson Oblast, and Zaporizhzhia Region are littered with mines, which will require at least 20 years for demining. Therefore, education, science, technology, and IT potential will form the basis upon which the new Ukraine will be built,” emphasized Volodymyr Bugrov, the rector of Taras Shevchenko National University of Ukraine (Focus on Ukraine, 2023). As an educational project, the Carpathian School plans to focus on implementing educational programs that aim to gain experience in the restoration of contaminated territories and the application of energy-efficient technologies for the remediation of oil pollution and nitrates, which are generated in significant quantities from ammunition use. Both types of pollution are biodegradable. It is necessary to learn from the experiences of neighboring countries in post-war development and then train those who will carry out this work.

Estonia, Poland, and Germany have experience in implementing similar technologies, having built models in their territories after gaining independence from the USSR. Many Swedish companies have shared their construction experience with Estonia, particularly in waste management related to the demolition of residential buildings and industrial facilities. Unfortunately, the situation in Ukraine represents a somber experience that may prove useful for other countries in the future. Trained experts could potentially share their acquired experience of waste management as guest lecturers in various European universities.

2.4.1. Carpathian Convention

The Carpathian Convention is a multilateral environmental protection agreement aimed at the conservation of nature and the sustainable development of the Carpathian mountain region, covering various thematic and interdisciplinary areas. Article 13 of the convention focuses on raising awareness, education, and public participation, making it central to the integration of ESD into the convention's documents and measures. It promotes multilateral dialogue and joint project development in several themes and interdisciplinary spheres (Strategy, 2007). Article 13

of the Convention contains provisions on raising awareness, education, and public participation, which should be a central theme of integrating ESD into the documents and activities of the Carpathian School in the future. The convention can be seen as a mechanism for mutual learning and negotiation in implementing ESD and the UN agenda until 2030 in the Carpathians (Mitrofanenko, 2021, 2020).

The organizers of the Carpathian School believe that under the new geopolitical conditions and the government's announced reforms in Ukraine, there is a

need to realize new perspectives for the sustainable development of the Carpathian region and enhance international environmental cooperation at the community level (Fig. 7). Therefore, it is essential to further establish multilateral cooperation and expand the number of partner institutions. It is also important to popularize and support Ukrainian folk art, preserve the cultural traditions of the region, encourage young people to continue these age-old traditions, care for the preservation of nature's beauty, purity, and resources, and improve the cultural and educational environment.



Fig. 7. Participants of the spring session of the Carpathian School of 2023 – representatives of the National Ecological Center of Ukraine

3. Conclusions

The analysis of the participants' views revealed that the “third” mission of universities and the corporate social responsibility of higher education institution employees should be effective tools for promoting informal and professional education and identifying their social role in society. The founders of the Carpathian School have noted positive dynamics in terms of increased participation in events and the

involvement of partner organizations, as well as the expansion of the geographical coverage to different regions of Ukraine and foreign countries. In the plans for the modernization of the Carpathian School's educational activities, there is a need to improve interdisciplinary educational programs in schools and lyceums and involve university students in cooperation. The next step should be the implementation of cross-cutting education for sustainable development among managers and businessmen, improving community

awareness of the state of the environment, and encouraging activists to receive professional training.

In the context of the global COVID-19 pandemic and ongoing conflicts, which have had devastating effects on society and caused losses in the education sector, distance learning technologies have brought education closer to mountainous regions and rural areas. This situation has emphasized the importance of integrating formal and non-formal education, transforming knowledge, and transferring skills.

The development needs of ESD in the Carpathian School include the unification of experts from various target groups on a long-term basis and the development of a strategy for further advancing a multidisciplinary approach to the thematic content of sessions. Additionally, it involves implementing practical measures related to the restoration of mountain areas and the development of professional education at the local community level. The Carpathian School's certificate serves as the first stage of collaborative educational activities offered by participating universities, certifying the level of advanced training for employees of educational institutions and local self-government bodies.

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