

GLOBAL RESOURCE SYSTEM CHALLENGE I: EDUCATION

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Summary

Education is a very important factor in human development. The present state of education of a nation is positively correlated with the human development state of that nation. Future educational achievements in a given nation can be expected to be equally decisive in determining that population's human development state. Human development does not start with the possession of goods, as this is one measure of development. It begins with people and their education. There are, of course, other human development resources that are of importance. However, without education all other resources remain as latent, untapped, potentials to support human development.

Human resource development cannot be an act of creation. It is the result of careful

planning and development. Human resource disparities exist in many nations of the world because education services are unequally distributed and of unequal quality throughout a given nation. They are also quite different across the nations of the world. Educational systems may have differential impacts on various aspects of development and social change. Their effect on fertility and migration in urban areas, for example, may be different from their effect on these components in rural areas.

There have been a plethora of discussions concerning relations between education and development, and associated strategy development. The International Conference on Population and Development (ICPD), held in Cairo in 1994, underscored education as one of the most important keys to social and economic development, improved status of women, and smaller family size in the developing regions of the world. The ICPD Program of Action concluded that education "is at the same time a component of well-being and a factor in the development of well-being through its links with demographic as well as economic and social factors." It also recommended the achievement of "universal access to quality education, with particular priority given to primary and technical education and job training, to combat illiteracy and to eliminate gender disparities in access to, retention in, and support for, education."

Education may be viewed as an end in itself, but it is also a means to address sustainable development and other important issues. Education is a many-faceted issue. It involves such diverse concerns as knowledge of the patterns of school enrollment at various age levels, and includes the translation of elementary, secondary, and tertiary education objectives into attainment among the adult population.

Education leads to economic benefits. Perhaps more importantly, it is a relevant and crucial aspect of empowerment for all humans and especially for the disadvantaged. In principle, it provides a very necessary condition for all humans to participate fully in society and to improve their quality of life. It also enables individuals and communities to cope better with the social, economic, cultural, technological, and environmental changes they face.

It is for these reasons, and others, that education, being a component of HDI, is invariably one of the major indicator variables for human resource development.

1. Introduction

The biological life on the Earth has emerged as the Universe phenomenon, the evolution of the Universe, the life cycle of galaxies and stars (the Sun in particular) still being of vital importance for the existence of the biosphere. During its history the planet has passed through several bifurcation points where the trajectory of the Earth's evolution changed drastically. But the time for those changes was of a geological scale. The Earth's life-support systems resembling a gigantic web, in which network of interconnected bands might be stretched a long way without breaking, are the result of the evolutionary process that has been lasting for billions of years. Life has been tested in unlimited varieties and the most viable species have survived through the power of natural selection.

The two bifurcations are mentioned on the Figure 1, deal with profound chemical changes in the environment (see: also *The History of the Earth*, EOLSS on-line, 2002).

Human beings (*Homo sapiens*) are now playing the dominant role in the evolution of the Earth's biosphere. It is only in the most recent, and brief, period of their tenure that they have developed in sufficient numbers, and acquired enough power, to become one of the most potentially dangerous organisms that the planet ever hosted.

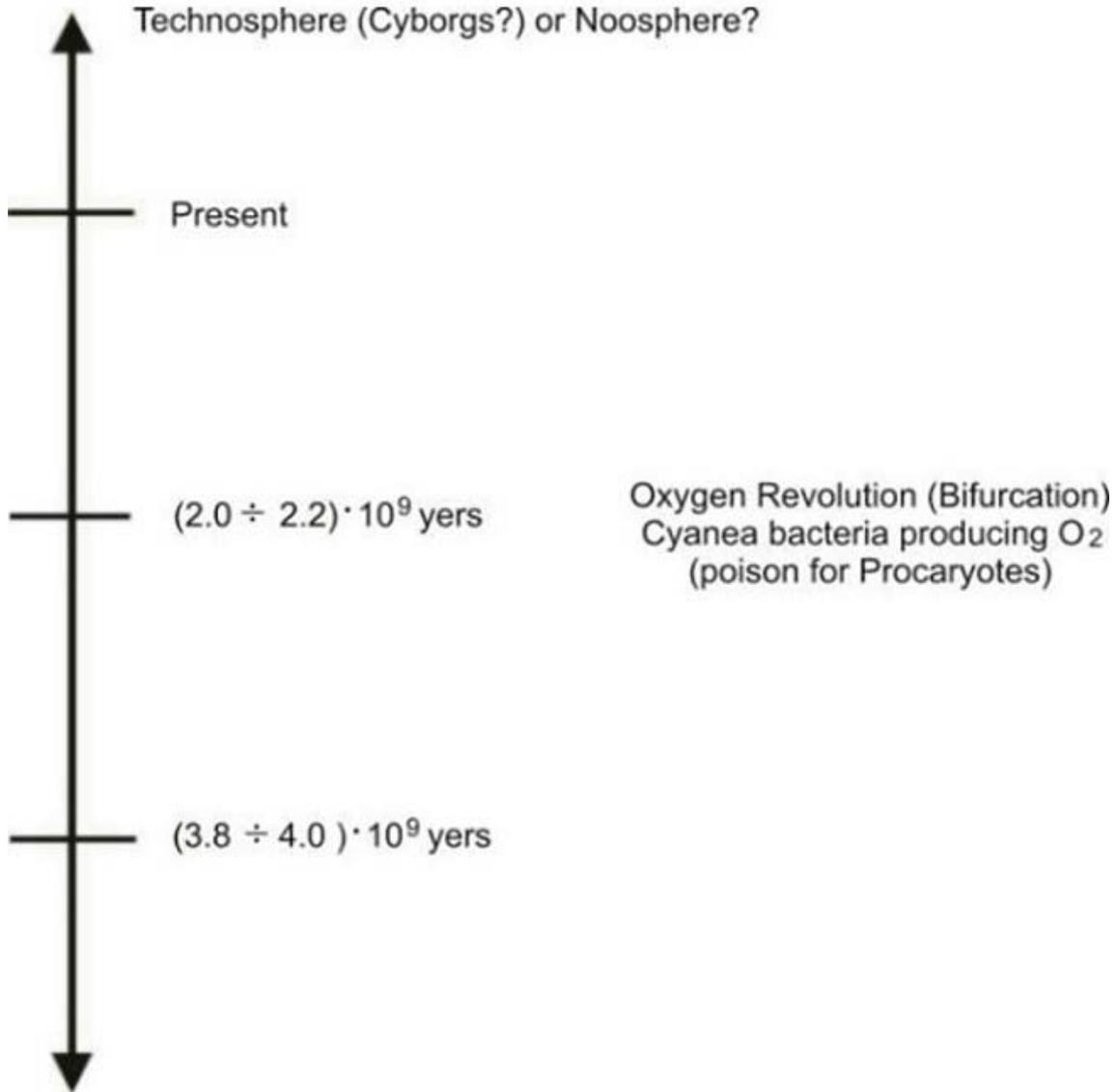


Figure 1. Historical Perspective.

The emergence of reason, the capability of thinking turned *Homo sapiens* into the leader of the evolution, the non-genetic heredity (education, culture, and other components of the human civilization) giving a great momentum to the growth. The result of exponential growth is that the Earth's life-support systems are being strained and degraded: most people deplete and degrade the Earth's resources to support short-term economic growth and throwaway lifestyle(see: also *Education and Human Development*).

The civilization-support systems, especially moral and ethical values, are being degraded as well. The change of the life paradigm is necessary, as the alternative to the next global bifurcation that will inevitably lead to the collapse of the human civilization, sustainable development being considered as this new paradigm.

The term "sustainable development" was brought into common use by the World Commission on Environment and Development (the Brundtland Commission) in its seminal 1987 report *Our Common Future*. The idea of sustaining the Earth has proved a powerful metaphor in raising public awareness and focusing on the need for better environmental stewardship.

With the threat of extinction increasingly valid, there is a need to seriously contemplate whether the current crisis is a manifestation of humanity's suicidal tendencies, or merely a low point in its trajectory pointing towards the need for a new societal structure. And this is the education that is responsible for the implementation of the new life paradigm. Since society is flexible and dynamic, educational systems have to be continuously revised. By the time proposals and studies are implemented, they tend to be already outdated. It is thus essential to challenge current educational norms and stagnant concepts, and channel human potential towards constructive bio-supporting behavior.

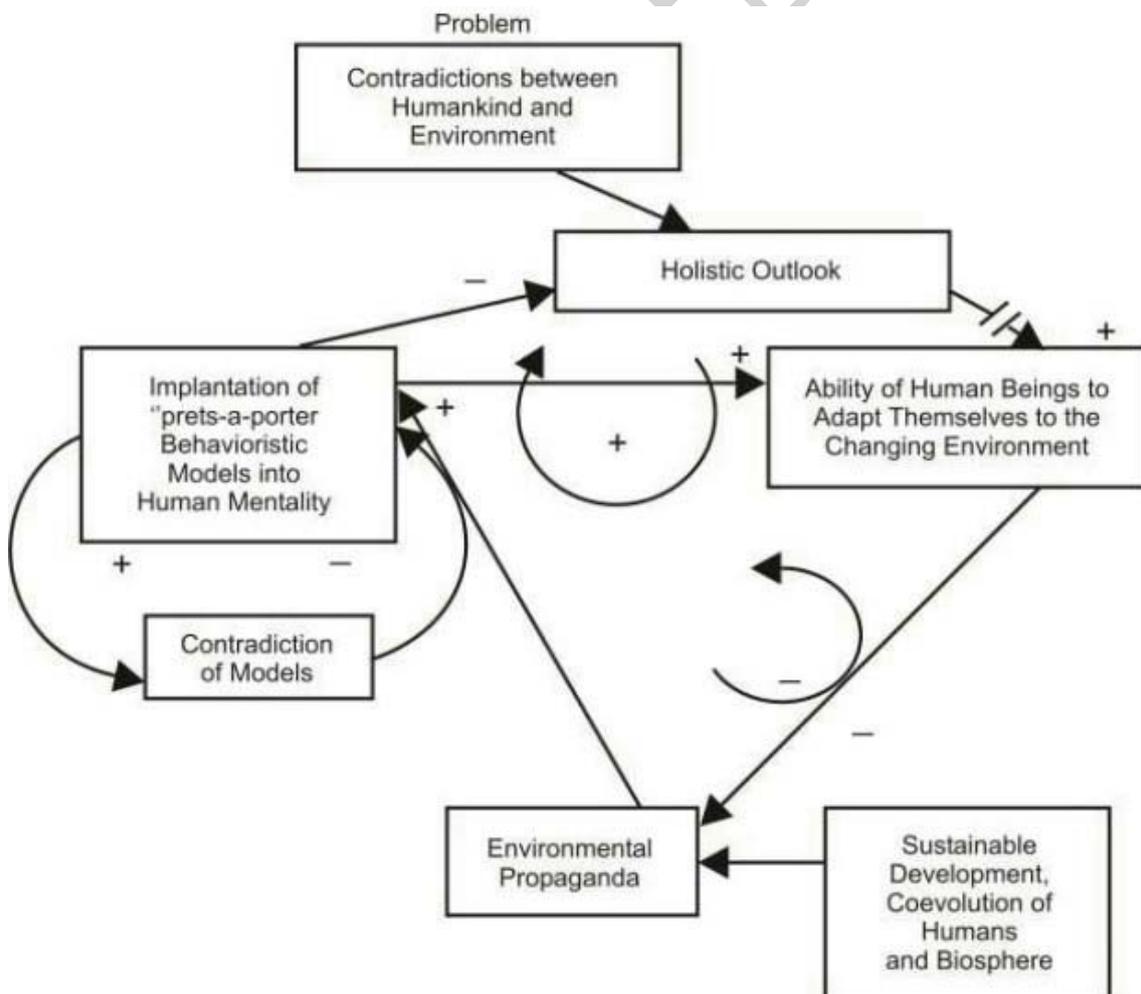


Figure 2. Global World Outlook Trough the Environmental Propaganda.

The system possesses the positive feedback and thus is unsustainable.

In early 1970th UNESCO has defined literacy as an individual's ability to "read write a short simple statement on his everyday life". Recently "functional literacy" was defined as the ability to comprehend what is read or written to an extent sufficient to perform adequately in society, whether to communicate with individuals, to further one's own economic or other interests, or to participate in the democrat way of life. Scientific literacy implies this functionality: the ability to respond to the technical issues that pervade citizens' daily lives and the environment in a meaningful way.

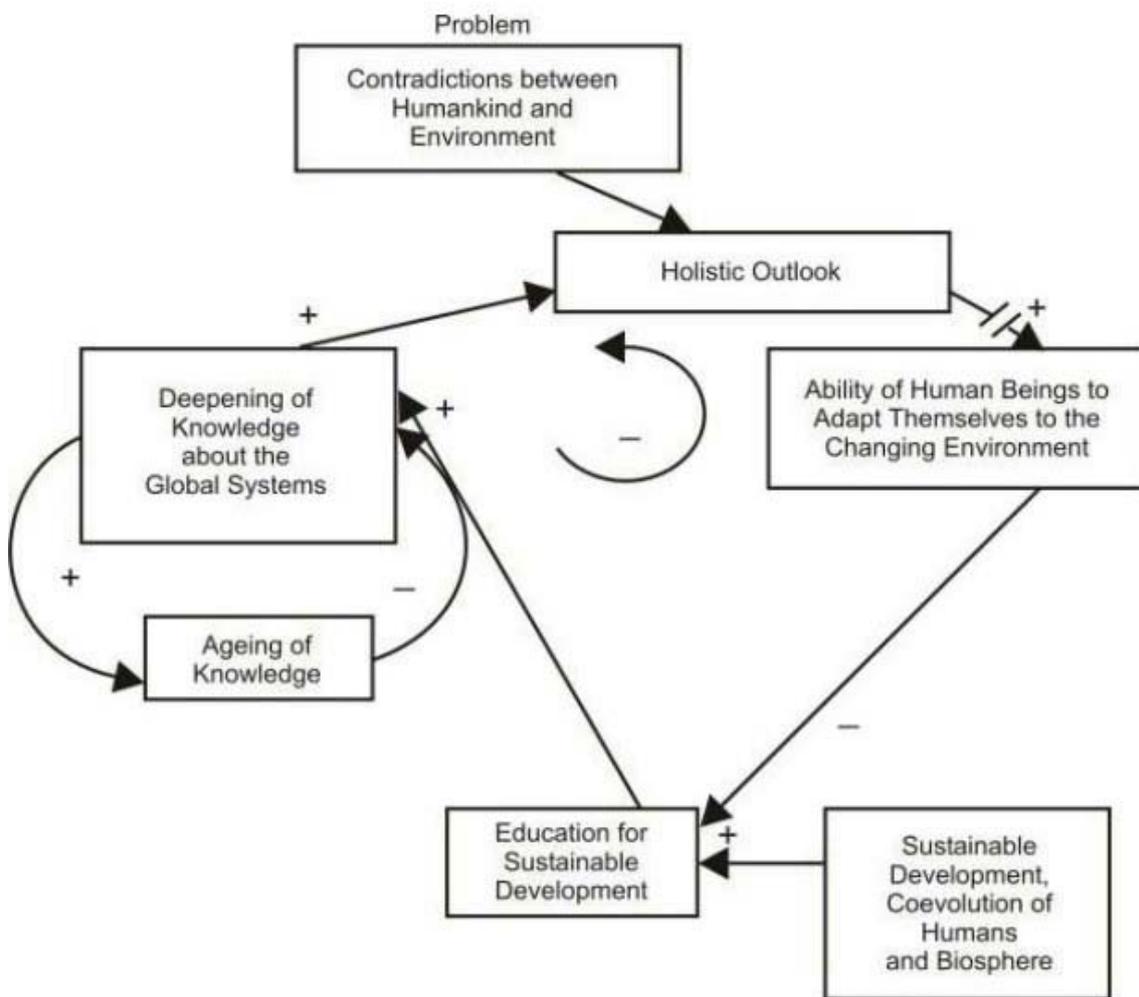


Figure 3. Global World Outlook Trough the Education for Sustainable Development

The system possesses the negative feedback and thus is sustainable .

The critical question facing education is "Should we assess what we value, or value what we assess?" The world events at the beginning of the 21 st Century prompt us to

think that we should pay more attention to "The Common Good." To develop a sustainable future is to anticipate what that future holds for us from an ecological point of view, a social perspective, and how this differs through time. The Common Good has a vitally important time dimension to it, and we neglect it at our peril, and the peril of generations yet to be born.

A fundamental objective of education is the integrated formation of the whole person, able to act with ethical concern for the advancement of humanity and society, respecting the past and orientated to a better future. Within this, there has to be consideration for the self, one's communities and society at large, as well as for the environment locally and globally. It is essential in the development of the individual and of communities that there is a respect for the environment and that this in turn looks towards the future so that the environment is left in a more sustainable condition in the future than when this generation first became part of the ecosystem. There remains the philosophical dilemma as to whether or not the formation of the integrated human being is the primary purpose of education, or whether the primary purpose of education is more orientated towards society. These are not alternatives, nor are they in conflict. This is the purpose of education to ensure that there is a proper relationship between the person and the society in which the person is involved (see: also *Education and the Consumer Society*).

The key to education for sustainability lies not in its content, which may be highly diverse according to context, but rather in a particular approach to education which results in the development of an ethical and interdisciplinary approach to problem solving decision making, which takes into account present, future, local and distant impacts on economy, the natural environment, and the interests of others. The principles underlying education for sustainability include, but are not limited to, strong core academics, understanding the relationships between disciplines, systems thinking, lifetime learning, hands-on experimental learning, community-based learning, technology, partnership, family involvement, and personal responsibility. The environmental education has provided the base from which the education for sustainability can grow.

Education for sustainable development is perhaps the most critical component for bringing about the shifts in thought and action that are essential for sustainability -- at individual, family and community levels and within the policies and practices of governments, international organizations and the global private sector. Indeed, there is a growing international consensus on the need for concerted programs of education for sustainability. As the Secretary General's report prepared by the United Nations Educational, Scientific and Cultural Organization (UNESCO) for the sixth session of the United Nations' Commission on Sustainable Development (April 20 to May 1, 1998) put it:

"Education is the most effective means that society possesses for confronting the challenges of the future and for shaping the world of tomorrow...Education is also the means for disseminating skills, for bringing about desired changes in behaviors, values and lifestyles, and for promoting public support for the continuing and fundamental changes that will be required if humanity is to alter its course, leaving the familiar path that is leading towards growing difficulties and possible catastrophe, and starting the

uphill climb towards sustainability. Education, in short, is humanity's best hope and most effective means in the quest to achieve sustainable development."

Below, the interested reader will find a short review of the content of the Theme. The contributions have been prepared by educators-scientists and educators-practitioners from all over the Globe: from the New Zealand to Russia and from Japan to Brazil.

2. Knowledge for Sustainable Development

As education and the social context of education change, it is important to seek new paradigms for learning. These new paradigms will include reflection on the scientific, social and philosophical basis of curriculum design and planning set in changing educational contexts. While respecting the different ways of thinking and different disciplines, there is a need to consider learning in ever changing circumstances. The significance of inter-disciplinarity in which there is a contact between the disciplines and a sense of inter-related activity among disciplines is of course very important. The significance of "trans-disciplinarity" is now of particular significance in higher education. This implies the application of all the principles, concepts and skills of one discipline to a new field of knowledge and understanding. This creates new approaches and new paradigms to knowledge and to education more generally.

2.1 Investigating the Past - Looking into the Future

Education is often built on tradition, respecting the past and being orientated towards the future. The traditions of education respect other peoples and other times and places. Education for social inclusion has become a very important aspect of life and of thought and this is at the heart of work in the field of sustainable development. While respecting the past it is important to have an education system which is orientated to the future.

Senator Al Gore points out in his bright book "Earth in the Balance": "The edifice of civilization has become astonishingly complex, but as it grows even more elaborate, humans feel increasingly distant from their roots in the Earth. In one sense, civilization itself has been on a journey from its foundation in the world of nature to an even more contrived, controlled, and manufactured world of peoples' own initiative and sometimes arrogant design. And the price has been high. At some point during this journey we lost the feeling of conceitedness to the rest of nature. Are we so unique and powerful as to be essentially separate from the Earth? Many of us act-and think-as if the answer is yes. It is now too easy to regard the Earth as a collection of "resources" having an intrinsic value no larger than their usefulness at the moment. Thanks in part to the scientific revolution, we organize our knowledge of the

natural world into smaller and smaller segments and assume that the connections between these separate compartments aren't really important. In our fascination with the parts of nature, we forget to see the whole".

The roots of this process are to be looked for in the history of the human development. To begin with, it is probably necessary to strip away all the identifying marks by which present (or possibly historical) populations and groups are commonly designated and to

move back simply to a species-designation of homo species, as one group of animals among others.

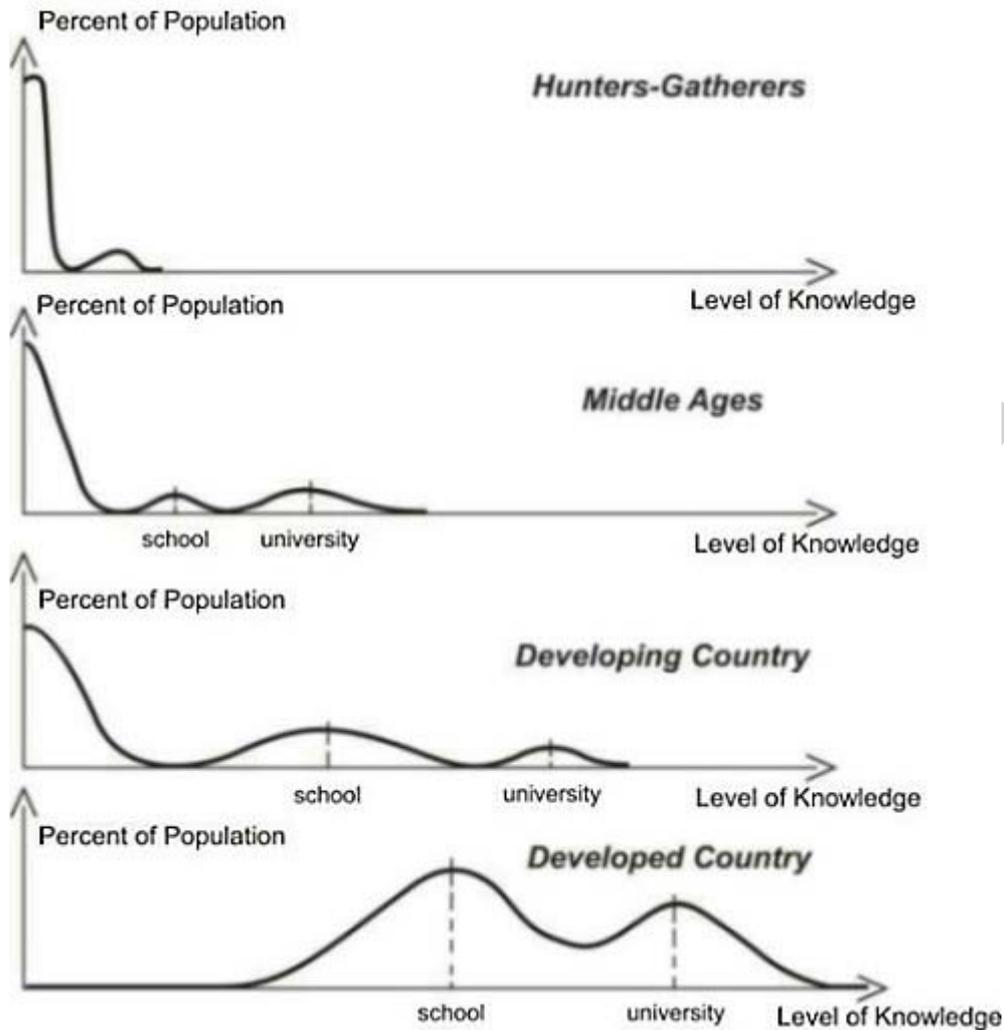


Figure 4. Distribution of Population According to the Level of Education (Knowledge)

Homo sapiens, as well as all other species, originated in the process of biological evolution. Modern paleontological data provide an opportunity to trace the whole succession of evolutionary events that had led to the origin of Homo sapiens. Thus, Homo sapiens, as all other species, originally belonged to a certain biological community. Inside the community Homo sapiens, as well as all other species, did a certain amount of work aimed at stabilization of the environment. But, unlike all other species, Homo sapiens proved to be able to accumulate cultural information that, as well as the genetic information of a species, can be transmitted from generation to generation. But, unlike genetic information, the amount of cultural information increases from generation to generation. At present the cultural information of the whole humankind is comparable to the genetic information of Homo sapiens as a species. The major part of the present-day cultural information of the humankind is represented by scientific information about the surrounding phenomena, i.e. about the environment of humans. Fundamental studies of physical, chemical and biological laws of nature gave

humans an opportunity to work out technology-based applications of the acquired knowledge. Thus, humans were able to inhabit all continental areas of the Earth and even began to actively explore the outer space (see also *Knowledge of Environment, EOLSS* on-line, 2002).

The group of living organisms is then sustainable if it is able to feed itself, and to continue to exist at all on this basis. It needs to do no more. It cannot well do less, on pain of reduction in numbers, and eventual extinction. The extent, adequacy and actual availability sets limitations on numbers, in an absolute and primitive Malthusian sense.

If the possibility of surplus to present need, produced in a number of ways, eventually stored, then superimpose upon this primitive adequacy this permits the familiar succession of hunter-gatherer, farmer (the agricultural revolution) and city-dweller which simultaneously mark forms of culture and differentiation, - the world of human history, now thought to be no more than 6000 years in length and a very tiny part of universal time. Empires were formed and declined in the 'ancient' Near East, succeeded by Rome, Byzantium and Islam; in the 'ancient' Far East, in China and India; in the isolated Americas, by the Maya, the Inca and the Aztec; the division-of-labor which agricultural surpluses permitted the development of artistic and artisanal traditions of enormous skill and performance; and the range of human types and societies vastly variegated and diversified. This produces the opposition of human culture (in all its senses) and natural forces within which 'sustainability' emerges as a product of knowledge, human inventiveness and technology.

Unfortunately, the scales of the 20th century have been balanced between construction and destruction. The world was shaken by economic depressions, and social revolution. There have been continuous wars and world wars - the first ones in the history of humankind - took place. In the wars of the 20th century nearly 150 million people were killed, more than during the whole history of civilization. Humankind was surprisingly inventive in its manifestations of violence, fascism with its aspirations of achieving world domination, strict totalitarianism which destroyed all foundations of democracy. This century saw the confirmation of violence as legitimate method of solving international problems. Such acts of widespread violence as the destruction of the Jewish people, liquidation of Slavonic culture, the use of gas chambers for the mass extermination of people, grotesque and lethal experiments on people, have never before been seen in all of world history (see also *Education and Human Development*).

Humankind has developed military skills, which have the potential to destroy large areas of land and large numbers of people. Such things as nuclear and thermonuclear weapons, rockets, smart bombs, biological and even ecological weapons give eloquent testimony to humankind's inability to use the gift of knowledge for a peaceful purpose. The most surprising fact is that people are already accustomed to living in a world where people are constantly at war and there are enough weapons to annihilate all life on the Earth many dozens of times (see also *Future - Oriented Knowledge : Lessons of the First Nuclear Age*).

The world is going through a crucial period of transition, and a revaluation of priorities in society is essential in order to face the challenge ahead. New models and a new vision

for the future are requirements of building a harmonious society. Destructive attitudes, that have led to severe environmental deterioration, need to give way to a conscious effort to preserve the Earth for the generations to come. Now, more than ever before, it is time to realize that respect for life and the bio-environment needs to become the essence of every action and thought.

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Biographical Sketches

Natalia P. Tarasova. *Corresponding Member Of Russian Academy Of Sciences, Professor Of D. Mendeleev University Of Chemical Technology Of Russia, Head Of The Department For The Problem Of Sustainable Development, Director Of The Institute Of The Problem Of Sustainable Development.*

Natalia P. Tarasova was born in Moscow 2 June 1948. Corresponding member of Russian Academy of Sciences, Professor of D. Mendeleev University of Chemical Technology of Russia, Head of the Department for the Problem of Sustainable Development. Director of the Institute for the Problems of Sustainable Development. The fields of professional interests are Legislative , Political and Economic Aspects of Sustainable Development, Environmental Policy, Education for Sustainable Development, Environmental Chemistry. Graduated from D. Mendeleev University of Chemical Technology of Russia, Department of Radiation Chemistry (MS 1st class, with Honors in Chemical Technology) in 1972. MS in applied mathematics from Moscow Institute for Electronic Machinery Building (1984). Doctor of Sciences in inorganic chemistry from D. Mendeleev University (1994). National representative of Russian Federation to CCE IUPAC. Vice - President of the UNESCO Associated Center for Chemical Science and Education.

Bartholomew J McGettrick. *Professor Of Education, University Of Glasgow Dean, Faculty Of Education, University Of Glasgow*

In 1985 Professor McGettrick was appointed Principal of St Andrew's College, which was the National Catholic College for the Education of Teachers. He was formerly Assistant Principal (1975) and Vice-Principal (1980) of Notre Dame College of Education. On 1 April 1999 he was appointed Dean of the Faculty of Education of the University of Glasgow.

He holds a number of prominent positions in national and international committees such as President ACISE; Chairman of the Schools Commission for The Holy Land; Vice Chairman of Scottish Consultative Council on the Curriculum; Chairman of Catholic Union, Scotland. Chairman of Governors of independent schools and Chairman of Scottish Council on Independent Schools in Scotland, Chairman of The Scottish Centre for Children with Motor Impairments He is also involved in British Broadcasting and Education; and Educational Consultant to many organisations and institutions. Professor McGettrick chaired the Secretary of State's Committee on Education for Sustainable Development.

He has been involved in various research projects, and in curriculum development in Scottish education; and has also acted as External Examiner on a number of occasions.

Professor McGettrick has contributed to international conferences, and worked in different international settings with research, consultancies and lecturing commitments. His main areas of interest are:

- Sustainable Development and Education
- Values in Education
- Educational Management and Administration
- Assessment.

He also holds responsibilities in wider areas of public life, eg advising Government and Church authorities on political and social issues.