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SCIENTIFIC PRIORITIES OF NEW ENVIRONMENTAL PROGRAM

The article discusses the scientific priorities in the preparation of the new environmental education program developed by an international team of scientists and university professors, as well as employers. The priorities of research in the field of environmental science are concentrated in 17 Goals of Sustainable Development, which determine the development prospects and indicators for achieving progress in the field of ecology and society until 2030. The growing global threats associated with climate change, energy, water and food security, biodiversity conservation and ecosystem restoration require new solutions and the integration of the entire global community to train qualified specialists meeting the requirements of international education standards. Modern environmental education is an interdisciplinary system of knowledge in the field of fundamental and applied tasks in environmental research, aimed at students acquiring practical skills and competencies for the integrated solution of environmental management and sustainable development issues on a national and global scale.

Analysis has been carried out the relationship of scientific environmental priorities with the mission and goals, as well as learning outcomes of the Environmental Program. Scientific and technical achievements in the field of renewable energy sources, energy and resource saving, environmentally friendly technologies in agriculture and industry became the basis for creating such courses as “Green Economy”, “Green Technologies”, “Renewable Energy”. The experience of the Reading University and Cumbria University (Great Britain) in applying scientific priorities and the achievements of modern research in the field of environmental services, forecasting the future and environmental project is used in the development of new academic disciplines and programs of educational and research practices.

Key words: scientific priorities, environmental science, sustainable development goals, ecosystem services, environmental project, educational program.

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Жаңа экологиялық бағдарламаның ғылыми басымдықтары

Мақалада ғалымдар мен университеттің профессорлары, сондай-ақ жұмыс берушілер тобы әзірлеген қоршаған ортаға арналған жаңа білім беру бағдарламасының ғылыми басымдықтары қарастырылады. Қоршаған орта туралы ғылым саласындағы зерттеулердің басымдықтары тұрақты дамудың 17 мақсатына негізделген, олар 2030 жылға дейінгі экология және қоғам саласындағы үдеріске қол жеткізу үшін даму болашақ көрінісі мен көрсеткіштерін айқындайды. Климаттың өзгеруі, энергетика, су және азық-түлік қауіпсіздігі, биоалуантүрлілікті сақтау және экожүйелерді қалпына келтіруге байланысты жаһандық қауіптер жаһандық қауымдастықтың халықаралық білім беру стандарттарының талаптарын қанағаттандыратын білікті мамандарды даярлау үшін жаңа шешімдерді және интеграцияны қажет етеді. Қазіргі заманғы экологиялық білім беру – қоршаған ортаны басқару және тұрақты даму мәселелерін ұлттық және әлемдік ауқымда кешенді түрде шешу үшін практикалық дағдылар мен құзыреттілікке бағытталған экологиялық зерттеулердегі іргелі және қолданбалы міндеттер саласындағы пәнаралық білім жүйесі.

Ғылыми экологиялық басымдықтардың миссиясы мен міндеттері, сондай-ақ экологиялық бағдарламаны зерттеу нәтижелерімен өзара байланысын талқылайды. Жаңартылатын энергия көздері, энергетика және ресурс үнемдеу, ауыл шаруашылығында және өнеркәсіптегі экологиялық таза технологиялар саласындағы ғылыми-техникалық жетістіктер «Жасыл экономика», «Жасыл технологиялар», «Жаңартылатын энергия көздері» сияқты курстарды құру үшін негіз болды.

Ғылыми басымдықтарды және экологиялық қызметтер саласындағы заманауи зерттеулердің жетістіктерін қолдануда Рединг және Кумбрия университеттерінің тәжірибесі (Ұлыбритания) оқу және зерттеу практикаларының бағдарламасын және жаңа пәндерді құрастыру барысында қолданылады.

Түйін сөздер: ғылыми басымдықтар, қоршаған ортаны қорғау, тұрақты даму мақсаттары, экожүйелік қызметтер, экологиялық жоба, білім беру бағдарламасы.

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Научные приоритеты новой программы по окружающей среде

В статье рассмотрены научные приоритеты в подготовке новой образовательной программы по окружающей среде, разработанной международным коллективом ученых и преподавателей университетов, а также работодателей. Приоритеты исследований в области науки об окружающей среде сосредоточены в 17 целях устойчивого развития, которые определяют перспективы развития и показатели для достижения прогресса в области экологии и общества до 2030 года. Растущие глобальные угрозы, связанные с изменением климата, энергетической, водной и продовольственной безопасностью, сохранением биоразнообразия и восстановлением экосистем, требуют новых решений и интеграции всего мирового сообщества для подготовки квалифицированных специалистов, отвечающих требованиям международных образовательных стандартов. Современное экологическое образование – это междисциплинарная система знаний в области фундаментальных и прикладных задач по исследованиям окружающей среды, направленная на приобретение студентами практических навыков и компетенций для комплексного решения вопросов экологического менеджмента и устойчивого развития в национальном и глобальном масштабах.

Был проведен анализ связи научных приоритетов с миссией и целями, а также результатами обучения образовательной программы по экологии. Научно-технические достижения в области возобновляемых источников энергии, энерго- и ресурсосбережения, экологически чистых технологий в сельском хозяйстве и промышленности стали основой для создания таких учебных курсов, как «Зеленая экономика», «Зеленые технологии», «Возобновляемые источники энергии». Опыт университетов Рединга и Камбрия (Великобритания) в применении научных приоритетов и достижений современных исследований в области экологических услуг, прогнозирования будущего и экологического проектирования используется при разработке новых учебных дисциплин и программ учебных и исследовательских практик.

Ключевые слова: научные приоритеты, наука об окружающей среде, цели устойчивого развития, экосистемные услуги, экологический проект, образовательная программа.

Introduction

Science is the driving force behind educational reform, ensuring its development and quality growth. Based on scientific importance and the search for optimal ways of regulating the environmental problems of our time, relying on the latest achievements in the field of environmental management. The international team of scientists and teachers developed a new educational program on environmental science for Bachelor's level of education.

The growing global threats associated with climate change, energy, water and food security, biodiversity conservation and ecosystem restoration require new solutions and the integration of the entire global community to train qualified specialists, who meet the requirements of international education standards (McIntosh M. at al., 2008: link).

For the first time, under the State order, the development of educational and methodological documentation for the training of bachelor-ecologists in Republic of Kazakhstan in English has been carried out. The Chief drafter of the Program was the leading university – Al-Farabi Kazakh National University (KazNU). The staff of the UNESCO Chair for Sustainable Development of the Faculty of Geography and Environmental Sciences of the KazNU won the open competition of the Ministry of Education and Science of the Republic of Kazakhstan and received the right to create a working group from foreign and domestic experts for the qualitative development of such a program. The working group included representatives:

– Well-knowing universities in Europe, among the TOP 200 universities in the World, such as:

Reading University, Middlesex University and University of Cumbria from United Kington; Polytechnic University of Valencia from Spain; Porto Polytechnic Institute from Portugal; The University of Urbino from Italy;

– Kazakhstan universities, with bachelor-ecologists program training: Seifullin Kazakh Agro Technical University; NARHOZ University; National Laboratory Astana, Nazarbayev University;

– Foreign and Kazakhstan companies and enterprises as a stakeholders interested in qualified specialists in this field: Environment Europe Ltd, Oxford from United Kingdom; The Republican Scientific Production and Information Center "KazEcology"; Scientific Engineering Center of the National Engineering Academy of the Republic of Kazakhstan "Oil and Gas"; LLP "Marine Biology"; Institute of Polymer Materials and Technology from the Republic of Kazakhstan.

The educational program focuses on the global nature and the paramount importance of solving environmental problems for Kazakhstan and the entire world community in the 21st century in accordance with the Sustainable Development Goals adopted by the Paris Agreement in 2015. Research priorities in environmental science are focused on 17 sustainable development goals, which shape development prospects and indicators for achieving progress in ecology and society until 2030 (The Millennium Development Goals Report, 2015: link; About the Sustainable Development Goals-17SDGs, 2015: link).

Goals, leaning outcomes and novelty of the Environmental Program

Modern environmental education is an interdisciplinary system of knowledge in the field of fundamental and applied environmental problems, aimed at students acquiring practical skills and competencies for the integrated solution of issues of environmental management and sustainable development on a national and global scale.

At the same time, the increasing internationalization of the labor market makes demands for the quickest integration of Kazakhstan's environmental education into the international educational system, contributing to the improvement of the professional competitiveness of graduates, their multilingual and cultural adaptation.

The scientific priorities of the new ecological program for the bachelor degree were determined by foreign and Kazakhstan experts as a result of a discussion at an International Workshop in Almaty in June 2018 (Figure 1).

Mission and goals of the Environmental Program. The mission of the Educational Program is to train specialists in the field of ecology and environmental protection, equipping them with expert knowledge and implement activities that ensure the rational use of natural resources and meet sustainable development goals. The goal of the Educational Program is to create a new generation of practitioners able to work a various sectors of economy, such as the industry, agriculture and services, related to the processing of raw materials, industrial wastes, to conduct basic scientific research in the field of environmental protection.

*Key Performance Indicators of the Environmental Program***.** Students are expected to complete education in 4 years. Studying component is 131 credit units; total with practices are not more than 154 credit units. The amount of the undergraduate program are 18-19 credit units in one academic year. The program offers two options: governmental scholarship and fee-based. It is practice oriented, is taught in English language. Assigned qualification: Bachelor of Natural Science in the field of Environmental Science.

According to the outcomes of the program, graduation alumni can work in state, non-governmental and international organizations, research institutions involved in the analysis and forecasting of changes in the state of environment for various industries, agriculture sector and services (Tanybaeva et al., 2019: 132).

Learning outcomes of the Environmental Program. This program is expected the several learning outcomes:

Stable understanding of the fundamentals of ecology that determine the interaction of living organisms with their habitat; modern concepts and strategies for the sustainability of human development and sustainable development goals; consequences of anthropogenic human activity on the environment; major groups of pollutants, their migration routes, transformation and accumulation in ecosystems; chemical transformations of pollutants in the environment.

To evaluate, monitor and predict the state of the environment; to identify the main hazards to human habitat and assess the risk of their accuracy; to perform environmental monitoring and apply environmental protection technologies, plan and manage environmental activities of enterprises, and analyze the effectiveness of the environmental activities.

To have understand of the biosphere evolution, the boundaries of the biosphere and specific features, the regularities in the formation of vegetation and soil cover, the key links biological and geological cycles of substances, the theoretical foundations for the sustainability of ecosystems and the biosphere as a whole; legislation in the field of environmental protection.

To develop analytical skills to assess environmental situation at global, regional and local levels; modern methods of field, laboratory and instrumental research, physical-chemical and biological methods.

Successful use of professional English.

To apply knowledge and methods of environmental impact assessment (EIA) as a result for developing natural resources and implementation of environmental risk analysis of environmental measures, calculating levels of hazardous and harmful factors in the habitat, determining the environmental characteristics of atmospheric air, hydrosphere, and soil.

To analyze, systemizing and generalizing of information in the field of environmental protection and rational nature management for the inquiries and analytical reviews.

To be capable to carry out on the path of continuing independent learning, accursing additional expertise in the field of environmental protection and environmental management.

To be able to work effectively in a team, to find compromise with collective opinion. There are to possess positive communicative skills based on the principles of citizenship and tolerance. To be understand multiculturalism in a modern global society, to continue independent learning at the end of the curriculum, to expand their knowledge based on information technologies, R&D and R&T.

To be ready to act rationally and independently, guided by their scientifically grounded conclusions, observations and experience obtained because of cognitive professional activity.

To analyze multifaceted information of the environment, correctly formulate relevant conclusions and conclusions in English and foreign languages.

To promote a healthy lifestyle, to use sociological knowledge and modern methods of research; to be able to plan the time, prioritize, observe the deadlines for the completion of work independently.

The novelty of the Environmental Program. It is directed in the preparation of undergraduate students in international education standards – based on credit-modular technology of education, taking into account the variability and diversity of elective modules (optional disciplines), which is of particular value for employers.

The novelty of the Program is characterized by the following:

Application of the world's best educational practices and recommendations of scientists from foreign universities;

Focusing on scientific environmental priorities in curriculum development;

Competence-based, practice-oriented approach focused on learning outcomes and based on the interdisciplinary nature of environmental knowledge and the needs of employers;

Use of project-based and student-centered learning technologies;

Creation of innovative educational and methodological support in English, which is confirmed by the introduction of up to 60% of new subjects recommended by foreign scientists, domestic specialists and employers into the curriculum (Tanybaeva et al., 2019: 133).

Results and discussion

Analysis of modern environmental science priorities allowed introducing new innovative modules into the educational program: "Integrated Ecosystem Management", "Applied Green Economy", "Adaptation to Climate Change", "Environmental protection" and disciplines: "Global environmental challenges and Sustainable Development Goals (SDGs)" , "Environment and Humans", "Land Management", "Water Resource Management", "Sustainable Resource extraction", "Green Economy", "Green Technologies", "Renewable Energy", "Climate Change", "Urban Studies (Urbanistic)", "Ecosystem Services", "Environmental Project" and others. Scientific innovations of the educational program provide in-depth training in mathematical processing of information data and computer modeling, in expanding the skills of conducting technical calculations and forecasting in environmental risk assessment and waste management, which justifies the inclusion in the curriculum of the following disciplines: "Environmenal GIS", "Mathematical modeling in ecology", "Methods and models of waste management "and others.

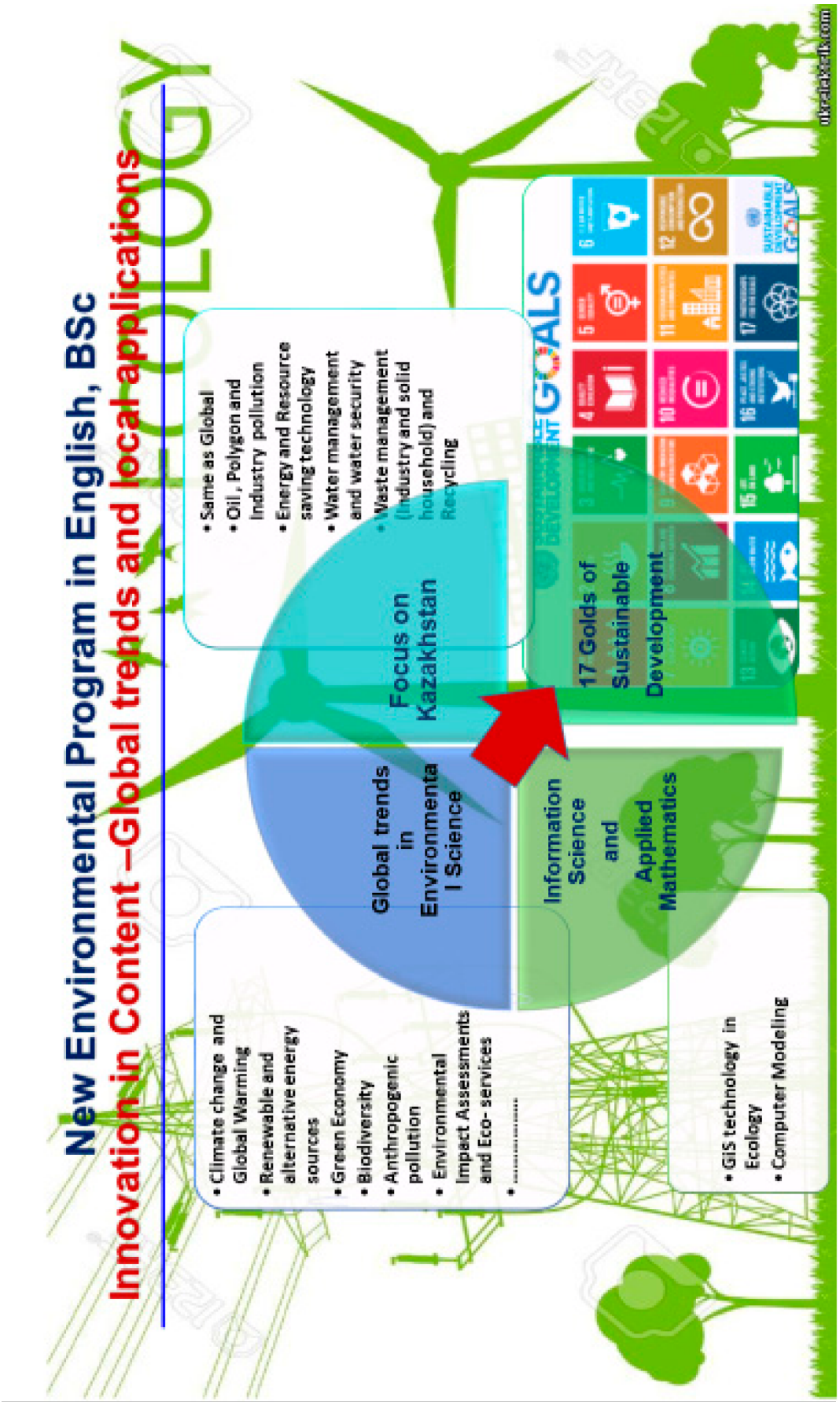

Figure 1 – Scientific priorities of environmental program

The scientific priorities of the new environmental program focus on a comprehensive study of SDGs. All disciplines of the educational program, to one degree or another reveal various aspects of achieving these Goals. A key training course was "Global Environmental Challenges and Sustainable Development Goals (SDGs)". Scientific and methodological developments for this discipline were prepared at the Department of Natural Science, University of Cumbria, UK, by the Research Director of the Center for National Parks & Protected Areas, Professor Ian Convery . By the end of the study, students should be able: to discuss critical issues facing sustainable development with reference to the UN Sustainable Development Goals (SDGs); to link SDGs to a range of global environmental challenges; demonstrate a deep understanding of the complexities inherent in achieving sustainable development. The scientific basis of the course is the analyze complex interrelationships between human wellbeing, poverty and ecology, including cause / effect relationships across scales from the local to the global and placing the issues within the wider debates surrounding sustainability. Students must learn to understand value and critically analyze the various approaches of different disciplines and points of view in social and natural sciences to the problem of human needs and ecology. This scientific approach introduces the main challenge of sustainable development: the need to balance the economic, social, and environmental costs and benefits of development, both for people living now and for future generations (Adams W.M., 2009: 8-10).

This unit focuses on the relationship between environment and development, and the tensions that can exist in that relationship. Above all, this session emphasizes environmental and development challenges must be tackled together if there is to be any hope of understanding – or meeting – the UN SDGs (Stepanyan et al., 2013: 96-100).

Among the scientific priorities in the study of environmental science and sustainable development, the issue of providing water and water security is of great importance. Integrated Water Cycle Management is a management system based on all types of water resources within the hydrographic boundaries, which combines the interests of various industries and the levels of usage. It involves all interested parties in decision-making, promotes the efficient use of water, land and other natural resources in the interests of sustainable ensuring with requirements of nature and society in water (Meyer et al., 2014:225).

Clean, accessible water for all is an essential part of the world and there is sufficient fresh water on the planet to achieve this. However, due to bad economics or poor infrastructure, millions of people including children die every year from diseases associated with inadequate water supply, sanitation and hygiene. Water scarcity, poor water quality and inadequate sanitation negatively affect food security, livelihood choices and educational opportunities for poor families across the world. At the current time, more than two billion people are living with the risk of reduced access to freshwater resources by 2050, at least one in four people is likely to live in a country affected by chronic or recurring shortages of fresh water. Drought in specific afflicts some of the world's poorest countries, worsening hunger and malnutrition. Fortunately, there has been great progress made in the past decade regarding drinking sources and sanitation, whereby over 90% of the world's population now has access to improved sources of drinking water. To improve sanitation and access to drinking water. It is necessary increase investment in management of freshwater ecosystems and sanitation facilities on a local level in several developing countries within Sub-Saharan Africa, Central Asia, Southern Asia, Eastern Asia and South-Eastern Asia (UN – Water, 2016: link).

To achieve the SDGs, different countries of the world are intensively developing environmental energy strategies, conducting scientific developments in the field of renewable energy sources. The focus of the educational program is aimed to studying energy in ecological systems, energy for sustainable development.

Students will be able analyze the complex interrelationships underpinning energy and environmental challenges. They will do this across scales from the local to the global and will place the issues within the wider debates surrounding sustainability. Using a case study approach, they will critically appraising a variety of sources of information, including academic literature, activist publications, governmental reports and internet sources.

Energy is central to nearly every major challenge and opportunity the world faces today. Access to energy for all is essential, even it will be for job, security, climate change, food production or increasing incomes. Working towards this goal is especially important as it interlinks with other Sustainable Development Goals. Focusing on universal access to energy, increased energy efficiency and the increased use of renewable energy through new economic and job opportunities is crucial to creating more sustainable and inclusive communities and re-

silience to environmental issues like climate change (Tomain, 2011: 300-302).

At the current time, there are approximately three billion people, who lack access to clean-cooking solutions and are exposed to dangerous levels of air pollution. Additionally, slightly less than one billion people are functioning without electricity and 50% of them are found in Sub-Saharan Africa alone. Fortunately, progress has been made in the past decade regarding the use of renewable electricity from water, solar and wind power and the ratio of energy used per unit of GDP is declining. However, the challenge is far from being solved and there needs to be more access to clean fuel and technology and more progress needs to be made regarding integrating renewable energy into finite se applications in buildings, transport and industry. Public and private investments in energy also need to be increased and there needs to be more focus on regulatory frameworks and innovative business models to transform the world's energy systems. This lecture and accompanying seminar will consider the key issues relating to SDG 7 and GECs; we will Critique SDG 7 targets and further actions required, including reformulating the SDG targets to better reflect global challenges/realities (Rasul, 2014: 38-45; Zhang Ming et.al., 2013: 125-132).

Scientific and technological advances in the field of renewable energy, energy and resource saving, environmentally friendly technologies in agriculture and industry have become the basis for the creation of such training courses as,"Green Economy","Green Technologies","Renewable Energy" (Mukund, 2006:61-392).

Green Economy is considered as the basis for environmental management and sustainable development on a global and national scale. Learning outcomes of these courses focused on:

Systematize international experience and describe modern concepts of the green economy;

Understand the current problems of depletion of traditional resources and the need to introduce the principles of "green economy" and environmentally friendly technologies to reduce anthropogenic impact on the environment;

Explain the role of the "green economy" in combating climate change in the world and the Republic of Kazakhstan, describe the mechanisms for reducing greenhouse gas emissions;

Analyze the tasks and measures to ensure the "green economy" with environmentally friendly technologies to reduce air pollution based on alternative energy sources, sustainable use of water resources and transport;

Evaluate ways to improve resource conservation and energy efficiency, waste management methods, as well as the technology of "green" chemistry and biology, agriculture;

To possess methods and technologies for analyzing the effectiveness of environmentally friendly energy production for the formation of priorities and setting specific objectives of the green economy in order to ensure sustainable development;

Use this knowledge to solve specific professional problems in the introduction of environmentally friendly technologies, in particular, the principles of the "green office" for the implementation of the mechanisms of "green economy" (Concept for the transition of the Republic of Kazakhstan to a "Green economy", 2013: link).

Based on the experience of Reading University and the advice of our colleague from the UK, Professor Martin Lukac, a new course of discipline"Environment and Humans" was introduced into the Curriculum. Discipline summarizes current trends in the interaction of society and nature, studies of permissible anthropogenic pressures and the diversity of ecosystem services, environmental protection technologies and attributes of ecosystem sustainability.

Ecosystem services are the benefits provided by ecosystems that contribute to making human life both possible and worth living. Examples of ecosystem services include products such as food and water, regulation of floods, soil erosion and disease outbreaks, and non-material benefits such as recreational and spiritual benefits in natural areas. The term 'services' is usually used to encompass the tangible and intangible benefits that humans obtain from ecosystems, which are sometimes separated into 'goods' and 'services'. Some ecosystem services involve the direct provision of material and non-material goods to people and depend on the presence of particular species of plants and animals, for example, food, timber, and medicines. Other ecosystem services arise directly or indirectly from the functioning of ecosystem processes. For example, the service of formation of soils and soil fertility that sustains crop and livestock production depends on the ecosystem processes of decomposition and nutrient cycling by soil microorganisms.

An ecosystems approach provides a framework for looking at whole ecosystems in decision-making, and for valuing the ecosystem services, they provide to ensure that society can maintain a healthy and resilient natural environment now and for future generations. An ecosystems approach is a way of looking at the natural environment throughout your

decision making process that helps us to think about the way that the natural environment works as a system. In doing so we will also be thinking about the spatial scale of your interactions with the natural environment, the range of constraints and limits at play and the people involved in supplying and receiving ecosystem services and benefits. Carrying out economic valuation of the ecosystem services involved will help us to incorporate the value of the natural environment in decision-making (Primmer et al., 2015:160-163; Costanza et al., 2017: 2-11).

It is interesting of the position of scientists in the UK regarding models and modelling approaches to predicting likely future, the development of scenarios and their use in policy formation. To understand what the changes are likely to be, we use three-dimensional climate models, or General Circulation Models (GCMs). By changing the greenhouse concentrations in these GCMs, we can build scenarios of future climates. It is important to recognize that these scenarios are not predictions – they are simply "plausible futures". Some climate variables are better simulated by GCMs than others. That is, we can be more confident about some variables, such as sea-level rise and temperature, and less confident of others such as wind and rainfall. Uncertainties exist in model outputs. Some are irreducible, for example, we are uncertain about how we will live in the future, will economies continue to be fossil fuel based, or will they move strongly towards renewable energy sources? It is important to remember that model outputs provide a future that is likely for variables such as temperature and plausible for others for which there is less certainty, but not necessarily one that will occur (Aherna et al., 2014: 256; Bull et al., 2016:100).

Modeling ecosystem services is closely related to another topic of this discipline "Predicting the future". The course explores how theory developments, together with past data analysis are used to create models of Earth sub-systems and how these are used to create scenarios depicting possible futures. The students are engaged with global circulation models, crop and forest models, as well as the principles of demographics and economic forecasting. General circulation models (GCMs) are essential tools for climate studies. Agricultural models are mathematical equations that represent the reactions that occur within the plant and the interactions between the plant and its environment. Key technology applied to the modelling of climate, crop, natural systems, human society will be discussed, and their usefulness as well as pitfalls highlighted. Forest growth models are important tools within research to investigate and understand key ecosystem processes and to support forest management decisions. Sustainable forest management requires detailed information on tree growth and forest dynamics, including structural development, biodiversity indicators, and effects of disturbances. Economic-demographic models are designed to describe in formal terms the main effects of demographic change on economic activity and those of economic activity on demographic change. The goal of these models is to forecast how the linked population-economy system will evolve over time, provide insights into the effects of policy change, or both. The main original purpose of these models was short-run forecasting, but they also could give policy-makers insights into the effects of policy changes without the need to carry out those changes. Formal economic-demographic models for developing countries were designed to illuminate the interaction between population and other variables in the development process and evaluate the consequences of various policies on economic and demographic variables (Bonan et.al., 2018: 28-32; Hengeveld et al., 2017:256).

The requirements of Foreign and Kazakhstani employees (Stakeholders) are taken into account in the formation of the academic discipline "Environmental Project" and the content of educational programs of the Educational Internship, Practice Training, Pre-Graduation Internship.

The effective application in work of the experience gained within the walls of the university is the key to successful and productive work. That is why, at the meeting with main Stakeholders the Director of Company "KazEcology" A.A. Skakov underlines that it is important not only the baggage of university knowledge, working skills in information networks, with databases and computer programs, but above all the ability to analyze, professionally reflect research results in reports and projects.

Ecological project is the process of justifying and assessing the environmental impact of facilities, either specifically projected to change the unfavorable properties of the human environment (natural and fabricated landscapes), or objects of direct environmental value. There are projects of landfills for solid household and industrial wastes, sewage sludge deposition devices, as well as projects to create reserves, national parks, reserves (Massey, 2011: 18-21).

Conclusions

Generally, the practical significance of the educational program "Environmental Science"

is extremely high and is aimed at training highly qualified specialists in ecology and sustainable development, organizing and conducting comprehensive environmental protection measures in the national, regional branches of the economy, as well as working in international organizations and foreign companies.

Sustainable consumption and production is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Its implementation helps to achieve overall development plans, reduce future economic, environmental and social costs, strengthen economic competitiveness and reduce poverty. At the current time, material consumption of natural resources is increasing, particularly within Asian counties. Countries are also continuing to address challenges regarding air, water and soil pollution (Yolles M et.al., 2014:15-19).

Science and manufacturing are an important driver of economic development and employment. At the current time, however, manufacturing value added per capita is only US$100 in the least developed countries compared to over US$4,500 in Europe and Northern America. Another important factor to consider is the emission of Carbon Dioxide during manufacturing processes. Emissions have decreased over the past decade in many countries but the pace of decline has not been even around the world. Technological progress is the foundation of efforts to achieve environmental objectives, such as increased resource and energy-efficiency. Without technology and innovation, industrialization will not happen, and without industrialization, development will not happen. There needs to be more investments in high-tech products that dominate the manufacturing productions to increase efficiency and a focus on mobile cellular services that increase connections between people (About the Sustainable Development Goals-17SDGs, 2015: SDG9, link).

Given the above areas of human development, identified for 17 SDGs, the scientific priorities of new environmental program are green economy and renewable energy, innovative resource-saving technologies and environmental protection, ecosystem services and socially responsible environmental design, etc.

A scientifically based approach in the choice of disciplines, a benchmark for innovative achievements in the field of ecology and sustainable development, the use of the training experience of foreign scientists and taking into account the views of employers form the basis for the successful implementation of the environmental program in Kazakhstan's universities.

References

About the Sustainable Development Goals -17SDGs (2015). United Nations. Web site: https://www.un.org. Last modified: 24.01.2020

Adams W.M. (2019) The dilemma of sustainability. In: Adams WM Green Development: Environment and Sustainability in a Developing World, 3rd edn. Routledge, pp.1-25.

Aherna J., Cilliers S., Niemelä J. (2014) The concept of ecosystem services in adaptive urban planning and design: A framework for supporting innovation. Landscape and Urban Planning, vol.125, pp. 254-259.

Bonan G.B., Doney S.C. (2018) Climate, ecosystems, and planetary futures: The challenge to predict life in Earth system models. Science, vol. 359 (6375), pp. 26-33.

Bull J.W., Jobstvogt N., Böhnke-Henrichs A., Mascarenhas A. (2016) Strengths, Weaknesses, Opportunities and Threats: A SWOT analysis of the ecosystem services framework. Ecosystem Services, vol.17, pp. 99-111.

Concept for the transition of the Republic of Kazakhstan to a "Green economy". (2013) The Decree of the President of the Republic of Kazakhstan, No. 577. Web site: https://strategy2050.kz. Last modified: 15.11.2018.

Costanza R., de Groot R., Braat L., Kubiszewsky I., Fioramonti L., Sutton P., Farber S., Grasso M. (2017) Twenty years of ecosystem services: how far have we come and how far do we still need to go? Ecosystem Services, vol. 28(A), pp. 1-16.

Hengeveld G.M., Schüll E., Trubins R. (2017) Forest Landscape Development Scenarios (FLDS)–A framework for integrating forest models, owners' behaviour and socio-economic developments. Forest Policy and Economics,vol. 85(P2), pp. 245-255.

Massey S. (2011) Best Practices for Environmental Projects Teams, Elsevier, 316 p.

McIntosh M., Cacciola K., Clermont S., Keniry J. (2008). State of the Campus Environment: A National Report Card on Environmental Performance and Sustainability in Higher Education. Web site: http://www.nwf.org. Last modified: 19.11.2019

Meyer B.C., Lundy L. (2014) Integrated Water Cycle Management in Kazakhstan. Al-Farabi Kazakh National University, 320 p.

Mukund Patel R. (2006) Wind and Solar Power Systems: Design, Analysis, and Operation. Taylor & Francis Group, 433 p.

Primmer E., Jokinen P., Blicharska M., Barton D.N., Bigter R., Potschin M. (2015) Governance of ecosystem services: a framework for empirical analysis. Ecosystem Services, vol.1, pp. 158-166.

Rasul G. (2014) Food, water and energy security in South Asia: a nexus perspective from the Hindu Kush Himalayan region. Environ. Sci. Policy, vol. 39, pp. 35-48.

Stepanyan K., Littlejohn A., Margaryan A. (2013) Sustainable e – Learning: Toward a Coherent Body of Knowledge. Educational Technology & Society, vol.16 (2), pp. 91-102.

Tanybaeva A., Voronova N., Abubakirova K., Tazhibaeva T., Rodrigo Illarri J. (2019) Tendencies of Higher education development in ecology. Journal of Geography and Environmental Management, vol. 52 (1), pp. 130-134.

The Millennium Development Goals Report (2015). United Nations. Web site: https://www.un.org. Last modified: 07.10.2019

Tomain J. (2011) Politics of Clean Energy: Moving beyond the Beltway. Energy Law, vol. 3, pp. 299-303.

UN –Water Annual Report (2016). United Nations. Web site: https://www.unwater.org. Last modified: 25.05.2018.

Yolles M., Fink G. (2014) The Sustainability of Sustainability. Business Systems Review, vol. 3, n. 2, pp. 1-32.

Zhang Ming, Wang Landan (2013). The Impacts of Mass Transit on Land Development in China: The Case of Beijing. Research in Transportation Economics, vol. 40, pp. 124–133.