

# International University Projects as Means of Developing Russian Ecological Education

Yuriy Kholopov

*Samara State Transport University,  
Faculty of railway construction and  
information technology, Construction  
Department  
Samara, Russia  
[kholopov@bk.ru](mailto:kholopov@bk.ru),  
<http://orcid.org/0000-0002-2442-7186>*

Elena Lukenyuk

*Samara State Transport University,  
Faculty of railway construction and  
information technology, Construction  
Department  
Samara, Russia  
[elena063@list.ru](mailto:elena063@list.ru),  
<http://orcid.org/0000-0002-5482-3075>*

Yuriy Khmelnskiy

*Omsk State Transport University  
Institute of Land Transport  
Systems, Life safety  
and Ecology Department  
Omsk, Russia  
[omgupsovr@mail.ru](mailto:omgupsovr@mail.ru)*

Inna Denisova

*Omsk State Transport University,  
Institute of Management and Economics,  
Russian and foreign  
languages Department  
Omsk, Russia  
[mig161704@gmail.com](mailto:mig161704@gmail.com)  
<https://orcid.org/0000-0003-0491-2501>*

Bela Musatkina

*Omsk State Transport University  
Institute of Land Transport  
Systems, Life safety  
and Ecology Department  
Omsk, Russia  
[iovv@mail.ru](mailto:iovv@mail.ru)  
<https://orcid.org/0000-0003-1607-7611>*

**Abstract** – The article applies to the necessity of organizing continuous ecological education of specialists of railway enterprises and students of transport universities in the field of environmental management and auditing. The article presents the results of training and the survey of pilot advanced training courses participants on the program “Environmental management and the integration of the environmental auditing program in the corporate decision-making process”. It is noted that the academic curriculum was created on the basis of students' requests and it was adjusted for foreign experience. Much interest had been generated by the topics reflecting the features of the environmental management implementation, environmental standards and procedures, the legal and legislative basis for protecting the environment. The article emphasizes that the innovative feature of these courses was the co-education of students and enterprise specialists. The article reveals the contents of a student environmental forum such as team-building training, public speaking, discussions, business games, decision-forcing cases and a photo contest. The effectiveness of ecological education and the development of environmental culture based on a combination of class and out-class training are shown in the article. The project contributed to developing motivation for environmentally oriented behavior among practitioners and students. The article presents the research results of the awareness level on the pollutant emissions and global climate change issues of ecological non-academic organizations representatives. International cooperation will continue on the basis of agreements between universities and the international ERASMUS+ programme cooperation.

**Keywords:** *continuous ecological education, environmental management, environmental culture, international environmental project*

## I. INTRODUCTION

Sharpening contradictions, reducing the amount of available resources, increasing human pressure on ecosystems and emerging objects of accumulated environmental deprivation characterize present-day relations in the "Human – Society – Nature" system [1]. At the same time, understanding the need to change the anthropocentric approach to an ecocentric one is increasingly taking root in the social consciousness. Enterprises of various industries are developing their environmental programs, the largest monopolies adopt environmental development strategies, ecological doctrines and agendas in the field of sustainable development are being formed at a national level [2-4].

Education for sustainable development is a fundamentally new view of the educative process. It is based on the correlation of economic and social well-being with cultural and educational traditions as well as a careful attitude to the environment. The core of the sustainable development matter lays in the need to preserve humanity and the biosphere of the planet due to significantly reducing human pressure on the environment. Only a scientifically sound methodology based on the principles of sustainable development will create an advanced educational system for training the third-millennium specialists who will be able to solve both domestic and global problems, to ensure the survival of civilization and preservation of the biosphere. In the higher education context, greening the economy of vocational education implies training the environmentally responsible specialists with different areas of expertise, skills and experience who make decisions in all areas of their activities adjusted for the requirements of the environmental imperative. In order to get that done it is necessary to understand the interdependence of the

economic, social, political and environmental aspects of the world around; the penetration of environmental ideas, concepts and principles into other disciplines. It is necessary to make a transition from traditional teaching to an environmentally oriented model of education, which should be based on a broad range of multidisciplinary knowledge, a systematic and holistic approach to the development of society, economy and environment.

The objective of ecological education and one of the priority tasks of education for sustainable development is the improvement of the environmental culture in individuals. The most important element in developing the environmental production process culture is the continuous education of specialists who run enterprises.

Implementing the environmental management at enterprises allows not only to comply with environmental legislation, but also increases its own resource/energy efficiency and reduces production costs, which permits to obtain the competitive advantage [5].

Using new management technologies aimed at improving business performance and investment attractiveness is one of the directions for increasing the economic wealth of the enterprise. Also, when modernizing production, a special role should be given to implementing the best available technologies, which can improve significantly the environmental situation in industry and transport [6].



Fig. 1. Discussing scientific and informational cooperation between Polish and Russian participants of the RECOAUD TEMPUS project

At present, production managers in Russia undergo compulsory training only in two supplementary vocational training programs: “Ensuring environmental security by managers and specialists of the management systems” (72 hours) and “Ensuring environmental security when working in the field of hazardous waste management” (112 hours).

To deal with industry and regional environmental problems it is necessary to create ecologically-oriented management competencies among practitioners taking into account the worldwide experience in the field of ecological education, which determined the work of the RECOAUD TEMPUS project “Environmental management in Russian companies – advanced training courses in order to implement and integrate environmental auditing programs in corporate management” (2013 - 2017) [7].

## II. RESULTS AND DISCUSSION

Eight universities took part in the RECOAUD TEMPUS project. They are Dresden Technical University, Germany - project coordinator; University of Maribor, Slovenia; Czestochowa University of Technology, Poland; University of Žilina, Slovakia; Samara State Transport University; Industrial University of Tyumen; Ural State University of Railway Transport; Omsk State Transport University. The appearance of the oil- and gas-industry university (Industrial University of Tyumen) in the consortium along with transport universities is quite natural and it had positive effects for all project participants. It is known that Russian Railways structure has developed a rather effective environmental management system based on operational monitoring.

However, the facilities of accumulated environmental damage, especially those associated with long-standing oil-contaminated areas, have a number of features in assessing possible risks for the population and the environment. Oil and gas enterprises have extensive experience in the remediation of contaminated sites, and at the same time, they are major customers of rail transportation.

The international RECOAUD TEMPUS project was aimed at solving the following problems:

The analysis of the state of ecological education and the existing higher vocational and supplementary training programs in ecology in Russian partner universities.

Curriculum development of supplementary vocational training programs on “Environmental Auditing and Environmental Management” in Russian partner universities.

Preparing and publishing a textbook on “Environmental Auditing and Environmental Management” course in the English and Russian languages by a team of the European and Russian academic staff.

A refresher training of the academic staff of the Russian Federation universities in European universities for arranging advanced training courses in environmental management and auditing for Russian practitioners and students in the next phase of the project.

Implementing new technologies in the continuous education process.

Promoting cooperation between the participants who represent different Russian regions.

Exchanging knowledge and cooperation between the organizations and companies participating in the project.

From the very beginning of the implementation of this ambitious project, it was supported by railway enterprises as well as oil and gas enterprises from Russian participating regions. Russian project participants conducted a survey of practitioners to identify a primary level of knowledge on environmental management and auditing.

The Russian academic staff got the opportunity to take an internship (refresher training) with their European colleagues at the Czestochowa University of Technology, Poland. The program of refresher training courses included the following sections: the history of the development of

environmental protection, environmental deficit; the theoretical basis for quality management; the theoretical basis for an environmental management and auditing system (EMAS); environmental management standards. Comparative analysis of ISO 14000 and EMAS standards; product life cycle assessment; carbon footprinting and adaptation to climate change; environmental situation in urban areas; environmental costs and others.

Training of the Russian academic staff with the participation of European lecturers from the project partner universities was organized in Russia based on Samara State Transport University. This time, issues related to risk management and the concept of sustainable development, implementation of ISO standards, "green" logistics, environmental monitoring and reporting were considered.

As part of the next RECOAUD TEMPUS project phase, advanced training courses for the program "Environmental management and the integration of the environmental auditing program in the corporate decision-making process" (120 hours) were held at partner universities in Russia. The course curriculum, which was developed on the basis of enterprise specialists' requests adjusted for foreign experience, included the following sections: environmental problems and sustainable development; legal and economic framework of environmental protection; environmental regulation, environmental impact assessment; product life cycle analysis; conceptual framework of environmental management; environmental management instruments; SWOT analysis; environmental management international standards (ISO 9000, ISO 14000, EIA, EMAS); environmental management system implementation at the enterprise; environmental auditing; socio-economic efficiency of the environmental management system implementation; environmental policy, ecological image formation of the enterprise (company); calculating environmental damage to the environment, calculating the effectiveness of environmental protection measures.

The developed continuous vocational education program creates a wide range of competencies. As a result of the program development, students should know environmental legislation; legal and economic framework of environmental protection and environmental sustainability; the system of environmental standards and regulations; environmental regulation; environmental management; international standardization in the field of environmental management; main environmental problems associated with professional activity and modern approaches to deal with them. Course participants should be able to apply the acquired knowledge to solve environmental management problems; to take a systematic approach to environmental risk reduction measures in the field of professional activity; to choose the most environmentally effective solution to technological processes; to apply inventory methods of harmful emissions into the atmosphere, the discharge of untreated and treated wastewater into surface waters, as well as domestic solid garbage; to own methods for assessing economic and environmental damage in professional activities.

An innovative feature of these advanced training courses was the co-education of students and enterprise specialists. The classes were held by the academic staff, who took supplementary training within the project and received

international certificates. The academic activity used active and interactive teaching methods. Exchange of views among enterprise specialists, students and academic staff, joint discussions of current industry, regional and global environmental problems and ways to solve them were held during the academic activity.

An increase in students' knowledge in the field of sustainable development, global environmental problems, environmental management methods and instruments at the enterprise was noted according to the results of the final questionnaire. In practitioners' opinions, the most important issues among the topics proposed for railway and oil and gas enterprises are the implementation of environmental management, environmental standards and procedures, a SWOT analysis, and the legal and legislative framework of environmental protection. Students of Russian universities also showed a great interest in the problems studied in the courses and appreciated the interaction with practitioners.

According to the results of the pilot courses, 10 students were selected at each Russian partner university to participate in a two-week environmental management competition forum in Samara.

During the first week of the competition forum, the participants were involved in active training, their objective was to prepare the teams for developing environmental management projects:

Team building. The aim is the acquaintance of all 40 participants with each other, the formation of a team spirit, the development of team roles, the identification and development of leaders, the organization of coordinated team work to develop high-quality projects on the forum themes.

Public speaking. During the training, participants were able to perfect public speaking skills, to learn the techniques of managing public attention, to learn how to find answers to difficult questions quickly and to gain persuasion skills.

A discussion eco-cinema club. This kind of work involved watching films on environmental topics and subsequent discussions.

The lecture-seminar "Environmental and economic assessment and natural resource management."

The game "Environmental Management". The teams discussed environmental and economic aspects of the activity by reference to the use of water resources by enterprises.

The photo contest "Eco-positive and eco-negative." Within a few days, in their free time, the contestants had to find and take photos of positive and negative attitudes towards the urban environment. As a result, they made presentations.

The second week of the forum was active in carrying out projects and making presentations. The team of each university drew up 4 projects in the following categories:

1. Implementation of the environmental management system at a large industrial enterprise. Competitors developed an environmental management structure using the example of a working industrial enterprise and

recommendations on the implementation of ISO 14000 standard.

2. Green PR of a company. The project involved the development of a PR campaign for a socially beneficial environmental event.

3. Decision-forcing cases. Each team received a package with a specific environmental problem and it had to draw up an algorithm of proceedings to solve the problem, taking into account current legislation, internal instructions and case data.

4. Organizing selective waste collection at university. The job was to describe the possibility of organizing selective waste collection at the universities which took part



Fig. 2. Team building training in Samara forum.

In forum: the teams determined the types, volumes and hazard classes of waste, waste collection points and conditions for selective waste collection in the city, waste pick-up providers to remove waste from the university campus, project costs and payback, funding sources. The teams created a motivation program for employees and students.

The projects of the student teams were evaluated by environmental experts from the environmental management center of Kuibyshev railway, a branch of Russian Railways, which has gained considerable experience in environmental management. All students proved themselves worthy during the competition forum and received attendance certificates of the international RECOAUD TEMPUS project.

The environmental theme of educational projects is the particular concern of Europeans and it has a great chance to receive the ERASMUS+ programme grant. Currently, Omsk State Transport University is in the process of drawing up a grant application and searching for academic and non-academic partners to participate in the ERASMUS+ KA2 programme with the environmental educational project "Land transport harmful emission-reducing technologies in Russian and Kyrgyz companies - supplemental education to build specialists' competencies and to promote green technologies". The project is funded by the European Union (EACEA), the amount of the grant is up to 1 million euros, the estimated project duration is from 2021 to 2023.

The following partners are expected to participate in the project: two European universities from the ERASMUS+ KA2 programme countries (one of them will be a grant holder); two Russian universities and two universities in Kyrgyzstan; in addition, it is recommended at least one non-academic partner from each country - the Russian Federation and Kyrgyzstan. From the Russian side, the public environmental organization "Environmental Committee" (Omsk) is proposed as a non-academic partner.

Project objectives:

- forming and developing the environmental competencies of specialists, students, the population of Russia and Kyrgyzstan in the field of reducing harmful emissions of land transport;
- disseminating the advanced experience and promoting the technology to reduce greenhouse and toxic gas emissions of land transport.

Project tasks:

- developing and introducing an open educational resource in the English, Russian and Kirghiz languages in which it is expected to place the mission-oriented research in the field of technology aimed at reducing the negative impact of land transport emissions on the environment; engineering investigations aimed at reducing greenhouse and toxic gas emissions in regional companies of the Partner Countries of Russia and Kyrgyzstan
- developing and implementing the 72 hours supplemental education program (advanced training program) «Technology to reduce the negative impact of land transport emissions in Russian and Kirghiz companies» for specialists of industrial and land transport enterprises, students with directives of enterprises and guaranteed job placement and representatives of ecological nongovernmental organizations
- publishing an educational aid created by an international team of authors and English-Russian/English-Kirghiz dictionaries on the subject of the project. For the effective international scientific cooperation and interpersonal communications it is efficient to translate scientific papers accurately from the terminological point of view, therefore the task of developing specialized technical dictionaries is urgent [8]. To develop the dictionaries it is crucial to determine terminological fields. European partners provide scientific publications on the subject of the project in order to use particular terms in the relevant context for developing the dictionaries.
- disseminating environmental knowledge in the field of environmental protection from land transport emissions through extended coverage in the academic environment, in the society and municipal authorities including the assistance of non-academic project partners.
- developing and strengthening of scientific and technological cooperation between the EU and the eligible Partner Countries (and amongst the eligible

Partner Countries), creation and promotion contacts and intercultural communication in academic and non-academic environment, among specialists of enterprises and ecological non-governmental organisations.

The environmental competency of a specialist determines his ability to work in accordance with acquired environmental knowledge, skills, beliefs, motives, value ideas, environmentally significant personal qualities and practical experience in environmental protection. Competency is characterized by the ability to solve different problems and tasks in manufacturing and non-production situations, based on the formed values and motives, knowledge and experience [13], [14].

When applying in Omsk, 16 members of the Ecological Committee public organization who work in the field of ecological education and training and have a higher level of environmental knowledge than enterprise specialists and students were surveyed. The survey was conducted to determine the existing "green" knowledge and skills and, in particular, climate technologies in land transport; to identify the needs for supplemental education and the introduction of European experience as tools for developing environmental competencies among enterprise specialists and students; to promote green technologies. Respondents could score each of the 10 questionnaire statements from "-2" "totally disagree" to "+2" "totally agree".

In general, the respondents agree that at present it is possible to state about global warming (average score +0.75), but they are less confident about the priorities of environmental security and sustainable development of Russia (average score +0.69) and about climate problem causes and aggravations (average score +0.69). Respondents are really confident about the fact that all enterprises need to reduce harmful emissions (the answer to the opposite statement was -1.44 points on average), but at the same time they find it difficult to answer questions about the ability to determine or predict the causes and sources of polluted emissions and greenhouse gases emissions (average scores +0.06 and +0.12 respectively). Specialists of ecological nongovernmental organizations approved the impact of environmental competencies and staff motivation on the implementation of environmental protection and climate technologies (+1.38 scores). At the same time, it is necessary to develop these competencies before implementing environmental protection technologies (+1.50 scores), in the course of international educational projects of universities (+1.25 points), with international cooperation between countries, companies, the academic and non-academic environment (+1.38 points).

Similar research was conducted among students, bachelors, undergraduates of Omsk State Transport University studying land transport maintenance (over 150 people); among specialists of railway enterprises of the West Siberian region (over 30 people). The results showed a lack of awareness of all respondents in the identification of sources of polluted emissions and greenhouse gas emissions in land transport, advanced climate technologies.

The results demonstrated the need to increase the specific knowledge and skills of specialists, students, ecologists in promoting (implementing) "green"

technologies; to disseminate the advanced experience and the best available technology in the field of environmental protection. Thus, the need for forming environmentally-oriented professional and managerial competencies among specialists of land transport enterprises, students - future specialists, Russian academic staff, specialists of ecological non-governmental organizations and the population, in general, was identified. Such an opportunity is given by international educational projects.

### III. CONCLUSION

In general, during the implementation of the RECOAUD TEMPUS project (2013 - 2017), the following results were obtained in the Russian partner universities:

- the analysis of teaching environmental disciplines on the higher vocational and supplemental education work programs at Russian universities is carried out;
- all the Russian academic staff participating in the project improved their English language skills and received appropriate certificates (the working language of the project was English);
- the Russian academic staff improved their qualifications in environmental management and auditing (at Czestochowa University of Technology and Samara State Transport University) and received international certificates;
- the 120-hour advanced training program in environmental management and auditing was implemented for specialists in the oil and gas and railway industries of the Russian Federation, as well as for students of the project partner universities;
- new technologies in the continuous ecological education process were introduced; decision-forcing cases for holding interactive classes in various sections (modules) of the Ecology study subject, supplemental education programs in environmental management and auditing for students and specialists of Russian companies were developed by the Russian academic staff taking into account European experience;
- knowledge sharing and collaboration between organizations and companies involved in the project were intensified;
- the implementation of continuing student environmental projects "Organizing selective waste collection at University" in partner Russian universities was initiated;
- multimedia equipment for video conferencing and computer equipment for Russian partner universities were acquired;
- the team of authors - the academic staff of European and Russian universities published a textbook on the course of environmental management and auditing in English [9-12];
- the monograph "Environmental management as the basis for the company renewing" with the participation of Russian and foreign researchers is

being prepared; dozens of articles and abstracts have been published in project partner universities;

- seminars to monitor the quality of the project were held in all the Russian partner universities with the participation of European academic staff and EACEA representatives.

The RECOAUD TEMPUS project showed the interest of practitioners in learning the basics of environmental management, the possibility of organizing advanced training courses for the students studying technosphere security. The project contributed to developing motivation for environmentally oriented behavior among practitioners and students - future managers. The development of environmental-value orientations, the increase of ecologically significant knowledge among students helped them move to a new level of environmental culture: from a passive-consumer attitude to an active-saving one, with the initiative of practical activity in accordance with the choice of environmental-oriented interaction with nature.

Effective results were obtained in all areas of the RECOAUD TEMPUS project. This means that international cooperation will be continued on the basis of agreements among universities and in the course of the international ERASMUS + programme, which integrates some previously existing programmes, including TEMPUS, scientific and educational ties among participating universities, academic environment and Russian companies will be strengthened.

#### REFERENCES

- [1] B.A. Anfilofiev, et al., "Ecological and economic problems of effective use of urban land with accumulated environmental damage", in *Ecology and industry of Russia*, vol. 22, no. 7, pp. 59-65, 2018.
- [2] G.S. Rozenberg, and G.P. Krasnoshchekov, "The origin and development of nature conservation: a view from the boundary between millennia", in *Russian Journal of Ecology*, vol. 31, no. 3, pp. 145-161, 2000.
- [3] V.M. Zakharov, and G.S. Rozenberg, "Ecology and sustainable development: the regional context", in *Povolzhskiy journal of ecology*, no. 1, pp. 3-4, 2014.
- [4] G.S. Rozenberg, et al., "Social Responsibility for Sustainable Development", in *Ecology and industry of Russia*, no. 6, pp. 32-37, 2012.
- [5] E.V. Lukenyuk, et al., "On some results of the continuous education program in the field of environmental management in the international RECOAUD TEMPUS project", in *Vestnik SamGUPS*, no. 1 (35), pp. 83-88, 2017.
- [6] A.G. Gun'kova, and Yu.A. Kholopov, "Improving ecological and economic performance of the enterprise on the basis of introducing the best available technologies", in *Vestnik Volgogradskogo Gosudarstvennogo Universiteta. Series 3: Economics. Ecology*, vol. 19, no. 3 (40), pp. 235-242, 2017. DOI: 10.15688/jvolsu3.2017.3.22.
- [7] E.V. Lukenyuk et al., "RECOAUD TEMPUS International Environmental Management Project Acknowledged Successful," in *Railway Transport Journal*, no. 4, pp. 73-77, 2018.
- [8] Inna Denisova, "International words in English railway terminology," in *Transportation, Science and Economy Journal*, no. 6, pp. 511-517, 2016.
- [9] Borut Jereb, Darja Kukovič, et al., "Environmental management & audit: Tempus project Recoaud. 1, Scarcity & introduction to environmental management," *Czestochowa [etc.]: SPH - Scientific Publishing Hub*, 1st electronic ed., vol. 1, 2016, p. 139.
- [10] Borut Jereb, Darja Kukovič, et al., "Environmental management & audit: Tempus project Recoaud. 2, Management systems," *Czestochowa [etc.]: SPH - Scientific Publishing Hub*, 1st electronic ed., vol. 2, 2016, p. 172.
- [11] Borut Jereb, Darja Kukovič, et al., "Environmental management & audit: Tempus project Recoaud. 3, Controlling and stakeholders," *Czestochowa [etc.]: SPH - Scientific Publishing Hub*, 1st electronic ed., vol. 3, 2016, p. 154.
- [12] Borut Jereb, Darja Kukovič, et al., "Environmental management & audit: Tempus project Recoaud. 4, Environmental assessment – featured articles," *Czestochowa [etc.]: SPH - Scientific Publishing Hub*, 1st electronic ed., vol. 4, 2016, p. 156.
- [13] E. Politsinskaya, V. Lizunkov, and O. Ergunova, "Organization of student project based activities through individual learning routes", *International Journal of Emerging Technologies in Learning*, Vol. 14, Iss. 11, pp. 186-193, 2019.
- [14] E. Yu. Malushko, O. A. Maletina, and V. A. Tsybanyova, "The Model of Teaching Listening Skills to Postgraduates with Disabilities and Special Needs in the Educational Podosphere", in *Advances in Social Science, Education and Humanities Research (ASSEHR)*, vol. 198, pp. 275-279, 2018.