Biosphere: Storehouse or Temple?

Vladimir Sokolenko, Deputy Director, Department of Foreign Policy Planning, Ministry of Foreign Affairs of the Russian Federation, Doctor of Sciences (Political Science): The Department of Foreign Policy Planning holds regular round tables devoted to topical issues of Russian foreign policy, international politics, and the international political process. The round tables offer a platform for the interaction between the Ministry of Foreign Affairs and the scientific and expert community, the exchange of new ideas and approaches, and the introduction of the most interesting projects into foreign policy.

The interaction of the Ministry of Foreign Affairs with the scientific and expert community, the business community, the Moscow Patriarchate of the Russian Orthodox Church, and civil society as a whole serves the interests of Russian foreign policy, acting as an important source of intellectual thought and complementing the professionalism of diplomatic workers.

A key link in this interaction is the Scientific Council Under the Russian Minister of Foreign Affairs that brings together directors of leading scientific research institutes of the Russian Academy of Sciences – in particular, the Institute of World Economy and Foreign Relations, the Institutes for the U.S. and Canadian Studies, the Institute of Europe, the Institute of the Far East, the Institute of Oriental Studies, the Institute of Africa, the Institute of Latin America, and others. In 1996, the Business Council was set up as a platform for exchanging ideas with the business community. An important role is played by the joint Working Group on the Interaction between the Ministry of Foreign Affairs and the Moscow Patriarchate of the Russian Orthodox Church, whose co-chairmen are Hilarion, Metropolitan of Volokolamsk, and G. Karasin, Deputy Minister of Foreign Affairs and the Ministry's State Secretary.

These mechanisms are constantly developing. Recently, the Russian Academy of Science created a new subdivision called the Department of Global Problems and International Relations headed by Academician

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Round table at the Ministry of Foreign Affairs of the Russian Federation

A.A. Dynkin. The Department includes the Center of Situational Analysis headed by Academician Ye.M. Primakov. In February 2010, President Dmitry Medvedev signed a decree establishing two nongovernmental organizations – the Russian International Affairs Council, whose aim is to augment the role of experts in the elaboration of the main lines of Russian foreign policy, and the A.M. Gorchakov Foundation for the Support of Public Diplomacy that assists in integrating Russian nongovernmental organizations into the international NGO community.

The main areas where processes threatening civilization are taking place are, of course, climate, fresh water, forests, desertification, and biodiversity.

The degradation of the biosphere is one of four main global problems threatening mankind today, alongside global economic crises, nuclear weapons, and conflicts.

As the UN Secretary-General Ban Ki-moon noted during his talk at *International Affairs'* "Golden Collection" on March 26, 2009, scientists have drafted an extensive report on the main causes of global warming at the commission of the UN. They came to the conclusion that the warming of the Earth's climate is mostly the result of anthropogenic activities.

In his work *Scientific Thought as a Planetary Phenomenon* that was written in the mid-1930s, Academician V.I. Vernadsky noted that man "in his thought and work faces the question of reconstructing the biosphere* in the interests of freely thinking mankind as a single whole. This new state of the biosphere that we are unwittingly approaching is called the noosphere."**

In keeping with Vernadsky's words, we are approaching (and, indeed, unwittingly) a new state of the biosphere whose control man is taking upon himself (after it had been the exclusive prerogative of the Supreme Intelligence for millions of years). In the 21st century, man's fate, just as the fate of life on Earth as a phenomenon of the Universe, will be determined by his behavior.

*The biosphere is the sphere of life and habitat of homo sapiens and all other types of organic material; it is an envelope around the Earth about 2 km thick in the atmosphere and about 2 km thick in the hydrosphere.

** The noosphere is a term used by V.I. Vernadsky to denote the last of many stages of evolution of the biosphere in the geological history of the Earth. Noosphere derives from the Greek *noos* "mind" and sphere, i.e., the sphere of reason.

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As to the theme of today's meeting, it clearly has major importance for current international development. At the same time, scientists and politicians have different levels of awareness of this importance. As our scientists note, the biosphere problem is still not adequately reflected in the international agenda.

Russia advances its proposals on the protection of the biosphere in the international agenda in different forums such as the G8, the G20, and other international organizations, including the UN, OSCE, UNESCO, etc.

I hope that concrete proposals and recommendations will be voiced in the course of our meeting.

Yuri Israel, President of the Russian Ecological Academy, Director of the Institute of Global Climate and Ecology of the Federal Service of Hydrometeorology and Monitoring of an Environment and the Russian Academy of Sciences, Member of the Russian Academy of Sciences: Climate has a very rich history. The present-day climate formed approximately in the 1970s. At that time, a very clear increase in temperature of about one degree Celsius began. Scientists relate this increase to anthropogenic impact – industrial development and greenhouse gas emissions into the atmosphere in enormous quantities. If we take the total emissions in the world today as 100%, we can say that industrially developed countries emit less than half (47%). In particular, the U.S. emits 19%. China has already outstripped the U.S.: 22%. The difficulty of solving the problem of reducing greenhouse gas emissions lies in the fact that developing countries do not want to decrease emissions free of charge. They say that Western states had developed their industries without any limitations in order to become developed countries and want to do the same. Today, international organizations and political and scientific circles hold that the maximum admissible temperature increase is two degrees.

At the same time, in a situation where only one Kyoto Protocol exists, we will be unable to meet its climatic goals for a long time to come. The

Russian Federation is ready to participate in the preparation of a legally binding international agreement and fix the quota decrease in greenhouse gas emissions to over 30 billion tons by 2020, which corresponds to a 25% reduction of emissions over this period. There is a number of other approaches to lowering greenhouse gas emissions into the atmosphere and, correspondingly, to bringing the temperature back to normal, i.e., to the level of the 1970s.

This is why we insist that one should also make use of other possibilities and apply new methods. An example is the reflection of direct solar radiation, i.e., the reflection into space of part of direct solar radiation through the use of tiny aerosol particles that build up in the lower stratosphere. Large reflectors can be placed into space, yet this is a thing of the future.

From 2005, several institutes of the Russian Academy of Sciences headed by the Institute of Global Climate and Ecology tried to use tiny aerosol particles to stop climatic warming. Calculations were made, model chambers were built, and real-life experiments with artificially created aerosol layers began. If we managed to reduce direct solar radiation by 1-2%, we would preserve the present-day climate without any additional means.

A second way of attaining this goal is to stimulate gas absorption by changing the reflective capacity of the Earth's surface – increasing the spectrum of reflected infrared solar radiation and pumping gases into the Earth's depths.

A third way is to use environmentally friendly energy resources: hydraulic, light, solar, and bio energy. Another area continues to be the use of nuclear power, which does not emit any greenhouse gases.

Finally, one can try to exclude the possibility of phenomena and events that can change the Earth's climate. This includes terrestrial possibilities such as sound economic policies and extraterrestrial warning systems that would limit the effects of the impact of meteors and other celestial bodies that can lead to major climatic change.

In 2008, in the wake of the G8+5 summit in Tokyo, a scientific symposium was held with the participation of 13 presidents of science academies from these countries. I gave a talk on behalf of the Russian Academy of Science. It was decided that one should continue studying new approaches and technologies, including bioengineering, which can contribute to the preservation of a stable climate and reduce greenhouse gas emissions. The academies of the G8+5 proposed organizing an inter-

national conference for discussing such technologies.

I believe that, for the in-depth discussion of these problems, it would be expedient to hold an international conference in Moscow on the stabilization of the present-day climate with the use of new technologies. The idea of holding such a conference has received the support of President Dmitry Medvedev.

Viktor Danilov-Danilyan, Director of the Institute of Water Problems of the Russian Academy of Sciences, Corresponding Member of the Russian Academy of Sciences: The main areas where processes threatening civilization are taking place are, of course, climate, fresh water, forests, desertification, and biodiversity. These are the five main areas. Academician Israel has already spoken about climate. Fresh water is apparently under threat, insofar as a world shortage of fresh water will arise in twenty years or so and will become the main factor limiting the growth of the world economy and a lot more. This factor will be decisive for the lives of two thirds of the Earth's inhabitants that will live on our planet by that time. All of these problems and processes are closely connected. Major international agreements have been signed on climate and biodiversity. There are also agreements on desertification that are playing a positive role. However, no satisfactory agreement on forests has been signed so far, although one had planned to do so as far back as the Rio de Janeiro conference in 1992. Nor was this done later in 1992 or 1997 in the course of G8+5 meetings organized by the UN or in Johannesburg in 2000 or since that time. There is also no adequate and sufficiently broad agreement on water problems. The difficulty in concluding the necessary agreements derives primarily from economic reasons. I would like to say a few words about them.

In all of these interconnected areas, the only way to normalize the situation and give hope for survival is to reduce the anthropogenic impact on the environment. One of the hindrances is the necessity to divert resources from economic growth in its traditional sense to the protection of the biosphere. This is where international politics should step in.

Another hindrance is competition between states and the fear that diverting resources for solving environmental and biospherical problems (which are the same thing, in my opinion) will make a country less competitive economically and possibly in other domains, too. The political arena has become market-phobic to a large extent. For this reason, contemporary states insist that efforts on protecting the biosphere be equally

spread between countries. Yet one needs to define what "equally" means. Most environmentalists believe that an ethical transformation is necessary for changing this unacceptable situation: a shift in public opinion and a transition to a new system of values in which environmental or biospherical values will get absolute priority. The ethical transformation could be brought about through education and public awareness measures. However, there is a risk that the intended result of such work, i.e., a change in public awareness, will only take place when it is already too late to reverse the process of biospherical degradation.

I'd like to note that there are economic ways of promoting ethical transformation. I'm referring to the "internalization of external effects" that was discovered almost a hundred years ago by Arthur Pigou. It refers to bringing inside a system something that was initially outside.

The first step towards the globalization of methods of internalizing the harmful effects of civilization was the Kyoto Protocol. Whereas Pigou spoke about two methods of internalization (corrective taxes and corrective subsidies), a third method is needed in the international arena today. This method may take different forms; in the Kyoto Protocol, it consists of countries making voluntary commitments to limit greenhouse gas emissions and taking measures aimed at lowering the discharge of carbon dioxide (CO2) into the ecosystem. Such commitments have opened the way to the emergence of the so-called carbon market, i.e., to the development of market relations with regard to something that had never been bought and sold before, and, consequently, to the reduction of the total emissions of greenhouse gases into the atmosphere by 5% by 2012 in comparison to 1990.

In 2009, three years before the expiration of voluntary commitments under the Kyoto Protocol, the turnover on the world carbon market amounted to 136 billion dollars. This is equivalent to over 8.2 billion tons of carbon dioxide. In other words, the Kyoto Protocol led to a reduction of 8.2 billion tons of emissions. I should say that 8.2 billion tons of CO2 is a sizeable amount that shows that the carbon market is an effective international economic mechanism for raising the environmental effectiveness of a cost-based reduction of the anthropogenic impact on the planet's ecosystem.

Do Kyoto mechanisms have an effect on public awareness? In my opinion, this effect is very direct. If we admit that the most important thing for most human beings is market realities or, more precisely, money, we should not build utopian projects of doing without money, doing away

with it, etc. One should try to use the predominating psychological stereotype in the public awareness today: if something becomes a market commodity, then it has value. Most contemporary people think like that. And one should make use of it.

The main thing is that global value shift from the focus on the value of money to the focus on the value of the biosphere should begin with public awareness work. To this end, one should use the generally accepted postulate of the market as the absolute behavioral indicator to assure the biospherical adequacy of politics of the 21st-century civilizational imperative. Of course, one might say that this approach is cynical. I don't agree. From the standpoint of romanticism, realism almost always looks cynical.

Thus one should support all initiatives and proposals on activating market mechanisms for solving environmental problems. After all, it is well known that one of the main criticisms of the Kyoto Protocol is that it is not effective and that the reductions in greenhouse gas emissions that it requires have not been sufficient. Yet it would be naïve to expect sizeable reductions after only five years when this process will clearly take several decades. Moreover, it would be utopian to hope for a stricter agreement in view of the enormous difficulty with which this relatively lax agreement was adopted.

At the same time, the Kyoto Protocol works in spite of everything. Thanks to it, the carbon market has emerged and will undoubtedly lead to the appearance of similar environmental markets in many other sectors, including water. This is why we should support and disseminate such mechanisms as "green investments," "clean development," "green new course," "Russian forest," etc. We should support target "environmental funds" that we had abolished in 2000 for some reason despite the fact that they worked well.

Such measures and mechanisms will inevitably lead to the rising priority of environmental measures in the public awareness. At the same time, we should not forget that market and economic assessments do not fully reflect the true value of environmental utilities. The latter have an infinite value for mankind as a whole, because the very survival of the human species depends on their conservation and renewal. If the ethical changes that environmental reformers are so eagerly expecting gradually take place over time, the new mankind may ask at some point why one needs all these market gimmicks in the holy task of the protection of the biosphere. And I would only applaud in this case.

There also exist totally non-market forms of international interaction – first and foremost, environmental expert evaluation. One should promote its broad use for the study and assessment of all projects whose implementation would also affect non-participating countries. Such evaluation is particularly important for hydropower projects, because water will become the key factor limiting the development of the world economy and is a major environmental factor already today. To start with, one could adopt a single and fairly narrow international agreement on international expert evaluation of hydropower projects whose implementation affects the interests of several countries.

International environmental expert evaluation, along with the expansion of the sphere of market relations in the environmental domain, can and must solve concrete environmental problems as well as actively promote the "environmentalization" of public awareness.

Elena Bukvareva, senior researcher at the A.N. Severtsov Institute of Ecology and Evolution, Candidate of Sciences (Biology): The mechanisms of consuming biospheric resources changed greatly in the second half of the 20th century. As a result, people have transformed ecosystems more rapidly and intensively over the past 50 years than in any other comparable historical period. Through his activities, man has fundamentally changed the biospherical system: natural resources are consumed twice as rapidly, water withdrawal has increased fourfold, the global economy has become six times bigger, and food production has more than doubled. The nature of relations between man and the biosphere changed radically. This means that we must treat nature differently. We must behave totally differently than before.

Natural mechanisms of environmental management should come to the fore. Politicians and economists seldom think about this. Yet the environment in which man lives and in which civilizations can develop was created and is supported by the constant functioning of ecosystems. Natural ecosystems and living nature fulfill such functions as supporting biochemical material cycles; assuring a sustainable hydrological regime of territories and water purification; creating fertile soils; stabilizing the environment at the local, regional, and global scales; and maintaining temperature and the atmospheric gas balance that regulate the climate. Natural flows are dozens of times greater than anthropogenic emissions. If we violate the natural system of carbon cycle regulation, if ecosystems begin to function improperly, then even small variations in the total vol-

ume of natural flows can make all our efforts on reducing anthropogenic emissions futile.

Nevertheless, modern man continues to systematically destroy living nature and natural ecosystems. Politicians have been unable to stop this process so far.

Today, a third of dry land is covered by greatly transformed ecosystems. Alarming symptoms of the disfunction of the biospheric machine are already visible. For example, after World War II, China began to prepare for an economic boom and cut down a lot of forests. As a result, soil erosion became so great in the 1990s (and up to the present day) that it can be seen from space. Soil and subsoil are carried into the ocean so intensively that the shoreline cannot be made out, while enormous clouds of dust travel as far as America and Europe, depending on the wind direction. When the losses from forest destruction in China were assessed in the late 1990s, it turned out that they amounted to 12% of the country's GDP at that time. It should be noted that 92% of these losses resulted from the degradation of the habitat-forming functions of the destroyed forest. The cutting of forests led to smaller precipitation, losses in river flow, desertification, soil barrenness, reduction in the transport capacity of rivers, etc. And only 8% resulted from timber losses.

Similar processes are taking place in the Amazon River delta. Today, forests are being cut there, too. One large clearing, which is also visible from space, is 260 km wide. The cutting of forests results in a destructive vicious circle: the smaller the forests, the drier the regional climate; the drier the climate, the greater the risk of forest fires; the greater the risk of fires, the smaller the forests; and the circle closes upon itself, leading to irreversible changes in the community on the site of the destroyed forest. The dry savanna communities that are forming there now are incapable of regulating the regional climate in the same way as tropical forests once did. The climate is becoming drier on the whole. As a result, the flow of rivers is also decreasing. If things continue in the same way, scientific models show that irreversible changes will take place in the regional climate and vegetation, leading to more frequent and severe droughts. One such drought took place in 2005-2007. The Amazon Basin was declared an environmental disaster zone.

Another problem that can arise from the impairment of habitat-forming functions is, in contrast, an excess of water. This takes place when forests and wetlands in river basins are destroyed. This can be seen both in Europe and the USA. Another example is losses from the destruction

of coastal wetlands, which serve as buffers against such disasters as hurricanes and tsunamis. They impede the water wave – in part, if not wholly – and reduce the damage caused by the natural disaster. Scientists have shown that the tsunami in the Indian Ocean and Hurricane Katrina in the US in 2005, which caused human losses and material damage, had such a big impact because virtually all the wetlands had been destroyed in these regions. In fact, a special program for restoring the wetlands around New Orleans had been adopted yet was subsequently scrubbed. Today, it is being launched anew. Forest fires in Russia during the past and previous summers and the peat bogs that burn annually are also a case in point. In dry years, peat bogs are sources of catastrophic fires. This is a direct result of the destruction of the water-regulating functions of swamps that had been drained over the preceding decades.

The end result is that losses from the destabilization of the natural environment become a major factor in national and global economies. In certain countries, these losses are already comparable or surpass the annual growth of the GDP, preventing these countries from developing in a sustainable fashion. If this destabilization of the natural environment continues, it will become a major obstacle to the further economic development of the global community.

In recent years, people have increasingly recognized that habitat-forming functions and natural regulatory mechanisms of the environment are important economic factors. It has been shown that preserving natural ecosystems is more economically advantageous than attempting to replace them with artificial analogues or paying for losses caused by natural disasters and the violations of these habitat-forming functions. Examples abound. Scientists have calculated the cost of the functions of wetlands, preventing erosion, stabilizing river flows, purifying water, etc.

Let's return to the problem of globalizing the processes of internalizing harmful civilizational impact on the biosphere. The REDD Program (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries) has been developed and is being rapidly implemented in the framework of the Kyoto Protocol. Its aim is to preserve forests as natural carbon sinks and, to all intents and purposes, shift the market of ecosystem services from the regional to the global level. This program only concerns tropical countries. Unfortunately, Russia is not participating.

Nevertheless, Russia has an exclusive role. In view of the alarming processes taking place in the biosphere, its role in the modern world is

totally unique. As things stand, Russia is a major center of biospheric regulation, housing the main natural ecosystems that continue to perform their biospheric functions properly. With regard to the REDD Program, it is very surprising that only tropical countries are participating, while our ecosystems perform much more important climatic regulation functions than tropical forests. Russia has the world's biggest carbon reserves – in particular, in soil, peat, and permafrost. They are a lot bigger than what tropical ecosystems can absorb and conserve. Yet we aren't participating in this process for some reason. This shows that one of our most urgent tasks would be to promote programs similar to REDD in the international arena for the preservation of our ecosystems – not only forests but also tundra, steppes, and marshes.

One such conceptual approach would be an environmentally-centered conception of natural resource management based on the principle that the most important natural resources for mankind are not material goods (fish, meat, timber, and even fuel) but natural mechanisms for regulating and stabilizing the environment, whose value we still cannot fully appreciate. If these mechanisms are disrupted, no economy can develop. Russia, which has the world's key and most powerful resource of biospheric regulation, should promote mechanisms in the international arena that would make this resource adequately appreciated and taken into account. In other words, we must actively participate in the development and formation of the market of ecosystem services. We are interested in this more than anyone else.

Armen Oganesyan, Editor-in-Chief of **International Affairs:** What should one do with the extremes of our civilization that employs, in particular, the tools of genetic engineering to fight its own "anthropogenic insanity"? One could solve this problem in a very simple way – by organizing an international environmental police. Today, we see two factors at work: on the one hand, positivism that says that man can manipulate the biosphere to serve his own needs, and, on the other, ethics that insist on a different attitude towards nature and on the understanding of its meaning and the reason why it exists around us.

Would you agree that genetically modified products are connected with environmental problems? The importance of what you said is already becoming apparent today. It is necessary to change the ethics of human behavior and devote a lot of more attention to environmental protection.

V. Danilov-Danilyan: I'm a strong proponent of a principle that is analogous to the presumption of innocence in civil law: the presumption of environmental danger. Don't do anything if you're not sure it's safe. The age of invention has led mankind into a blind alley. Fifty million chemical substances are known to man today. Five million of them are used by industry. And only about fifty thousand have been thoroughly analyzed in their effects on human health and the environment. The age of invention should finally give way to the age of analysis and prediction. This requires that greater attention be paid to fundamental science. To analyze and predict consequences, one must know the laws of nature.

E. Bukvareva: I'd like to add something. The basic principle is that you can effectively manage something only if you understand how it works. Yet all climatic models have a large dose of uncertainty. There are blocks of models, some of which are purely physical and others chemical. They interact between themselves. There is a block that connects climatic parameters and the biota.*

This block has been the least studied by scientists. We don't know enough about this mutual dependence, how the functioning of the biota will change as a result of climatic change, and how the functioning of the biota, in turn, affects the climate. This is one of the most poorly understood areas, and all genetic-engineering projects have a global influence on the functioning of the climatic system and the biota. Today, there are no definite models that can predict the reaction of the biota to these changes. For example, people have implemented projects and experiments on fertilizing the ocean to make seaweed grow faster and absorb more carbon dioxide. Yet it turned out that toxic single-cell algae often begin to grow, too, poisoning and destroying the marine ecosystem in the region.

V. Danilov-Danilyan: Ms. Bukvareva did not have the time to explain why biodiversity is necessary. Biodiversity casts the foundations for the adaption of biota. The biota has to adapt to the changes that are taking place in the biosphere today. This adaption takes two forms: changes in the geographical distribution of organisms and changes in the existing species. Biodiversity is essential for both. People say that the climate was formerly warmer on Earth by two degrees and even by six. Yes, it was

* The biota is living animals and plants.

warmer. Yet the biota was different at that time. That biota had adapted for a hundred million years to those temperature changes. And it had a full potential of adaption. Today, the biota is ill and undermined by man. Today, biodiversity is decreasing at least a thousand times faster than at any other period studied by paleontologists. This pathologic biota is simply incapable of adapting to any serious changes. That's where the problem lies.

Oleg Kalimulin, consultant to the Department for External Church Relations of the Moscow Patriarchate of the Russian Orthodox Church: This year, the Russian Orthodox Church through its Department for External Church Relations has begun to take an active and fundamental interest in environmental problems. For the first time in its history, the Russian Church has decided to formulate its stance on the entire range of environmental issues. All in all, this is completely new for the Church: the environment is a domain in which the Church had never formulated its stance before. In other words, we are creating this area of work from scratch.

Neither the Church nor society has ever faced such challenges before. We cannot turn to the experience of the past – to the experience, say, of the Byzantine Church, traditional experience, or any other experience for that matter. We can only formulate our attitude to this challenge of modernity. The Church cannot keep silent on this matter.

Today, the Department of External Church Relations is elaborating a Conception of Environmental Work of the Russian Orthodox Church. After this Conception is drafted, it will be submitted to the Primates' Council for approval, after which it will become a binding document of the Church. The content of the Conception is not well defined for the time being. The process has only begun. A fairly large number of people, both clergy and church scholars, are participating in this work.

I'd like to say a few words about the Conception's main theses. Naturally, we attach importance not only to scientific aspects, about which we've heard a lot today, but also to the theological and ethical understanding of what is taking place in the environmental domain in our country.

First of all, I would like to emphasize that the Church views nature as God's creation in which all of us live and of which we are all part. According to the Church, man is not so much the user but the guardian, cultivator, and guarantor of nature. In other words, the Church considers

man to be responsible for preserving the creation that he got from God and transmitting it to future generations. We believe ethical and environmental education to be very important in this context. At the same time, we understand that the modern psychology of people is founded on the idea of continuous economic growth and is, in essence, a consumer mentality. Yet the idea of the priority of material over spiritual values is a blind alley, as we can clearly see from the present-day crises of the biosphere and society.

It is fairly dangerous to use what we didn't create ourselves but got from God simply in order to make a profit, even for the people that benefit from it. This lowers the quality of water, air, soil, food, and so on. Thus our Conception will call for a serious scientific study of what is taking place around us and to the impact that the environmental changes will have on states, societies, and individuals.

To this end, we plan to hold special consultations with the Russian scientific community. Our Conception will offer a theological and ethical view that draws on the resources of Russian science and on the interaction between the Church and Russian scientists, experts, and diplomats. I invite all the participants of today's meeting to participate in this process. The Department of External Church Relations – most likely, in the person of Father Filipp (Ryabykh) – should turn to you for such assistance in the near future, and I ask for your brotherly and friendly response to the Church's needs.

Let me mention another aspect. We will pay more attention to the liturgy because the Church's liturgical tradition is essentially agricultural: there are many prayers about agriculture, harvests, and the work of farmers. Today, cities have become the center of life. Naturally, we must take this into account liturgically, too, and reflect it in sermons. Moreover, in view of the environmental changes taking place, we should make liturgical changes and innovations that would reflect our environmental activities. In this domain, the Church's work will be open to all contacts and interactions with secular organizations both in Russia and abroad, including UNESCO and other international organizations. The Church is already conducting such work at the inter-Church level with other Orthodox Churches and its Western Christian partners. Joint projects have already been initiated. We hope to expand such work in the future, and, to this end, we need scientific contributions in addition to theological and ethical reflection.

Valery Neronov, Vice-President of the International Coordinating Council of the UNESCO Man and the Biosphere Programme, Deputy Chairman of Russian Committee of the UNESCO Man and the Biosphere Programme, Senior Researcher at the A.N. Severtsov Institute of Ecology and Evolution: First of all, I would like to note that our mass media pay very little attention to international biodiversity forums. Russian organizations that participate in the work of the Convention on Biological Diversity have not done anything to publicize their activities. We do not know anything about the trip of our delegation to Nagoya or the decisions that were taken there. I am afraid that we will bungle this work once again, because the International Year of Biodiversity is ending already; nor are we likely to do anything for the Year of Forests (2011), which could be very advantageous for us. Ms. Bukvareva is right that we have a special biospheric function. At the same time, she was mistaken when she said that China loses 12% of the GDP as a result of forest cutting. The International Union for Conservation of Nature cites other figures: China is the only country in the world that has increased its forested territory by 12%. Today, they do not cut down their own forests but get billions of dollars from having created a huge number of timber industry complexes along our border. In the Far East, one sees truck after truck loaded with our ashes, oaks, and cedars. We will spend over 50 million dollars to save tigers that have nothing to eat because their ecosystem has been destroyed. Nagoya has played a role here.

The European Environmental Strategy has recently appeared. Its key thesis is the task of "renewing ecosystems" in order to restore their biospheric functions. It turns out that there is a lot of abandoned land in Europe. We, too, have a lot of abandoned land. Yet we don't even think about how to renew it. We don't even try to assess how much their renewal would cost. We have lost an incalculable number of forests and peat bogs. Without a doubt, Academician Danilov-Danilyan and I will return to this issue at the next forum that will be held in 2011.

Now let me speak about the role of the Man and the Biosphere Programme. As it turns out, it was created after the famous 1968 Biosphere Problems conference by three leading members of our Academy of Sciences – Academicians Israel (who is present here), Gerasimov, and Sokolov. Since 1974, I have been, to all intents and purposes, the executive director of this program on a voluntary basis and, during the past ten years, Vice-President of the International Coordinating Council of the UNESCO Man and the Biosphere Programme.

In 1974, a U.S.-USSR intergovernmental treaty was signed by Leonid Brezhnev and Richard Nixon. It stipulated that both countries would participate in this program and create biosphere reserves as special laboratories for studying global natural ecosystem processes, as Ms. Bukvareva said. Today, there are 47 biosphere reserves in the US and 39 in Russia. However, the process has completely stopped in the U.S. after the successive Bush-Clinton-Bush administrations: the U.S. doesn't even have a Man and the Biosphere Programme Committee today. Thus it'd be a good idea to draft a new agreement to "restart" our relations. I hope that it may be ready for the fortieth anniversary of the Man and the Biosphere Programme in May 2011.

The Ministry of Foreign Affairs should accord attention to such important events and agreements and actively participate in them. One should invite to these roundtables not only scientists, who are just patriots that do all they can, but also representatives of related ministries that are responsible for this. The problem is that they apparently do not participate in international forums and do not try to bring such events to Russia. In 2003, the 5th amendment to the UN Convention to Combat Desertification, for which Russia had fought for many years, was finally drafted. Yet Russia has still not ratified the convention. In the meantime, we continue to lose chernozem, fertile soil, and agricultural lands. This will apparently continue. After a long period of silence, Russia joined the UN Food and Agricultural Organization. Now there is a Russian ambassador to the FAO, and we will soon send several more staff members there. Yet why don't we have a national committee and experts that would deal with this problem? The FAO is ready to give us technical assistance. Yet nothing is being done by our side.

Or take the UN Ecosystem Assessment Programme, which I helped to elaborate. Despite all my letters to the Ministry of Natural Resources that we need such a program and that we must assess the state of our ecosystems, nothing has been done. Thanks to the efforts of the Nature Protection Center, a project for assessing ecosystems in the Altai-Sayan Ecoregion was launched. It will soon be complete, yet one has the feeling that everything will stop there. China, an active participant of this program, diverts our water, and, as a result, we are losing Lake Balkhash, the Amur River, etc. Working together with the United States, we have developed a computer program for inventorying biodiversity. Overcoming many difficulties, we brought together all of our protected territories in an enormous catalog that takes up six volumes and that reflects all of the bio-

diversity of protected territories. However, Ms. Bukvareva is right in saying that, to solve the problem of biodiversity, one must solve it outside protected territories, too. Now I am trying to prove that a model law on biosphere reserves has been drafted in Russia. Nevertheless, Belarus has adopted a law of its own on reserves, although there are only three biosphere reserves in the country. Belarus is one of the most active participants of the Man and the Biosphere Programme. Our 39 biosphere reserves are all illegitimate, because we have not adopted a biosphere reserve law. There is nothing that their poor staff members, who continue to work for $200 a month out of sheer enthusiasm, can do.

In other words, nothing serious is being done to promote Russia's leading role in the domain of bioprotection. As long as Russia does nothing at home, it will not get any prerogatives in international cooperation. No one will listen to us. I would like to ask the Commission of the Russian Federation for UNESCO and other participants in the discussion to give this their attention and try to change the situation in a fundamental way.

Olga Tynyanova, Editor-in-Chief of the magazine **Space and Time:** Let me make a small aside. One has mentioned the problem of education. We believe that society obeys only social laws. Why? Because this is what we learn in school and college. College is probably the most important, because it directly prepares people for work in administration and the media. History textbooks have not said anything so far about environmental catastrophes that have led to the fall of many civilizations. Yet it is known that forest cutting has been one of the key causes of crises of local civilizations. Over the past 2,000 years, mankind has cut down over 40% of the Earth's forests.

Thus I believe that it would be important, first of all, to use the results of our round table to draft a bill requiring this issue to be included in the legislation. We have a lot of laws that are not implemented. We must think more about the mechanisms of their implementation. Secondly, international cooperation has also begun to focus on education recently. For example, Norway's arctic development strategy is based on education, including environmental education, and aims to promote Norwegian environmental priorities internationally. Who studies at Norwegian colleges? Their students include young people from the Murmansk Region. Yet Russia does not show an interest in this, either. The Murmansk State Pedagogic University has been trying unsuccessfully in recent years to

get grants to send its students for environmental studies in Norway where they would learn about the interaction of the natural and man-made environments.

V. Sokolenko: Let's sum up. For the first time in human history, the conflict between man and nature and the antagonism between civilization and the biosphere have become a central problem of the survival of civilization. One must start from there. Our discussion has shown that there are two possible ways of overcoming this problem. The first may be called the "innovative capitalist path": one must try to solve the problem in the context of the existing civilizational and cultural value system and through the preservation of the liberal capitalist priorities of civilizational culture that unfortunately inculcates the attitude to the biosphere as a "storehouse," leading to a "consumer mentality." In this case, the understanding of civilizational and social progress is centered around anthropocentrism: the striving to meet the growing demands of man, who continues to be a "sacred cow." Yet one runs up as a result against the apparently insurmountable problem of the unbridled and boundless human passion for gain and profit leading to a rapacious attitude towards the biosphere. The Earth's resources are not infinite. The branch on which mankind is sitting is beginning to crack. No other branch exists. The disadvantage of this path is that you can't solve a problem without eliminating its causes. Yet the main cause is the exhaustion of modern civilization's historical resource with its two-thousand-year history of monetarist culture and the anthropocentric priorities of its further development that are not balanced against the task of environmental protection. The agenda of international politics continues to focus on the interests of global capital – the main consumer of the biosphere and its resources. This has led to the problems of the protection of ecosystems and the biosphere as a whole that have been described vividly and in detail today.

The second path that is being increasingly discussed in international scientific circles and that is gaining an ever greater number of proponents is the noospheric conception. This is a successor to the present-day paradigm of civilizational development and represents a transition from anthropocentrism to "biospherocentrism" – the relation to the biosphere as a supreme value of social development and as a "temple." This conception calls for restoring the balance of material and spiritual priorities in the development of man and society.

Today, many consider this conception to be utopian on account of the

firmly established mindset of modern man, who, as Academician Danilov-Danilyan noted, requires "ethical reeducation."

For the time being, we can only observe the growing urgency of the problem of finding a way out of this antagonism. The lack of a universally acceptable answer to this challenge of modernity stimulates global intellectual thought.

A lot depends on Russia. With its major global biosphere regulation resource, Russia is objectively a leader of the international community who is interested in making the protection of the human habitat a political priority of the development of the international agenda. Today, this is, without a doubt, a unifying resource and an imperative to preserve the two-kilometer envelope around the Earth in which the phenomenon of life flickers in a cold Universe. The world counts on Russia.

Key words: biosphere, noosphere, Convention on Biological Diversity, environmental education, UNESCO Man and the Biosphere Programme, UN Ecosystem Assessment Programme, anthropocentrism.