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JOURNAL OF RESEARCH AND DIDACTICS IN GEOGRAPHY
1, 9, June, 2020, pp. 61-72 DOI: 10.4458/3099-06

Environmental education in Russian universities: practice and prospects

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Received: December 2019 – Accepted: April 2020

Abstract

The paper analyzes the state of higher environmental education in Russia using open information sources, communications and questioning of educators of leading universities, and data on the best practices of Russian universities (organization of the educational process, educational and methodological support, employment of graduates etc.). The position of Russia in the global system of training ecologists is shown, basing it on the international subject rankings of universities. The history of higher environmental education in Russia dates back to over 20 years, and during this period is has become an extensive system of training at Russian universities. The academic and applied-type programs are now offered by some 150 universities of Russia. The training within the Ecology and Nature Management subject area has undergone a serious evolution of competencies in connection with the changing professional activities and demands of the labor market. The organization of the educational process in Russia has its own peculiarities, although in some ways it is the same as or closer to the European system of environmental education.

Keywords: Competences, Ecology and Nature Management, Educational Standards, Environmental Education, Russian Federation, Universities

1. Introduction

Unlike geographical education, environmental training at the higher educational institutions (HEIs) is relatively young in Russia. The first State Educational Standard on Ecology and Nature Management was approved in 1994. Over the past 25 years, Russia has developed a ramified higher environmental education system. Today, bachelor's and master's degree programs are offered within several subject areas, namely, Ecology and Nature Management (fundamental environmental education), as well as Technogenic Safety and Environmental Engineering and Water Management (engineering and technical training).

Expressing its readiness to become part of a single European educational space, Russia joined the Bologna process in 2003. Nowadays Russia retains a strong educational and methodological position in higher environmental education and has well-developed scientific schools, although it does not occupy leading places in the international subject ranking of

universities (Arshinova and Mikheeva, 2019).

According to the Shanghai Ranking (ARWU) in Ecology, the best Russian university, Lomonosov Moscow State University, is in the top four hundred category in this subject ranking (301 to 400 group), although in the overall ARWU ranking it enters the Top-100 universities in the world, ranking 87th (Academic Ranking…, 2019). In QS Ranking (Environmental Sciences) the best Russian university, Lomonosov Moscow State University, is in the 201 to 250 group, although in the overall QS ranking it belongs to the Top-100 universities in the world, ranking 84th (QS World University Rankings, 2019). THE ranking in Geology, Environment, Earth Sciences, Oceanology places several Russian HEIs in Top-100. These are the Moscow Institute of Physics and Technology, the National Research Nuclear University, and the Lomonosov Moscow State University (The Times Higher Education World University Rankings, 2019).

The low positions of Russian universities in subject rankings have both external and internal reasons. As for the external reasons, it is evident that the referenced rankings are based on the educational systems of the Anglo-Saxon countries and the universities of Russia, as well as of some other European countries, and do not completely follow their requirements. In this context the disadvantages of the Russian system of higher environmental education include its insufficient involvement in the international educational exchanges, the low number of foreign students in Russian HEIs and the lack of educational programs in English etc. The self-containment of the Russian education system and the associated certain isolation has not been overcome to this day.

The growing demand for environmental professionals in the labor market and the cross-cutting nature of professional activities of ecologists in many sectors of the economy dictate the improvement of the quality of training at various levels. The higher ecological education in Russia obviously needs a degree of transformation, and it is due not only to the integration into the European and the global educational space, but also to the internal trends of the development of corresponding sciences and fields of education, and their growing role in society. The ongoing improvement of environmental education considers the following aspects: (1) formal, i.e., conducted in accordance with the policies pursued by the Ministry of Science and Higher Education and taking into account occupational profiles and European methodological approaches; (2) content-related, i.e., based on the conceptual and scientific-technological development in the environmental sector; and (3) methodological, i.e., related to improved methodological approaches in the teaching of environmental disciplines.

The purpose of the study presented herein is to identify the main directions for improving higher environmental education in Russia, based on the analysis of the best practices of leading HEIs both in this country and abroad. The study is focused on the Ecology and Nature Management subject area which provides fundamental training for environmental professionals and users of natural resources.

2. Materials and methods

A wide variety of methods were applied in the study for data collection, their qualitative and quantitative assessment and visualization. A historical analysis of initiation and evolution of environmental education in Russia is based on the data provided by individual universities and a number of related studies (Popova, 2013; Marfenin and Smurov, 2014). The trends and problems of the development of environmental education in Russia were analyzed in comparison with those of European and US universities (Clark et al., 2011; Schoot Uiterkamp, 2011).

We performed case studies of Russian universities engaged in environmental education. Detailed investigation of the open sources of information included the analysis of curricula and academic programs, major teaching and educational technologies etc. Collected data were systematized, thus providing the actual picture of the scope of environmental education at Russian HEIs, the range of undergraduate and postgraduate programs in Ecology and Nature Management offered at the universities of Russia, as well as the specific features of environmental education in particular regions and cities of this country.

A questionnaire survey of Russian universities-leaders in environmental education was particularly important for our study. Twenty HEIs were selected for the survey including classical universities, as well as agricultural, technical, pedagogical and specialized HEIs. The questions were grouped into several blocks related to different aspects of the academic programs offered. In the 29 questions the special focus was on the organization of the education process, field training and academic exchange, graduate employability and career prospects.

3. Past and present of the environmental education in Russia

Technical educational institutions were the first in Russia to offer environmental training. In the 1983/1984 academic year, the D. Mendeleev University of Chemical Technology started an environmental training program in "Ecology and Environment Protection" with 50 students. Thus, environmental education in Russia is more than 20 years behind compared with the universities of Europe, such as the University of Tours (France) or the Lund University (Sweden), and North America, such as the University of Wisconsin–Green Bay (United States) or the Waterloo University (Canada). Environmental education was formally offered at these universities at the turn of 1970s (Cook and Weidner, 1975).

In the early 1980s, it was widely accepted that the main occupation area for environmental professionals is industrial ecology, i.e. waste recovery, the creation and maintenance of devices for environmental quality control etc. Therefore, the professional expertise of ecologists was associated with the use of environmental quality control methods. It gradually became apparent that the activities of professional ecologists should include environmental evaluation, which requires fundamental university training to enable environmental impact assessment (EIA). Specifically, this professional competence became the main area for ecologists in the early 1990s.

The Kazan Federal University was a first classical university in this country where the need for the training of multidisciplinary experts was recognized and where the first Faculty of Environmental Sciences was established in 1989. During that period the main trend was the elaboration of integrative disciplines. The first universities to begin training in environmental science in 1992 were the Peoples' Friendship University of Russia and a private HEI – the International Independent Ecological-Political University. The former had a good experience in training safety engineers and rather easily expanded the education process to train multi-skilled ecologists. The latter was established on the initiative of two prominent scientists, N.F. Reimers and the Academician N.N. Moiseev, as an ecologically-oriented humanitarian university.

The active introduction of the "Ecology and Nature Management" specialization took place in the late 1990s and early 2000s (Kasimov et al., 2015). During the 1995-2005 period the number of universities offering academic programs within this subject area increased from 12 to 140 all over Russia. In the 2000s, environmental education under natural sciences programs was advancing in line with the State Educational Standards of the second generation adopted in 2000. Thus, the development of environmental educational programs in many HEIs is already over two decades long. Several universities began training environmental specialists in the 2010s.

As of September 2019, training in the field of Ecology and Nature Management has been realized at 147 HEIs of the Russian Federation, including 17 in Moscow and 8 in St. Petersburg. The ratio of State-financed and paid-tuition quotas is presented in Figure 1.

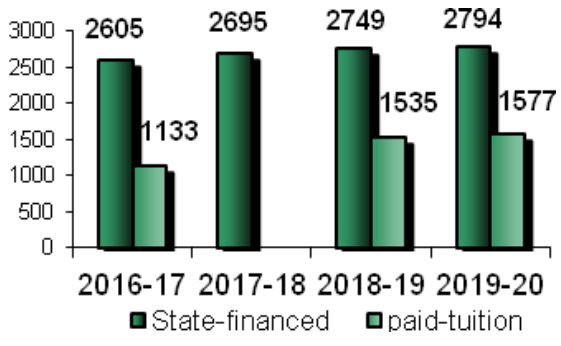

Figure 1. Full-time admissions to the Ecology and Nature Management — State-financed and paid-tuition quotas (based on the official HEI data).

Master's programs in Ecology and Nature Management are offered at fewer universities and admissions are half that of the undergraduate level (Figure 2).

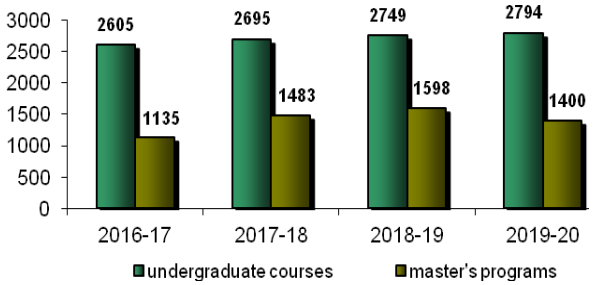

Figure 2. Admission dynamics for full-time State-financed bachelor's and master's programs in Ecology and Nature Management (based on the official data of universities).

The increase in the number of universities that offer undergraduate and postgraduate programs in Ecology and Nature Management and the launch of new environmental training programs at the chemical, technical and biological institutes (departments) of universities have led to a strong differentiation of training, in terms of both the content of education and the methodological support of the education process. The Ecology and Nature Management subject area is now offered at 68 classical universities. Apart from them, the subject area is pursued in agricultural, technical, technological, forestry, pedagogical, land-management, and specialized HEIs, e.g., the Moscow State University for Foreign Affairs, the Russian State Geological Prospecting University, the Nizhny Novgorod University of Architecture and Civil Engineering etc.

As the subject area under discussion is universally interdisciplinary, its position within university divisions varies significantly but it is usually at the junction of biological, geographical, and environmental studies (Figure 3). Therefore it is offered most frequently in the Faculties of Geography and Earth Sciences (40%) followed by the Faculties of Biology and Agriculture (24%) and Environmental Sciences (13%), as well as in technical-engineering-chemical (12%), and other faculties (11%).

Programs in Ecology and Nature Management are often offered in interdisciplinary faculties (institutes), usually in association with other natural sciences (or, to a lesser extent, socio-economic and engineering sciences). Interdisciplinary units are apparently more optimal for the implementation of educational programs and research in the field of environmental sciences, as they create opportunities for diversification of training, have the necessary human resources and conduct a wide range of basic and applied research.

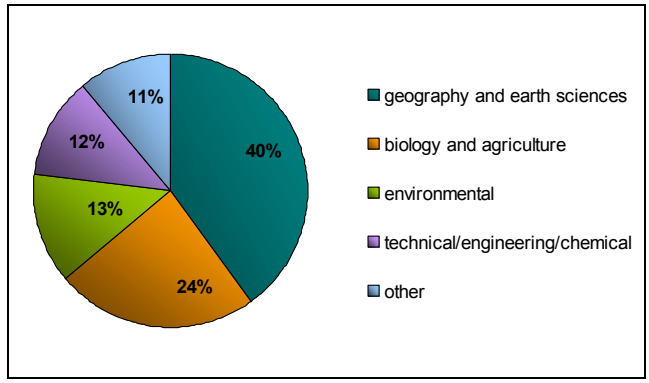

Figure 3. The divisions of HEIs offering academic programs in Ecology and Nature Management (compiled from databases of the HEIs).

With the increased number of HEIs, the variety of academic programs and the wide range of methods and teaching techniques applied at Russian universities have come across the same methodological and organizational problems in the implementation of environmental education as their colleagues from European universities (Schoot Uiterkamp, 2011). The most current ones are the achievement of a true, rather than formal, multi-disciplinarity, the fragmentation and unification of academic programs, as well as the growing interest in studying "hot and trendy" topics (Monroe et al., 2008; Clark et al., 2011). The balance between the fundamental block of environmental education and the specialized courses was also widely discussed.

4. Competence-based approach in environmental education

The types of professional activity and the competencies of graduates are defined in the state regulatory documents for higher professional education, which, in accordance with the Law on Education in the Russian Federation dated December 29, 2012, No. 273-ФЗ (as amended), include the Federal State Educational Standards (FSES). The current FSES for Higher Education adopted in 2015 implements a competency-based approach, which defines general cultural, general professional, and professional competencies (the latter subdivided by types of professional activity). The same standards assume the transition to a two-level system of training — undergraduate and graduate programs in connection with the Russian Federation's integration into the European educational space in line with the Bologna process.

The general trend in the development of educational standards in Russia, including those of higher environmental education, is associated with the elimination of the strict regulation of the content of teaching and the transition to a framework regulation of educational programs (Figure 4). Despite such evolution of standards, which provides greater independence and freedom to universities, not all of them are ready to develop high-quality educational programs in the absence of Model Basic Educational Programs, based on the FSES framework and taking into account the occupational profiles introduced.

The continuing improvement of educational programs is adjusted to the professional standards and European methodological approaches. The Russian classification of occupations is harmonized with the International Standard Classification of Occupations 2008 (ISCO-08). In the absence of the major professional standards of the environmental sector, professional competencies are defined based on the labor-market requirements to the graduates, the analysis of international practices, and the communications with principal employers.

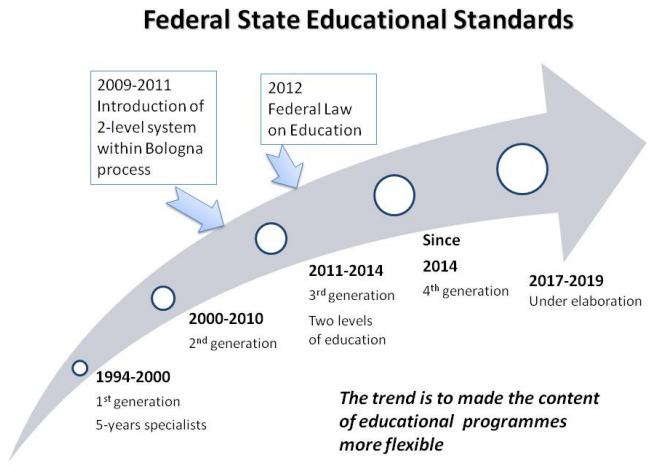

Figure 4. Evolution of Federal State Educational Standards in Russia.

The current FSES state that "a graduate who has mastered the undergraduate program must have competencies corresponding to the type(s) of activity covered by the given undergraduate program". Depending on the types of professional activities, HEIs elaborate either academic programs focused on research and (or) pedagogical goals or applied-type programs focused on practical and applied types of professional activity.

The current standards for each type of professional activity prescribe the corresponding professional tasks. For example, the survey and design type of activity assumes the collection and processing of primary documentation in order to perform environment impact assessment and the participation in the design of typical environmental protection measures etc. Employment at this kind of company requires enhanced training in the field of geoinformatics, hydrogeology, engineering geology, soil science, geochemistry, mathematical and environmental modeling, environmental monitoring, environmental impact assessment etc. Employment in scientific organizations requires much deeper theoretical training, knowledge of the history of science, methodology and methods of scientific research. Equally important is the mastery of field environmental research methods, as well as the advanced skills in GIS technologies.

The implementation of these and other types of activities is possible when students develop general professional (uniform for the subject ar-

ea) and specific professional competencies, which are established for each type of professional activity. The main bachelor's and master's degree programs are designed according to the types of professional activity chosen by the HEIs, which enables them to ensure the competitiveness of their graduates in the regional labor markets and provides for continuing education (*Gosudarstvennyj doklad O sosnoyanii i ob okhrane okruzhayuschej sredy Rossijskoj Federatsii v 2016 godu*, 2017). The results of our survey showed that in most HEIs students are trained to perform one to three types of professional activity at each level of studies.

There are three main stages of gaining competencies within environmental studies (Popova, 2013). Each subsequent stage is based on the achievements of the previous one, while the general trend consists in accumulating knowledge gained at the previous stages to developing creative activity at the subsequent ones. Each stage has specific tasks implemented through various approaches and methods.

The goal of Stage I (first and second years of studies) is to obtain theoretical natural-scientific and general humanitarian knowledge (the development of basic general cultural competencies). The stage is also focused on independent skills of work with information sources, generalization, and analysis. The goal of Stage II (third and fourth years of studies) is to obtain theoretical professional training and practical professional experience (bachelor's degree). A specific feature of the stage is the achievement of professional theoretical and practical competencies in four blocks of disciplines, namely, the fundamentals of ecology, earth sciences, nature management, and applied ecology.

The goal of Stage III (master's program) is to obtain professional specialization and advanced research skills, and to defend a master's thesis. A specific feature of the stage is the improvement of professional competencies through the implementation of analytical, survey, and research work. Mastery of one or another professional activity related to the specialization studied is achieved through disciplines of the variable part of the academic programs. The timing, number of disciplines, and their content are determined by the universities themselves based on the most in-demand areas of the professional activity of the graduates in the regional labor market. The choice depends on the area of science pursued at the HEIs, scientific traditions, and human resources. The admission figures also affect the number of specializations offered; smaller numbers are usually associated with the reduced number of specializations (there should be at least ten and five tuition-free admissions to the program at the bachelor's and master's levels, respectively).

In many HEIs, undergraduate training for a single specialization begins in the first semester. Some HEIs offer a selection of specializations later. Thus, at the N.P. Ogarev Mordovia State University two specializations are offered in the fourth semester, namely, Environmental Engineering Surveys and Landscape Planning and Environmental Management. Some HEIs offer various specializations in the third semester. For example, two specializations, i.e., Ecology (academic) and Nature Management (applied) are offered at the Kazan State University. The training at the Faculty of Geography of the Lomonosov Moscow State University splits into four different paths in the third semester. Some HEIs do not have such differentiation at the undergraduate level and the students are "attached" to the departments in the third year of studies to participate in the field-based training and prepare for the final graduation projects (for example at the Peoples' Friendship University of Russia).

In 2018 Russian classical universities offered nearly twenty undergraduate programs in the Ecology and Nature Management subject area, with about 2750 State-financed admissions. The "broad" specializations are the most common; thus, Nature Management is offered in 47 universities, Ecology — in 42, and Geoecology — in 22 universities. There are also several specific programs, e.g. Natural resource potential of the Arctic, Environmental problems of large cities and industrial zones, Multipurpose use and protection of water resources etc., offered by just one university each. On the other hand, there are 22 HEIs which deliver single (uniform) undergraduate program.

Many experts emphasize the importance of expanding training in practice-oriented fields aimed at design and production, environmental

engineering surveys, geographic information technologies, EIA and audit etc. At the same time, narrow-specialization training at the undergraduate level is hardly justified. Therefore, many HEIs offer thematically broad programs; the most in-demand ones are as follows: Nature Management, Ecology, Geoecology, Environmental Safety, Environmental Assessment, Environmental Management and Audit.

As a rule, the universities offer from one to five postgraduate programs. Postgraduate programs are significantly more diverse than undergraduate training, since it is at this level that a narrower specialization and professional "tuning" occur. Nevertheless, certain programs have a wider professional range — these are Ecology and Nature Management offered by 14 universities, Nature Management (including Nature Management and Sustainable Development, Nature Management and Environment Protection and Nature Management and Regional Development) offered by 12 universities and Geoecology (general and applied) offered by 11 universities. At least 10 HEIs offer master's degree training in Environmental Monitoring and Environmental Protection (or Safety).

The total number of postgraduate programs in Ecology and Nature Management offered by the Russian universities is above 70 (with 1400 State-financed admissions) and a large part of them are taught just in one or two HEIs. Among the specialist programs are, for example, Urban ecology, Agroecological monitoring, Aerospace exploration of natural resources, Soil ecology of natural and technogenic landscapes, Regional ecogeotourism, Environmental risk management in the Arctic, Environmental engineering surveys and landscape planning and so on. As in other countries, the postgraduate training programs in Russian universities may vary from year to year depending on both the demand for applicants and the availability of experienced faculty staff in the required field of knowledge. In Europe, universities often offer environmental education only at the master's level. Usually a great variety of environmentally-oriented master's programs is typical, with the total number of about 160 in the UK, for example.

A number of postgraduate programs related to environmental specialization are implemented in the universities within the Geography subject area. They include, for example, Environmental Monitoring and Planning, Geoecology, Nature Management and Environment Protection, Nature Management and Territorial Economic Organization and Nature Management and Territorial Organization of Society.

5. Organization of the education process

Russian students have a long cycle of study (4 years of undergraduate course + 2 years of master's program), similar, for example, to German or Scottish universities. In the UK, Denmark and the Netherlands there is a shorter cycle of education (3 years + 1 year respectively). In terms of the total labor intensity, Russian students and teachers have a much greater workload than their European colleagues. According to the European Credit Transfer and Accumulation System (ECTS), a credit unit in the European universities equals 25-30 hours of educational activities. The total academic workload at the European universities is equivalent to 1,500-1,800 academic hours per year. In Russia, a credit unit equals 36 academic hours. By recalculating the annual 60 units of Russian undergraduate programs, it appears that the total educational load in Russia is 17–31% higher than in Europe.

The Russian education system seems to be more conservative in the *forms of teaching*. Undergraduate programs at Russian universities usually have a higher percentage of compulsory disciplines: elective disciplines account for 30% of the variable part, which accounts for 15% of the total volume of all disciplines. The process of education involves various techniques, methods and strategies, both traditional (lectures and curriculum practical training) and new interactive (business and role-playing games, analysis of specific situations etc.). At the Moscow State University for Foreign Affairs, for example, the modeling of international negotiations and other decision-making processes related to ecology and nature management has been incorporated into the educational process. The teaching staff may organize open lectures and round tables. The training may include meetings with representatives of employers, state and public organi-

zations, and master-classes by experts and specialists.

The main priorities of Ecology and Nature Management educational programs target the practical skills of the graduates, especially in applied undergraduate programs. For example, the Faculty of Geography, Geoecology, and Tourism of Voronezh University applies practice-oriented teaching approaches, such as: 1) continuous training (from undergraduate to graduate) in the areas of design, laboratory analytical, full-scale experimental, and production and technology related to environmental damage, and risk assessment technologies; 2) attracting master's and Ph.D. students as leaders (moderators) of scientific sections at the conferences of scientific societies at high-schools, gymnasiums, colleges, and lyceums, and as panelists in competitions of high-school research work; 3) participation of undergraduate and graduate students in career guidance activities in the city of Voronezh and in the districts of the Voronezh region; 4) educational and volunteer environmental activities, including those defined by the competencies standards (environmental education). Another method to introduce students to practical work during the learning process is to engage part-time researchers and designers who involve students in their research projects and field studies.

According to the Federal Educational Standards in Ecology and Nature Management, the *practical-training* component is in the variable part of the educational programs; therefore, its structure is determined by the HEIs themselves. The scope of the practical-training component depends on the focus of the undergraduate program which has 27-39 credits in academic programs and up to 42-60 credits in applied ones.

Field training after the first year aims at obtaining primary professional skills. There are various options with regard to how it is conducted, i.e. classroom studies, excursions, route excursions, and the use of training grounds. Students carry out field work in key areas, interpret satellite images, and engage in thematic and integrated mapping. Practical-training sessions are most often carried out in specific disciplines. For example, after the first year, ecology students at the Faculty of Geography of the Lomonosov Moscow State University have eight practical-training sessions at the Satino Educational and Research Station in the Kaluga Region in topography, geomorphology, soil science, biogeography, hydrology, meteorology, landscape science, and economic geography, with a total duration of 58 days.

The scope and content of the practical training differ for students studying under the applied or academic undergraduate programs. For example, the undergraduate students of the applied program in Environmental Management of the Perm University have their field work in the city of Perm. Under the guidance of scientific advisers, students analyze environmental policies of enterprises and environmental activities, and get acquainted with the work of ecologists in various fields of the economy. Students of the academic undergraduate program have field sessions in biogeography, during which they acquire initial fieldwork skills (description of territories, herbarium collection, recording of small mammals, birds, invertebrates etc.).

The field training after the second year is aimed at obtaining primary professional skills, including the research one. It usually combines field route sessions and staying in field stations.

After the third year, internships are organized to give students the opportunity to gain skills in conducting field research and environmental engineering surveys, master the modern instrumentation in environmental research and to gain experience in working with environmental organizations etc. Often, the place of the internships is selected taking into account the topic of the planned graduate paper. Almost all HEIs have established a system of contractual relations with enterprises, government agencies, and research institutions. The execution of long-term cooperation agreements is the main requirement for sending students to practical training in one or another organization.

The curriculum of the fourth year (eighth semester) includes a mandatory pre-diploma practical training for the implementation of the graduate paper.

The master's level practical training includes internships which are focused on obtaining professional skills and gaining experience of pro-

fessional activity. Practical graduate training assumes that students work with the departments on solving pressing scientific problems and get acquainted with innovative methods and technologies. The places of practical training (industry and research organizations) are determined by the topics of the planned final thesis of master's students and the specifics of data collecting and processing.

Unlike in the European universities, *academic exchange* in the field of ecology and nature management has not yet become a widespread practice in Russian HEIs. Several Russian universities have bi-lateral agreements with foreign counterparts. For example, Irkutsk State University has an agreement with the Christian-Albrecht University of Kiel (Germany) on the exchange of students. Under the agreement, three to four students from both sides are annually trained in Nature management. Perm University has cooperation agreements with the Bialystok University of Technology (Forest Department) (Poland) and the University of Palermo (Italy). The Siberian Federal University offers a semester-long exchange training in the universities of Lleida (Spain), Gettengem (Germany) etc. The development of academic exchange is seen as an important priority in environmental education. However, from an administrative and financial point of view, the existing system of exchange in Russia is rather complicated to implement.

Term papers as a form of independent research work play an important role in undergraduate programs. By data collecting, writing and defending term papers students acquire various general cultural (e.g., organizational and self-educational), general professional, and professional competencies. Forms, due-dates, and number of term papers required at the undergraduate level vary in different HEIs. These can be term papers or term projects within specific disciplines or interdisciplinary term papers, which are evaluated by scientific advisers or during public defense.

The *State Final Certification* (SFC) in the Ecology and Nature Management subject area entails passing the State exam and defending the graduation paper. In the curricula, usually six credits are allocated for its preparation and defense; preparation for passing the State exam requires another three credits. The graduation paper is the result of a creative process that not all students are ready for and capable of this. It often involves literature reviews, but sometimes it lacks experimental work (Lisetskii et al., 2015). In this regard, some experts from the universities in our survey suggested replacing the final work with multidisciplinary comprehensive exams. However, there are quite opposite opinions at some other universities. They argue their position with the fact that during the State exam it is difficult to verify the mastering of all competencies specified in the FSES. This is the reason why they propose to phase out the State exam, freeing up more time for the graduation paper.

6. Career guidance for students and the demand for graduates in the labor market

Career guidance is provided to students in various forms. Many HEIs have career development centers or employment services. A number of HEIs practice the teaching of professional disciplines by employers interested in selecting promising students as a form of career guidance.

Students' part-time employment during undergraduate and graduate studies is often an important factor in their further employment. According to the results of our survey, part of the students are employed starting from the second year. However, the place of their employment is not always related to their future profession. At the graduate level, the learning process is organized in the way that more students are capable of working either in their degree field or in the ecology-related areas (occupational safety, technogenic safety etc.). In some HEIs, 80-90% of master's degree students are part-time employed.

Employment of the graduates is one of the indicators of HEIs' effectiveness. Monitoring is carried out by surveys at graduation and through the social networks, associations of graduates, and personal contacts with the graduates (Figure 5).

The data of the Ministry of Education and Science for 2016-2017 suggest that 70.2% of graduates specializing in Earth and Environment

Sciences were employed. The universities where the survey was conducted evaluated the employment in the specialization as good. A significant share of the graduates in environmental programs work in their degree field (e.g. 60% of the graduates of the Siberian Federal University, 65% of the bachelor's degree students and 100% of the graduate students of the Crimea Federal University). The high demand for environmental specialists was indicated in the surveys conducted in Mordovia, Perm, Stavropol, and Irkutsk. In some regions, admission rates for Ecology and Nature Management are lower than the actual demand for such specialists.

7. Conclusions

Notwithstanding the fact that environmental education in Russia is 20 years younger than in many countries of Europe and North America, the trends of its evolution are practically the same. This proves the principal orientation of the environmental education on the demand of the labor market and its close relation to the progress of environmental sciences.

In Russia bachelor's degree programs are usually offered by classical universities, and fewer universities are engaged in postgraduate training in Ecology and Nature Management. As for the variety of academic programs, the postgraduate training is far ahead offering more than 70 programs compared to about twenty for the bachelor's degree level.

The analysis of the organizational policies in environmental education at the Russian universities and the correlation of them with foreign HEIs made it possible to reveal a number of specific features of training in Ecology and Nature Management in this country. Just some of them are as follows.

The Federal State Educational Standards of the Russian Federation dictate a higher proportion of compulsory disciplines which account for 40-50% of credits. At the European universities their proportion is obviously lower. Compared with other countries, primarily the United Kingdom, the elaboration of "free education" trajectories is rather neglected in Russia.

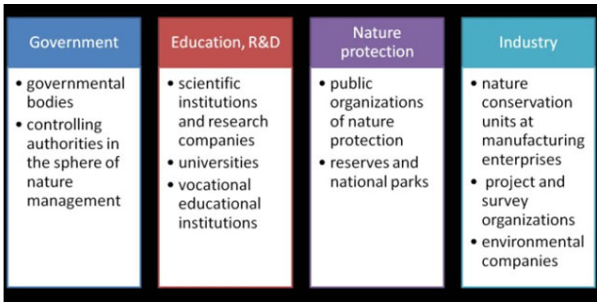

Figure 5. The main areas of employment of the graduates (compiled from university websites).

The situation could be changed for the better if more optional courses were suggested to the students and individual sets of competences established.

All the academic programs realized in Ecology and Nature Management include disciplines necessary to master specialized skills in GIS-technologies, analytical, statistical and other methods of investigation. The highest proportion of such disciplines is included in the curricula of British universities, while in Russia these disciplines rank low on the curricula. To raise the profile of these skills for all graduates it is necessary to improve the instrumental base of teaching and provide for the higher qualification of staff.

Both in Russia and abroad environmental education is to a great extent aimed at getting practice-oriented knowledge and skills. Therefore, practical training and field studies are considered as being particularly important. The proportion of practical training in the environmental education curricula of the Russian universities is several times higher than in European HEIs. As for the academic exchanges with foreign universities in Ecology and Nature Management, it is being held back by organizational and financial reasons in Russia.

The need for transformation of higher environmental education in Russia is due not only to the importance of integration into the European education system, but also to internal trends in the development of ecology as a branch of science, the growing demand of the labor market for qualified personnel in the field of environment protection, and the change in the general environmental thinking of society. Best practices

based on the methodological and practical experience in organizing environmental education could be recommended as guidelines for modernizing the structure and content of higher geographical and ecological-geographical education in Russia.

The future status of university environmental education in Russia will depend on its adaptation to the changing social and economic situation and the development of new scientific branches and educational technologies.

Acknowledgements

The study was financially supported by the Russian Geographical Society.

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