

Inclusion of educational ecological programs in the process of managers' training is an effective way of transition to pure production

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At the present stage of social progress creation of conditions for mankind development, improvement of life quality first of all characterizing by such indicators, as healthcare and education level, extent of population employment, level of its welfare, ecology, safety and human rights become the main criterion of development of territories, indicator of efficiency of structures of management activity of all levels.

At the same time, the ecological aspect of life quality is compiled by control of condition of the water-air pool and environment protection, recycling and recovery nature protection actions.

Strategic mission of development of the Arkhangelsk region is to increase of welfare of its population based on dynamic and persistent economic growth. The major task is a preservation of unique natural resources of our region when ensuring further development of its economy. After all in the north of Russia the largest array of natural ecosystems on a planet that serves as a reserve of stability of the biosphere has persisted.

The problems of ecological safety are among the most actual ones attaching to the northern territories. In the last decades the ecological situation developed in the territory of the Arkhangelsk region, was defined generally by the character and scales of negative anthropogenic impact of such enterprises as pulp and paper mills, the sawing and woodworking enterprises, hydrolytic plants, the enterprises of power system and defensive and military complex. However, in recent years capacity on environment is caused by carrying out of exploration activities and mining of all types of minerals.

Violation of the earth surface and subsoil, pollution of water and air environments become consequence of these activities.

The problem of water pollution is especially sharp in the Arkhangelsk region. One of the main reasons for unsatisfactory condition of water objects in places of water use is the dumping of raw (or insufficiently cleared) sewage of the enterprises containing polluting substances. In the tests of water investigated by ecological services of the region in 2012, 30 names of polluting substances are named in the sewage of enterprises. The prevailing number of pollution in superficial water objects is brought by the pulp and paper industry enterprises.

In this regard, despite the efforts undertaken by bodies of regional government and municipalities, the problem of providing the population with qualitative drinking water remains unresolved. According to the State Sanitary and Epidemiological Surveillance centers the specific weight of sanitary tests of water from the water supply system, not answering to hygienic standards, made 43,9% in 2002¹. By 2012 the share of studied tests of drinking water from the parting network, not meeting to hygienic standards on sanitary and chemical indicators, reached to 40,8% that by 2,4 times exceeds the average Russian indicators though the specific weight of sources of the centralized water supply not corresponding to hygienic standards has decreased to 32,7%².

Besides, during the analysis of quality of water in the sources of centralized water supply it was determined that all tests (100,0%) in 2012 didn't meet to hygienic standards for sanitary and chemical indicators in Koryazhma city where the largest pulp and paper mill belonging to JSC "Ylym Group" is located. The high percent of non-standard tests (more than 80%) is noted for a quarter of the territory of the region, including the regional center, Arkhangelsk city.

The main sources of atmosphere pollution are the enterprises of pulp and paper industry, heat power engineering, mechanical engineering, metalworking, asphalt concrete and cement plants, transport enterprises. Motor transport that number increases constantly in the cities of the region becomes one of the main sources of air pollution last decades. Municipal enterprises that are engaged in warm and water supply of the region also make considerable contribution to complication of ecological situation. Frequent change of the owners of the boiler rooms belonged to municipalities, dilapidated condition of these objects and other thermal networks, deterioration of the boiler equipment, failure of planned nature protection actions lead to increasing of emissions of harmful substances capacity in the atmosphere.

The enterprises for mining, pulp-and-paper production and the enterprise for production and distribution of the electric power, gas and water that are the main sources of the growth of waste also concern. The main contribution to increasing of the quantity of formed waste is made by the enterprises for mining recent years. Therefore, in 2012 the contribution of these enterprises to formation of waste made more than 95%!

According to statistical observation, 55776,654 thousand tons of waste were formed at the enterprises of Arkhangelsk region, but only 10,8% from total amount was used by

¹ Environmental condition and protection of Arkhangelsk region in 2002. Report. – Arkhangelsk, 2003 – p.90-91.

² Environmental condition and protection of Arkhangelsk region in 2012. Report. – Arkhangelsk, 2013 – p.53-57.

these enterprises, and neutralized only 0,05% from all weight of the formed waste in 2012.³

The lack of effective waste control system, systems of collecting, transportation, utilization, neutralization, storage and burial, conducts to their accumulation, both in territories of the organizations, and on unauthorized dumps and, as a result, to intensive soil pollution, surface reservoirs and underground waters, atmosphere air.

Such situation cannot but disturb the federal and regional bodies controlling and managing in the field of environmental protection and environmental management. Purposeful work on elimination of earlier accumulated ecological damage and decreasing of negative impact on environment is conducted in Arkhangelsk region. The state supervision in the environmental protection and environmental management sphere, supervision in use and protection of water and soil objects, land supervision, supervision by the sea and continental shelf, geological supervision, supervision in forestry sector and forest exploitation sphere, in the sphere of circulation with production and consumption waste are organized. The payment for negative impact on environment is taken, the long-term target programs directed on decreasing of environmental problems are accepted and realized.

At the same time, it is time to prevent not consequences of deterioration of ecological situation, but the reasons that have generated this deterioration.

A lot of attention is paid to development of ecological education directed on formation of system of scientific and practical knowledge and abilities, valuable orientations, behavior and the activity providing the responsible relation to environment and health at people of all age and social groups in recent years. Formation of ecological culture of the population of Arkhangelsk region begins in educational institutions. Thus, the special attention to ecological education is paid in educational institutions and the professional education institutions realizing natural-science profile of training.

At the same time, the main share of ecological responsibility lays down on the enterprise and its administrative personnel. Therefore, firstly as events in the field of nature protection they should be held directly at the enterprises. These events act as basic elements of production on the one hand, and as the main source of ecological danger on the other hand. So, the production managers must receive ecological knowledge first of all that will allow them to accept and carry out ecologically competent administrative decisions based on sufficient awareness about ecological consequences of economic activity of the

³ Environmental condition and protection of Arkhangelsk region in 2012. Report. – Arkhangelsk, 2013 – p.226.

enterprise run by them. The deficiency of ecological knowledge underlies the most part of violations of the nature protection legislation.

Knowledge about environmentally friendly technologies that could become a basis of future business development, and about the principles of ecological efficiency assuming decrease and prevention of negative impact of production on environment at the simultaneous increase of financial efficiency of its functioning are the more necessary for modern production managers.

The World Business Council for Sustainable Development (WBCSD) defines ecological efficiency as "increase in production of useful goods and services with simultaneous continuous reduction of use of natural resources, raw materials and energy"⁴.

Concepts of pure production and ecological efficiency, focusing business for sustainable development, are under construction not on economy and ecology opposition, but on creation of synergetic effect from ecological and economic components. Application of the technologies, allowing reducing of consumption of resources and harmful effects on environment at conservation of existing level of production, leads to reduction of expenses for acquisition of raw materials, water and energy; on emissions, discharges and waste disposal, to receiving economic benefits from extraction of valuable side products, therefore provides increase in profit of the companies. At the same time, the use of the concept of ecological efficiency in production guarantees possibility of more consecutive and active approach to environment protection problem, therefore possibility to increase of ecological component of life quality of current generation and that not less important, to appearance of guarantees on satisfaction of requirements for natural resources by future generations.

Establishing of the enterprises based on pure production has to be accompanied by preparation of the appropriate specialists and training in their methods of management necessary for safe, effective and ecologically friendly activity.

The methodology of pure production is under construction on consecutive application of uniform preventive strategy of environmental protection concerning processes and goods for the purpose of decrease in risk for people and environment:

- pure production concerning production processes assumes savings of raw material resources and energy, use of renewable energy and materials, exception of toxic

⁴ Bosshardt F.W. Okoeffizienz – das Leitmotiv des World Business Council for Sustainable Development//Weizsacker and Seiler –Hausman : Okoeffizienz: Management der Zukunft. – Berlin, Basel, Boston: Birkhauser,1999

raw materials, reduction of volumes and toxicity of all emissions and waste before the end of production;

- strategy concerning goods concentrates on interrelation of impacts made by goods throughout all its life cycle, since production of the raw materials used for its production, and finishing goods utilization;

- pure production is reached by application of "know-how", improvement of technology and by forming of new culture of business management.

The lecturers of the Northern (Arctic) federal university named after M.V. Lomonosov began to acquaint with the program "Pure production" in 2005. The initiator of "Pure Production project" directed on professional development of lecturers of higher schools and technical schools of the north-west of Russia, is the department of engineering protection of environment (NorTech Oulu), at that time it was Oulu university division, with the financial support of the Ministry of the environment of Finland.

Two groups of lecturers were selected from the Pomor state university (later entered in the structure of created federal university). They were the representatives of Institute of Management which was specialized on administrative education (both basic, and additional professional), and Natural and Geographical Faculty where natural-scientific preparation was conducted.

In the first half of 2006, a number of introductory seminars took place in Murmansk and Petrozavodsk where participants were discussing needs of the industry in experts in the field of pure production and needs of higher schools in programs of professional development of lecturers. The organizers have offered two programs for technological and administrative specialties in result of work of seminars.

In October and November 2006, the intensive advanced training courses "Pure Production" passed in training center of Oulu University for the lecturers of Russian higher schools. The first course was with emphasis on technology, the second one is on management. The questions like definition of pure production and other concepts, general quality management, questions of sustainable development, methods of ecological reporting, management of streams of materials, ecological ethics, European ecological legislation and the international standards, the system of ecological management and environmental problems of the region were considered in the program of courses. Visitation and acquaintance with pulp and paper mill Stora Enso work were organized for the learners.

Experts in economy and finance, management and logistics, ecology and biology considered the subject "Pure Production" from different positions and aspects, but on the same methodological basis.

Preparation and carrying out of 72-hour program of professional development "Ecology and environmental management" for the staff of our university during the period from March to May 2008 became the following stage of this work. First of all it was with the help of the teachers trained in Oulu, and with the involvement of Finnish colleagues. The professor of Tampere Technological University Simo Isoakho read the course "System of Ecological Management", the professor of Oulu University Yaakko Kuyala read the course "General Quality Management".

Besides, our two lecturers have special training in National certified chamber in Moscow and were certified as experts in certification of Systems of ecological management according to requirements of the ISO international standards of series ISO 14000 and ISO 19011.

Thus, the team of lecturers, able to conduct further work on introduction of educational programs of ecological management was prepared at the university. Unfortunately, further work was interrupted in this direction for objective reasons: disbandment of the majority of establishments of higher and secondary professional education operating in the region and creation of large federal university on their base began.

Today it is possible to say not only about completing of formation of the Northern (Arctic) federal university named after M.V. Lomonosov, but also about positioning of NArFU "as successful, innovative, educational institution, able to prepare highly-qualified specialists for the North and the Arctic"⁵.

Strategic goal of SAFU is maintenance of innovative scientific and personnel support of protection of geopolitical and economic interests of Russia in Arctic by creation of system of continuous professional education, integration of education, science and production, strategic partnership with business community. Among the priority directions of the university development is high-tech knowledge-intensive branches and productions; complex use of bio resources; protection and environment preservation.

Importance of efforts in these directions has confirmed again with acceptance of "Strategy of development of the Arctic zone of the Russian Federation and ensuring of

⁵ The Arctic vector of NArFU [Electronic resource]. - Access mode: <http://www.narfu.ru/university/about/presentation/>

national security for the period till 2020"⁶, approved by V. V. Putin, the President of Russia on February 20, 2013. It is emphasized in the Strategy that complex social and economic development of the Arctic zone of the Russian Federation is impossible without overcoming of a number of risks and threats that the current social and economic state of subarctic territories is characterized. Insufficient availability of the population with clear drinking water in social sphere; increase of technogenic and anthropogenous loading on environment in environment management and environment protection sphere are carried to such threats.

Therefore among the priority directions of development of the Arctic zone of the Russian Federation are distinguished:

- providing of ecological safety;
- energy efficiency increase, expansion of use of renewables, development and realization of projects in the field of energy saving and energy efficiency;
- creation and development of effective system of the management with production and consumption wastes in the Arctic zone, their maximum involvement in economic circulation;
- providing of rational environment management and development of ecologically safety types of tourism;
- elimination of ecological damage caused as a result of last economic, military and other activity in the Arctic zone of Russia;
- realization of actions for decrease of threats to the environment caused by expansion of economic activity in Arctic, including continental shelf (taking into account increase of responsibility for environmental pollution of the enterprises-users of nature);
- development and introduction of economic mechanisms stimulating use of new technologies, providing decrease of negative impact on environment, reproduction and rational use of mineral and raw and biological resources, energy and resource conservation, utilization of associated oil gas in areas of oil production.

In our opinion, there is a problem of development of ecological education becomes actual again in this regard. We plan to conduct this work in two directions:

The program of professional retraining "Pure production (Environmental management)", calculated on the heads of enterprises of the region and including four large modules: basic module "Environmental management" (10 ECTS), advanced module "Ecological Management and Economics" (10 ECTS) and two special modules (by 5

⁶ The strategy of development of the Arctic zone of the Russian Federation approved by Vladimir Putin the President of Russia [Electronic resource]. – Official site of the Government of Russia. Access mode: <http://government.ru/docs/22846/>.

ECTS): "Environmental business" and "Quality management" (see the table). Retraining will take 8-9 months while training 2-3 times a week in the evening (it is possible to use remote educational technologies).

Certainly, the possibility of attraction to carrying out this program of our foreign colleagues from the countries where the methodology of pure production is introduced at the enterprises would be ideal for us. It will increase sharply the appeal of the program to representatives of real sector of the regional economy.

The table is Curriculum of the program of professional retraining of the heads of enterprises "Pure Production" (the volume is 30 European credits, 360 classroom hours)

Content of modules	Credit units	Labour content (hours)		
		total	audit.	individual
Environmental management: EMS; Eco-Labeling/Eco-mapping; LCA; Supply Chain management; Environmental law and ethics	10 ECTS	360	120	240
Ecological management and economics: economic regulation in the field of environment protection; eco-efficiency; resources management; eco-accounting	10 ECTS	360	120	240
Environmental business: follow up of environmental expenditures; business know-how; ecological economic parameters of production; environmental communications	5 ECTS	180	60	120
Quality management: TQM; risk management; environmental risk and impact assessment; chemical and hazardous waste regulations	5 ECTS	180	60	120
Total:	30 ECTS	1080	360	720

The second direction of ecological education is connected with training of students. Our plans in medium-term perspective are opening of interdisciplinary magistracy on ecological management. Preparation of masters in directions "Management", "Ecology and Management Environment" and "Energy-saving processes" is conducted at the university. It is possible to create the innovative master program "Pure Production" on its basis. The huge advantage can become the point that federal universities have the right to conduct training of specialists not only according to the federal state educational standards (FSES), but also according to their own educational standards.

We are sure that this program will be interesting as to graduates of bachelor degree in engineering, natural science, economic directions, and to the experts who are already in production.

Realization of this master program within network interaction of federal universities of Russia can become the following step and, in ideal, its next inclusion in the educational network of higher schools of Europe, because the development of the joint master program can be supported by the organizations and the funds financing development of European education system.

We hope that colleagues will be interested in our offers and these offers may become the basis for further cooperation.

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