BIO-EDUCATION ON THE WAY TO NEW THINKING

Olga Musikhina
Director, Business Technical
Assistance Centre, Kuban State
Technological University, Russia

Professor Anatoliy Shishatskiy
Vice-Director
Kuban State Technological University
Novorossiysk, Russia

The Krasnodar Territory of Russia is situated on the Black Sea and has all the necessary conditions for common activities associated with living a quality life. The uniqueness and abundance of the land, its soils, sea and geographical location greatly enhance the opportunities for the inhabitants in the region. The benefits of this region, in comparison with other Russian regions, help to overcome the economical restructuring of the post-Perestroika period much easier. Novorossiisk, the biggest Russian Black Sea port, is within the Krasnodar Territory and has the same problems as the whole Black Sea region.

For many millennia, mankind has coexisted with the Black Sea environment, used it for its own purposes without hurting its stability, and thus allowed it to quickly and naturally recover. But the intensive development of industry, agriculture, house-building and tourism in all the countries of the Black Sea region has led, in the last decades, to the appearance of complex environmental problems. First and foremost is the syndrome of marine eutrophication, connected with a sharp increase of biogenic substances - phosphorus, nitrogen - in the river sewage collection. Research carried out has shown that the biological health of the biggest European river, the Danube, is jeopardised because of strong anthropogenic loads. This accounts for half of the nutrient and oil input to the Black Sea. Only the drainage basin of the Danube, Dnieper and Dniester rivers carries, each year, in average, 280 cubic kilometres of fresh water - 85 % of all fresh water income - where the concentration of phosphorus has increased from 10 to 200 mg/l and that of nitrates from 20 to 100mg/l. All this has led to a mass "flourishing" of seaweed, to the decrease of oxygen production, and to the ruin of benthic organisms. Red tides become chronic in the coast-waters of Bulgaria and Romania. The processes of eutrophication are especially intensive in the shallow north-western part of the Black Sea.

The Black Sea was polluted by radionuclides - strontium 90, cesium 137 and cesium 134 - after the Chernobyl disaster. The dangerous increase of hydrogen sulphide and its anomalous rise - up to 50 or 60 metres - greatly influenced the whole Black Sea ecosystem; fishing has decreased in the Black Sea. In the Novorossiisk region, the whole situation was portrayed very negatively to the citizens. Large cement producing factories, which tried to meet their quota at any cost, polluted the city atmosphere with great amounts of cement dust at the end of every month. Especially dangerous for human health and the environment is the thinly dispersed dust. The Novorossiisk cement industry is a leader among the large, air-polluting building material enterprises in Russia. The areas with a high content of cement dust and hazardous substances in the air are found around the factories. Different pesticides are widely used in agriculture, as Novorossiisk is the land for wine making and vegetable growing. The famous champagne-producing factory, Abrau-Durso, is situated in the city. Damages to the system of water supply, sewerage and irregular water supply are constant threats to the entire freshwater supply. The growing coastal out-flows into the Tsemess Bay cause the greatest harm to the bay itself.

Environmental problems inherited by our land and city as well as by the other lands of the former USSR are very serious. But there have been new ones appearing during the post-Perestroika period. The warships moved to the Tsemess Bay have increased the pollution significantly, and it is now the navy fleet which is the main threat to the bay.

"There is a high degree of traffic of oil, oil-products and cargo transfers in the port of Novorossiisk. The great concentration of vessels and the technical breakdowns or accidents on the coastal objects are the main cause of environmental contamination." This situation is described in the report On the state of the environment of the Russian Federation, in 1995. The industry and traffic contribute to the high level of air pollution. The increase of carbon oxide, sulfide dioxide and nitrogen oxide, up to 70% more, is connected with the growth of goods being trafficked through the trade seaport. The influence of motor transport on the environment is very large. The city is a key transit point for the goods/cargoes bound to go through to the port of Novorossiisk. Constant oil-spills in the brine are leading to the contamination of the whole coast and are contributing greatly to the destruction of bird and fish habitats. In 1991 alone, more than 44 tons of oil products got into the waters of the Black Sea between Anapa and Sochi. Oil contamination is the main danger for marine ecosystems, as 20-30 % of the world ocean surface is covered by oil films. On the regional level, large oil spills result in an ecological catastrophe on a local scale, that is followed by mass destruction of birds and animals, and a decline in fishing. Semi-closed seas with highly intensive shipping, such as the Black and the Mediterranean Seas, suffer from contamination the most. The Mediterranean Sea, for example, with a surface area of only 1.7% of the World Ocean surface, has suffered about 17% of the total ocean pollution.

The wrong ideology and practices sometimes have unplanned accessory productive and positive effects. For example, M. Gorbachev's "dry law," i.e. the outlawing of alcohol, destroyed some unique vineyards, but, also resulted in a decrease in pesticide application. In addition, the hard economic crisis, as a consequence of the interruption of certain industrial operations, had some positive ecological effects, such as, for instance, the Novorossiisk cement factories producing payments as environmental fines. The Black Sea ecosystem has received a short break from further abuses. The development of new economic relations makes enterprises calculate all the negative ecological expenditures and look for ways to reduce them. Hence, pesticide application in agriculture is reduced, non-herbicide methods for rice and corn growing are used, and the grain crops are even increasing. Biological methods of plant protection are also widely used. All these measures are leading to the decrease of environmental contamination. The same phenomena took place in 5 out of the 6 countries of the Black Sea region. But the negative influences may return, with the Black Sea countries coming out of the crisis situation and into a near-normal environment.

The environmental crisis comprises the whole globe, as the end of the 20th century nears. It is the result of "cowboy" or conqueror's attitudes towards nature, that were developed on the basis of production forces without regard to the surrounding environment. Having realised the consequences, humanity came to the conclusion to overcome this "cowboy" consciousness and to correct everything it has developed with all acceptable methods. Environmental education is imperative, in order to succeed in improving the condition of the environment. Environmental upbringing and information on the ecological situation in the world is a major tool to improve and to recover the beautiful environment that was being destroyed and may now be making a come-back. Public environmental upbringing and education must be changed in the direction of a more sensible and a more humane attitude towards nature. A more extensive application of environmental education is needed, in order to continue the recovery and the development of a higher planetary consciousness, that has as its basis a rich spiritual culture and the betterment of humankind.

At the beginning of the 1970s, environmental education was the mere study of principles and methods to defend the environment. It was of a passive char-acter. The last years have shown that this philosophy is too narrow in scope. The knowledge of the human environment needs to be monitored, evaluated, and corrected on a regular basis in a proactive fashion. The goal of environmental education must be to develop a systematic process in human societal upbringing and, therefore, it must combine the efforts of all scientists and educators. In modern conditions, the practical aspect of this problem is the environ-mental/professional training of specialists in industry to develop methods of production in a more harmonious manner with the surrounding environment. The societal responsibility of an engineer has increased greatly at the end of the 20th century. Consequently, the education and knowledgeability requirements of a specialist have increased greatly, also. One such requirement is environmental/humanitarian education, which promotes the mastering of cultural/humane values. The humanitarian education of the modern engineers is not a luxury, but a professional necessity. Humanitarian disciplines help to develop logical thinking and the skills to analyse a situation and to make decisions when faced with any difficulty. This is possible through an organised and continuous training effort by the scheme: school-lyceum-college-university-vocational-postgraduate, and continued professional training.

At the beginning of the 1990s, the problem of bio-education for the young is being intensively developed in the Kuban State University of Technology. Great attention is paid to the development of humanitarian disciplines, as the basis of the classic education which existed in Tsarist Russia. The humanisation of education is a progressive approach to fight with technocratism and to secure the breadth of thinking of a specialist, so as to tackle environmental interdisciplinary subjects. Education begins in the lyceum, with preparatory courses as well as with different professional courses and seminars. Many goals are achieved by this method: (a) the adaptation of freshmen to the higher perception of education. Siftings due to poor progress, or mistakes in professional choice are practically non-existent; (b) educational, environmental, economic and legal training begins at the initial level; (c) selection of the most talented youth is made; (d) recommendations for training at universities abroad, for post-graduate education and for working in the education field is given.

In the environmental field, higher education directly means two principal methods of training: (a) every technical and technological speciality has the disciplines of ecological orientation and is connected with technological progress, with the goal of environmental conservation; (b) together with the first method, ecologists and managers with different specialisations are trained.

Different enterprises with an environmental orientation are developing in parallel, for example, The Polytekh Scientific Industrial Educational Center that has in its body such creative groups as:

- a scientific research institute for the experimental production of environmental protection equipment, on the basis of polymeric filter materials, such as filters and analytic respirators
- office designers providing guidelines for the evaluation of environmental protection measures
- environmental impact assessment teams
- specialists developing laser technology devices for the assessment of degrees of contamination

Kuban State University of Technology in Krasnodar works in close co-operation with the Scientific Research Institute of Geochemistry and Biosphere of Rostov State University. The methodology of environmental education, carried out by both establishments, creates great interest in Russia, in countries of the former USSR and abroad. The students are widely attracted to practical and theoretical research, under the leadership of their educators in different directions: mathematical models of the disaster theory in ecology; higher ecology and the models of human brain activities, and others. Research areas include: devices and methods of non-homogeneous substances on water-surfaces, such as oil-spots and organic and inorganic film origins; the discovery of synoptic whirlpools as ecological disaster forerunners. The patents are registered in the USA, Germany and France.

However, environmental knowledge alone does not secure its application. The training of engineer/managers has also begun in Novorossiisk. The study includes: technological and production processes forming the profiles of the cities, regions and territorial complexes; multileveled forms of rebuilding the economy; new forms of property; the functioning of small, average and large enterprises, based on the most modern technologies in order to add supplementary accents.

Thus, a purposeful youth education - on the basis of one's own scientific research in the field of waste reduction technologies - and a geo-chemical assessment of activity results can help to compose the picture of the harmful influence of anthropogenic effects on nature and may also help to create a new way of thinking for the engineers of the twenty-first century.

Olga N. Musikhina is Head of the Foreign Language Department at the Novorossiysk Branch of Kuban State Technological University, and Director of the Business Technical Assistance Centre. Her special training is in Business Management and Goal Setting, and she has worked as Director of Studies at the Technical Railway College in Novorossiysk, where she was responsible for the curriculum and administration of the educational program. She has also served as Senior Lecturer in English and German at the Novorossiysk Branch of Kuban State Technological University.

Professor **Anatoliy T. Shishatskiy** is Vice-Director of Studies and Dean of the Faculty of Management and Rational Use of National Resources, at the Novorossiysk Branch of Kuban State Technological University. He holds a Ph.D. from the Pedagogical University of Moscow and has served as Head of the Department of Humanitarian Education and Law, as well as Senior Scientific Collaborator at the Scientific Research University.