

BIO-EDUCATION: AN AVENUE TOWARD SUSTAINABLE DEVELOPMENT IN THE THIRD MILLENNIUM

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One of the main causes of the degeneration of the environmental situation on earth is rapid population growth. The last doubling of the population from 2.5 billion to 5 billion took place during only a third of a century (from 1954 through 1987). During this time the total volume of industrial and agricultural waste increased ten-fold. The main path toward the sustainable development of nature and society, in the third millennium, is demographic regulation and a reduction in the growth-rate of the earth's population. This is one of the principle challenges for bio-environmental education, bio-culture and bio-policy.

We are all here today because we understand that humanity will not survive into the third millennium without new bio-environmental education and a new mentality, a new bio-environmental culture and policy. It is clear that the aim of bio-environmental culture is the sustainable development of that which surrounds us, nature and, what constitutes a small part of nature humanity itself.¹ The aim of this report is to discuss one possible way to reach such harmony.

First, some facts about Lomonosov Moscow State University and the Earth Science Museum. Lomonosov University is one of the oldest and most prestigious universities in Russia. It was founded by Mikhail Lomonosov, a noted scientist, in 1755 but has carried his name only since 1940. Originally there were only 3 faculties (philosophy, law and medicine). Today there are 19, some of which are situated on the old site next to the Kremlin and others in the new building, constructed between 1949 and 1953, on the highest point of Moscow, Sparrow Hills, an area considered almost sacred in Russian history.

Today, the University of Moscow has an enrolment of more than 26,000 students, approximately 7,000 post-graduate students, 1,000 lecturers and 5,000 technical assistants. The staff consists of 15,000 people and the library contains 8 million volumes. Included in the University complex are 3 museums and a publishing house, which, publishes 400 books per year.

Bio-Environmental Education at the Earth Science Museum

The Earth Science Museum is one of three museums in Lomonosov Moscow State University. Our museum occupies 7 upper floors of the main Lomonosov University building. The museum exhibitions present complex global problems, beginning with earth's evolution as a planet body, and ending with the relationship between human society and nature. With every year that passes, we increasingly understand the importance of the latter problem.

The scientists of our museum have had 10 years of experience in educating Moscow's students and children in bio-ecology. For 3 years, 1986 to 1989, we carried out the Special International Programme UNESCO-UNEP, Environmental Education by Means of a Museum. Within the framework of this programme, we prepared special exhibitions in the Earth Science Museum. The first was Environmental Problems of the Present and the second, Environmental Education by Means of a Museum in Lomonosov Moscow State University. These exhibitions were shown in Moscow and at Palermo University in Italy. We also prepared special scientific articles on methods of environmental education through a museum.² Collaborators at our museum, prepared two more special collections on the problems of ecology and bio-environmental education.^{3,4} Special methods of bio-environmental education have been developed for children of different ages and people from different social groups. Three general Russian, and two international, workshop conferences about the problems of bio-environmental education have already been carried out. Our Earth Science Museum has become the overall Russian museum centre for bio-environmental education. However, the more the methods of environmental education are developed, the more difficult it is to answer the question, "What is the main aim of this education?" Why is the environmental situation in Russia and in the whole world, in spite of enormous investments of capital for the preservation of the environment, worsening every year? We found the answer to this question in the scientific works of our Russian colleagues, Professors V.G. Gorshkov, K.S. Losev and Academicians, K.Y. Kondratiev and V.M. Kotliakov.^{5,6}

Main Aim of Bio-Environmental Education

In 1953, the earth's population totalled 2.5 billion and, in 1987, 5 billion. The doubling of the population occurred within 34 years, during only

one third of a century. If this current trend of rapid growth is continued, then somewhere in the year 2030, the total number of people on earth will be 10 billion. From the beginning of the 1950's up to the late 1980's, while the population doubled, the total quantity of anthropogenic waste in the world increased ten fold.

Over the last 100 years, the global human consumption of mineral and natural resources has increased by more than ten times. Today, the integral indices of consumption are expressed by the following mean figures: about 20 tons of raw material has to be produced and grown to feed one human being, for one year. This raw material is processed into the final direct-consumption product, with a total mass of about 2 tons, as a result of the expenditure of 2.5 kW energy an hour, and 800 tons of water, per year. From the two tons of this final product, one ton is turned into waste and as a rule, thrown out, annually. The second ton is also waste, but of a different kind, and its disposal is delayed for some years. Thus, from an environmental point of view, technological progress means a heavy increase in the consumption of energy, all kinds of mineral and natural resources and the rapid growth of the earth's population, as well as an even more rapid increase in anthropogenic waste.

During the last 20 years, in the period between the two major conferences on environmental control, the Stockholm and Rio de Janeiro conferences, regarding activities for the preservation and restoration of the environment, more than US \$1 trillion has been spent by developed market States, and more than 200 billion roubles (according to the prices of the 1980's), by countries with centralised economic control. In spite of some successes in the formation of environmental infrastructures, the positive examples of the cleansing of several areas at enormous financial expense, the negative global changes in the environment continue and, in the near future, their stabilisation does not seem possible.

It is clear that, in the 21st century, the survival and sustainable development of humanity, is dependent not only on developing low-waste industries and waste-free technologies but, more importantly, on stabilising the population figures on earth as soon as possible and then proceeding to depopulate. This is a very complex problem and its solution will come only about by teaching all people on earth a new mentality of a biospheric rather than an anthropogenic, nature. People must be educated about overall biospheric attitudes and activities taking place in the universities of every country, irrespective of religious and cultural differences, as soon as possible. Biospheric attitudes and activities are the new policy and basis for humanity's sustainable development in the twenty first century.

The environmental problems of humanity are the result of our anthropocentric approach. Our aggression, which helped primitive humanity to survive, now works against the whole of the human race and the main task of the new bio-environmental education is to adapt our thinking to form a more considerate relationship between society and nature.

Humanity, in the near future, possibly in the 21st Century, will come to accept the deliberate regulation of population, including depopulation, through the experience of catastrophe. In a low-key way, this problem was posed by Daisaki Ikeda, at the beginning of the 1980's. The depopulation problem is one of the most complex ethical ones, since the regulation of human numbers must be both deliberate and voluntary. Therefore, it is one of the most difficult and principal tasks of bio-environmental education and culture. In the very near future it will be necessary to integrate all world experience, to make a decision on the problem of regulated demography and to develop the main statements of the new bio-environmental education, especially for less developed countries, taking into account indigenous cultures and religions. On a voluntary basis, centres for bio-environmental education must be created and the Earth Science Museum of Lomonosov Moscow State University is ready to become one such centre.

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