Climate change in the context of global environmental governance possibilities

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Abstract: Recent information campaigns of media and the ongoing substantive discussions of experts have been more and more devoted to the climate change issue and its impacts that could affect our future and threaten the sustainable and balanced development of the planet Earth. However, the categorical apparatus as presented at the above mentioned events is not always used correctly and the same is true about the objective interpretation of the very nature of the processes. Also the explanations of realistic options of governance to mitigate and streamline the effects associated with climate variability in order to achieve the least possible damage of global environment are not always given appropriately. Because of a lack of specific statistical data on climate variability, which are usually at the sole disposal of professional climate scientists, and owing to the attention the public pays to these phenomena only at times of climatic anomalies (floods, extreme heat and drought, etc.), the issue is still on the edge of a broader awareness of people and academic research. This paper is in essence an overview of scientific works, which aims to contribute to the understanding of the issue of climate change by the means of summarizing the main approaches and use of categories, defining their substance and especially clarifying the phenomena in relation to possibilities of global governance.

Key words: climate change, climate changes, global warming, governance, global governance

Since the 1980s, there has been undeniably a significant increase in the temperature on the planet Earth. As noted by the Ministry of Environment (MŽP 2009: 10), "changes in temperature were confirmed by the results of the measurements made around the world. In the last fifty years, the average global temperature has increased at a rate of 0.13°C per decade. By the end of the century, there is expected a possible increase in the average temperature spanning from 1.8 to 4 degrees °C." What is the problem, if it is known that in the history of Earth the climate has changed several times due to many factors – such as the changes in the solar activity (the intensity of solar radiation), changes in the Earth's rotation (its mutation) or changes in the atmospheric composition (e.g. due to a strong volcanic activity)?

The problem now is the speed of that change, its signs and its impacts. The pace and scope of the climate change are, claimed not only by the scientists from the Intergovernmental Panel on Climate Change (IPCC), unusual and alarming. They are caused by rising concentrations of the greenhouse gases in the atmosphere[1], which are released into the air through almost every human activity. This enhances the natural greenhouse effect and consequently the Earth's atmosphere retains more heat than ever before. For

[1]Greenhouse gases are gases present in the Earth's atmosphere, absorbing the infrared rays, making the lower layer of the atmosphere and the surface of the Earth hotter. Naturally occurring greenhouse gases are water vapour, carbon dioxide (CO_2), methane (CH_4); greenhouse gases of anthropogenic origin are mainly carbon dioxide, methane, nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6) (their emissions are controlled under the Kyoto Protocol and the United Nations Framework Convention on Climate Change, see below); soft CFCs (HFCs) and hard chlorofluorocarbons (CFCs) and halons (controlled under the Montreal Protocol and its amendments); there are many other greenhouse gases such as SF5, CF3, CF3I, NF3. The concentration of CO_2 rose since 1750 by 31% to 367 ppm in 1999 and it was probably the highest value achieved in the last 400 000 years. The concentration of CH_4 increased within the same period by 151% and the concentration of N_2O by 17%. Perfluorocarbons and sulphur hexafluoride are new substances that did not occur around 1750. In 1985, the Advisory Group on Greenhouse Gases was established in order to identify the key issues of the science policy associated with that growth.

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instance Pretel (2010) points out that in addition to the growth of the typical concentrations of greenhouse gases (carbon dioxide and methane), it is also necessary to observe the influence of water vapour which contributes to the existence of the natural greenhouse effect by 65–85%. In the past, this effect was probably underestimated as the warming since the year 1990 was probably caused from one-third by the increasing content of water vapour in the stratosphere. After 2000, allegedly, the volume began to drop and made the temperature rise more slowly.

The estimated increase in temperature between 1.8 and 4°C by the end of the century could have major implications for life. According to the Ministry of Environment (MŽP 2009: 10), "changes in the intensity and location of rainfalls and melting of the glaciers could threaten up to 2 billion people through a lack of drinking water by the mid-century. Up to 30% of plant and animal species would be threatened with extinction. Although a slight increase in the global temperature would lead to higher agricultural yields, a temperature rise of more than 3°C would in turn dampened agricultural production." ... "If we are to prevent serious consequences of climate change by the mid-century, we need to reduce the greenhouse gas emissions by 80% from the current levels" (MŽP 2009: 10).

Hot discussions at all levels are taking place about the issues outlined above. The reasons of these debates on climate are not just the terminology used but also the nature of climate change, its causes and impacts and the ways of the greenhouse gas emissions abatement, as well as the adaptation to the already existing irreversible changed environment. Disputes in this regard are caused by different interpretations of scientific knowledge and as such they lead to different policy approaches regarding the choice of measures to reduce the climate change risks. Regarding the problem of interpretation of the results and their politicization, Pretel (2010) provides that this is viewed just from the black and white perspective. Most obvious are usually the adverse effects of the rapidly changing climate and thus they are more noticed by people and some of them, under the media pressure, feel more fear of the consequences. This makes them a suitable political issue. Regarding the choice of action, one can also recognize some fundamentalist views, such that climate change does not take place at all as the climate has always changed and any minor problems will be solved by the market.

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CLIMATE CHANGES OR CLIMATE CHANGE?

"Climate system" means the "totality of the atmosphere, hydrosphere, biosphere and geo-sphere and their interactions" (UN 1994: 3). The fact that there is a rise in the global temperature serves as a basis for the term "global warming". Global increase in the temperature causes changes in the climate system which do not reflect everywhere on the planet in the same manner. These changes are sometimes called "climate changes" and sometimes "climate change". The question that arises in this context is about the essence of these categories and how to use them correctly?

In the past, one could understand under the term "climate change", as stated by Lapin (2004), all changes related to climate. Currently, based on the definition applied by the the IPCC, one can understand under the term just the natural climate changes such as predominantly the changes that took place in the past geological periods of the Earth (back to millions or hundreds of millions years), the Ice Age (back to ten thousands to millions of years), the secular changes (hundreds of years), but sometimes also low frequent variations in the climate (tens of years).

Climate change in the IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by the changes in the mean and/or the variability of the its properties, and that persists for an extended period, typically decades or longer (UN 2007: 30). The United Nations Framework Convention on Climate Change (UNFCCC) defines the climate change in Article 1, paragraph 2 as follows: "Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UN 1992: 3).

Scientists from the IPCC therefore do not refer to any change in climate in the course of time, which would be subject to either natural factors or the consequences of human activity. From the IPCC reports, it implicitly results that the changes in climate are associated with a growing greenhouse effect in the atmosphere started by the industrial revolution (around the year 1750). These changes are subject to the consequences of human activity, but as such they can be distinguished from the natural transformations.

The scientists thus take into account both natural and anthropogenic influences. The IPCC concept differs from the one taken by the signatories to the UNFCCC conventions, who consider the anthropogenic impacts as the main cause of the climate change. In the atmosphere, there occurs a concentration of greenhouse gases that get into the air with almost every human activity. These gases enhance the natural greenhouse effect and the Earth's atmosphere retains more heat than before.[2]

The difference in the approach in terms of classification, which is not only evident in the case of the two major institutions of global governance can lead, as mentioned above, to the problem of different interpretations of the impacts of climate change as well as to the preference and selection of various measures.

MAIN OBSERVABLE ATTRIBUTES OF THE CLIMATE CHANGE, THEIR CAUSES AND IMPACTS

Observable attributes of the climate change, their causes and impacts have been described in numerous publications[3] and documents, among others the Fourth Assessment Report of the IPCC released in 2007. Despite the fact that the report was subject to a sharp criticism from the side of the press and internet media (see e.g. Klimánek 2010), both in terms of using the default source works and in terms of the correctness of some claims, the following description representing an integrated (commonly accepted) view of the climate change is drawing on this work. That is because its goal does not lie, in order to deepen the theory of the climate system, in quantitative information about the variability of climate. While such information is based on serious statistics and can be correctly interpreted in a physical way, the general description mentioned further in the text builds on the observable attributes that are defined as the occurrences and trends tested and proved by climatologists and that are, in general, accepted also by the critics of the IPCC. The same is true for the specification of the causes and impacts of the climate change.

The main tendencies, which in total lead to a definite warming of the climate, are according to the IPCC (UN 2007: 30–33) as follows: (i) Increase in the average air and ocean temperatures: A temperature increase occurs all over the planet and this increase is bigger in the higher Northern latitudes. Continental regions get warmer faster than the oceans. The frequency of cold days and nights decreases in most land areas and at the same time, the frequency of hot days and nights gets higher. It is likely that the heat waves are more frequent in land areas. (ii) The extent of the depletion of snow and ice: The annual average sea ice area is shrinking and the decline is faster especially in summer. Mountain glaciers and snow covers are reduced in both hemispheres. (iii) Increasing sea level: The sea level rise has been promoted by the thermal expansion, melting of glaciers, ice caps and polar ice-covers. The frequency of intense rainfalls went up and since 1975, there has been a higher incidence of the extreme high sea level worldwide. (iv) Increase in areas affected by drought: The volume of rainfalls has grown significantly in the Eastern parts of North and South America, Northern Europe and North and Central Asia. On the contrary in Sahel, the Mediterranean Sea, in Southern Africa and parts of South Asia the volume of rainfalls has dropped. The area affected by drought has probably globally increased. (v) Increased activity of intense tropical cyclones: Although there is no clear trend in the annual number of tropical cyclones and it is difficult to determine the longer-term trends, since about 1970s, an increased intense tropical cyclone activity in the North Atlantic can be observed.

The evidence obtained from the observations on all continents and the majority of oceans show that many natural systems are currently affected by the regional climate changes, particularly the increases in temperature. For instance, there is a high probability that the changes observed in the case of snow, ice and frozen ground (permafrost) led to an increased number and size of glacial lakes, increasing the soil instability in the mountain areas as well as other areas with the permanently frozen soil and to changes in some Arctic and Antarctic ecosystems. Some hydrological systems were also affected by the increased runoff and an earlier spring flow culmination of many streams fed by the melting snow and glaciers and by their effects on the thermal structure and

[2]Since the last Ice Age (about 12 thousand years ago) until 1750, the concentration of greenhouse gases in the atmosphere changed only slightly but after that year the growth in all greenhouse gases in the atmosphere has accelerated including water vapour that is growing slightly. CO_2 and methane concentrations measured in 2002 were about 33.5% or 159% respectively higher than before the year 1750 (Lapin 2004: 2).

[3]Already in 2006, there was translated in the Czech Republic a book by Vicente Barroso called "Global Climate Change", which aims to "provide information on many aspects of climate change as objectively as possible" (Barros 2006: 19).

water quality of warming rivers and lakes. Warming leads to an earlier start of the phenomena related to the period of spring and to the shifts in the range of plant and animal species to higher altitudes and away from the Equator. In some marine and freshwater systems, the changes and shifts in the range and abundance of seaweed, plankton and fish are associated with rising water temperatures as well as the related changes in the ice cover, salinity, oxygen levels and circulation.

There is also a medium level of certainty that there are also other effects of the regional climate change on the natural and human environment, although many of them are, due to the adaptation – see below – and non-climatic factors, difficult to identify. They include the effects of the temperature increase on: agricultural and forestry in the higher latitudes of the Northern hemisphere (such as an earlier spring planting of crops and changes in the disturbance regimes of forest fires and pests), human health (e.g. heat-related mortality in Europe, changing vectors of contagious diseases in certain areas and the allergenic pollen in the middle and higher latitudes of the Northern hemisphere), some human activities in the Arctic (e.g. hunting and travelling over snow and ice areas) and in the lower areas of the mountains (such as mountain sports).

The scientists from the IPCC (UN 2007: 36–41) identified the main causes of climate change associated with development and population growth (see also Jeníček 2010) and with a steady development of human activities. These are changes in the concentration of greenhouse gases and aerosols[4] in the atmosphere and solar radiation, which ultimately change the energy balance of the climate system. Global concentrations of carbon dioxide, methane and nitrous oxide in the atmosphere since 1750 have, due to human activities, increased significantly and are now much higher than

Global average annual temperature change relative to 1980–1999 (°C) 0 1 2 3 4 5	
WATER	Increased water availability in moist tropics and high latitudes----------> Decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes----------> Hundreds of millions of people exposed to increased water stress---------->
ECOSYSTEMS	Up to 30% of species at increasing risk of extinction----------Significant extinctions--> around the globe Increased coral bleaching--Most corals bleached--Widespread coral mortality---------->Terrestrial biosphere tends toward a net carbon source as: –15%----------40% of ecosystems affected--->Increasing species range shifts and wildfire risk---------->Ecosystem changes due to weakening of the meridional overturning circulation---------->
FOOD	Complex, localised negative impacts on small holders, subsistence farmers and fishers----->Tendencies for cereal productivity to decrease in low latitudes Productivity of all cereals----> decreases in low latitudes Tendencies for some cereal productivity to increase at mid- to high latitudes Cereal productivity---------> decrease in some regions
COASTS	Increased damage from floods and storms---------->about 30% of global coastal-------> wetlands lost Millions more people could experience----------> coastal flooding each year
HEALTH	Increasing burden from malnutrition, diarrhoeal, cardio-respiratory and infectious diseases---------->Increased morbidity and mortality from heat waves, floods and droughts---------->Changed distribution of some disease vectors---------->Substantial burden on health services---->

Figure 1. Impacts associated with the projected global average temperature change

Source: Composed on the basis of the UN (2007: 51)

[4]Increases in greenhouse gases tend to warm the surface, while the total effect of aerosols on the contrary, increases cooling of the planet. The net effect of human activities since the pre-industrial times is warming.

the figures corresponding to the natural range of their atmospheric concentrations from the pre-industrial period determined on the basis of the ice cores spanning about 650 000 years. The increases in the global concentrations of greenhouse gases are mainly caused by the usage of fossil fuels and the changes in land use (agricultural sector)[5]. Compared to those, the changes due to insolation have little warming influence[6]. There is therefore a quite high certainty that the resulting effect of human activities taken since the middle of the 18th century led to warming. It is also clear that the impact of human activity, in addition to the average temperatures expands and it covers other aspects of climate (shrinking volume of snow and ice, sea level rise, etc.). It is also evident that the anthropogenic warming also affects the observed changes in many physical and biological systems, as mentioned above.

The IPCC special report on the emission scenarios released in the year 2000 (quoted by the UN 2007: 44) assumes that under the current climate change mitigation policies and procedures related to the sustainable development, the global emissions of greenhouse gases will continue to increase over the next several decades (e.g. between 2000–2030 about 25–90%). In the next twenty years, it is expected that the temperature will go up by 0.2°C per decade. Even if the concentrations of all greenhouse gases and aerosols are kept constant (at the 2000 level), one would expect warming of about 0.1°C per decade. Keeping on the production of the greenhouse gases emissions at or above the current rates would therefore cause, during the 21st century, a further warming and induce in the global climate system a number of changes, which would very likely be larger than those observed in the 20th century.

The impacts of the climate change will vary according to the rate of the temperature change, the socio-economic development trajectory and the extent and success of the mitigation and adaptation measures. In principle, they will affect water, ecosystems, food production, coasts and human health. The examples of impacts associated with the projected global average temperature change are given in Figure 1.

The expected trends may be possibly alleviated through a political will of the leaders of the countries to adopt and implement effective measures to reduce the emissions and to adapt to the existing environmental conditions at best by a suitable combination of reduction (mitigation) and adaptation.

OPTIONS OF ENVIRONMENTAL GOVERNANCE – MITIGATION OR ADAPTATION?

Climate change, as evident from the above text, adversely affects the environment and quality of life on the Earth. On the basis of different approaches (UN 2007, or IPCC 2007) mitigation and adaptation can be defined as follows.

Mitigation is a process pursuing to reduce (mitigate) the intensity of the negative effects of global warming. It is therefore necessary to adopt and implement measures that will keep the climate change within tolerable and sustainable limits. We can reduce the emissions by saving energy, primarily by improving the energy efficiency of equipment, building the thermal insulation, the insulation of the distribution of heat or combined heat and power. An important mitigation tool is the production of heat and electricity from ecological resources, especially renewable ones (solar, wind, water, biomass, etc.). An important role in reducing the greenhouse gas emissions is played in particular by the forest ecosystems, which are able to bind the carbon dioxyde from the atmosphere. It is therefore necessary to promote afforestation and the expansion of the areas of permanent grassland. The reduction of the emissions of nitrogen and methane from agriculture and waste management is possible, for example by reducing the use of nitrogen fertilizers or the cancellation of illegal landfills.

Adaptation is a process of adjustment to the impacts of climate change because a certain change in climatic conditions is already irreversible. Adaptation measures will permit us in future to adapt to the climate change (e.g. through strengthening the country's capacity to retain water due to the higher incidence of extreme rainfalls). According to Pretel (2010), adaptation measures are the "best and probably the cheapest response to the inertia of the climate system." It should aim, inter alia, at how to increase the water retention in the landscape, focusing on the revitalization of rivers and their surroundings, the efficient management of water projects and installations and on ensuring the passage of floods and water quality.

[5]This situation is not changed by the fact that the growth rates of methane from the early 1990s decreased, which corresponds to almost constant total emissions (the sum of anthropogenic emissions and natural resources in that period).

[6]It is estimated that the sum of solar and volcanic activity during the past fifty years probably caused cooling of the planet.

In the agricultural sector, various agri-environment and anti-erosion measures will have to be applied at a much greater extent in order to prevent the loss of water in the soil, which means for instance a change in the agricultuural crops and agro-technical processes, ensuring the optimum irrigation and the control of insect pest, viral and fungal diseases. In the forestry sector, the attention should be paid to the predictions of local specifics, long-term planning, adaptation potential of species, age and genetic diversification of forest etc.

The authors of the article published as a contributions to the Fourth Assessment Report of the IPCC and in order to complete the portfolio of measures in response to climate change in addition to mitigation[7] and adaptation[8] and as a special kind of action, a benefit of the research on new technologies, institutional designs and climate science and impacts, which should reduce uncertainties and facilitate future decisions (IPCC 2007: 225).

Scientists believe that the anthropogenic warming and related phenomena will, under the influence of the time scales of the climate processes and the feedback, continue for centuries even under the assumption that it would be managed to stabilize the concentrations of greenhouse gases. Depending on the size and rate of the climate change, warming caused by the human activity could lead to abrupt or irreversible climate impacts. Climate change has gradually become not only a environmental but also an economic and social problem.

Since the climate change and its consequences are necessary to be fought not only at the global but also at the regional or national scale respectively, the mitigation and adaptation measures shall also be subject of governance at both the global, regional and national level. Differentiating the role of international organizations and the regional integration groupings of countries in the design of the mitigation and adaptation measures is thus very important. This paper will further consider only the institutional, negotiating and other aspects of global governance.

GLOBAL ENVIRONMENTAL GOVERNANCE

While the problem of the climate change was already evident in the 19th century, it was only in late 1970s when it began to be debated at the global level. In 1979, there was convened, at the initiative of the World Meteorological Organization (WTO), the first World Climate Conference (WCC). The institutional basis of global governance was gradually formalized and on its basis, there emerged concepts and were established conditions for the negotiation of the essential contractual documents and there were developed regimes affecting both the behaviour of the main players in the field and the implementation of measures at the regional and national level.

Institutions/concepts

Given the occurring problems in the environment and the development of society, the UN General Assembly decided in 1983 to establish an independent World Commission on Environment and Development (WCED), which had to propose long-term environmental strategies for achieving sustainable development to the year 2000 and beyond, to recommend ways in which the concern for the environment may be translated into a greater co-operation among developing countries and between countries at different stages of the economic and social development, the ways that would lead to the achievement of common and mutually supportive objectives which take account of the interrelationships between people, resources, environment and development, to consider the ways and means by which the international community can deal more effectively with environmental concerns, in the light of the other recommendations in its report, to help to define the shared perceptions of the long-term environmental issues and of the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long-term agenda for action during the coming decades, and inspirational goals for the world community (UN 1983). In 1987, the Commission published a report called "Our Common Future" (WCED 1987), in which it concluded that economic growth is linked to the increasing burden on the natural environment, and that the situation is not absolutely necessary. Economic development can be converted to a more sustainable trajectory, i.e. streamlining it so that the needs of the present generation are not satisfied at the expense of future generations or other communities.

[7]Mitigation is perceived as the "actions that reduce net carbon emissions and limit long-term climate change" (IPCC 2007: 225).

[8]Adaptation is defined as the "actions that helm human and natural systems to adjust to climate change" (IPCC 2007: 225).

In 1988, there was established – by the United Nations Environment Programme (UNEP)[9] and the World Meteorological Organization – the Intergovernmental Panel on Climate Change to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts. The IPCC is a scientific body. It reviews and assesses the most recent scientific, technological and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor the climate related data or parameters. The review is an essential part of the IPCC process, to ensure an objective and complete assessment of the current information. The IPCC aims to reflect a range of views and expertise. The IPCC is an intergovernmental body. It is open to all member countries of the United Nations and the WMO. Currently 194 countries are the members of the IPCC. Governments participate in the review process and the plenary sessions, where the main decisions about the IPCC work programme are taken and reports are accepted, adopted and approved[10]. Because of its scientific and intergovernmental nature, the IPCC embodies a unique opportunity to provide rigorous and balanced scientific information to decision makers. By endorsing the IPCC reports, the governments acknowledge the authority of their scientific content (IPCC 2010).

The second World Climate Conference in 1990 took place, as well as the first WCC, in Geneva and was gradually supplemented by political conferences of the heads of states and their various groups and meetings at the ministerial level, representing the forums for having discussions on various aspects of the climate change. These gradually included the climate change within the context of other global environmental and development problems. Given that the definition of the term of sustainable development is of great importance to environmental protection, because it prefers the preventive strategy to other forms of environmental protection, the newly established organizations such as e.g. the World Council for Sustainable Development continued in the work of the WCED. Those institutions started, in the conditions of the change of the global situation in the world after the year 1991, the process of preparing the United Nations Conference on Environment and Development (UNCED) called also the Summit of Earth and held in Rio de Janeiro in 1992. During the conference, there was negotiated and later entered into force the United Nations Framework Convention on Climate Change, see below, on the basis of which the regular Conferences of the Parties to the UNFCCC (COP)[11] are held. All above mentioned institutions gradually published reports about the seriousness of the problem of climate change, formulated the goals that are necessary to implement and fulfil, as well as the suggestions regarding the division of responsibility between the individual countries and groups of countries.

Political declaration published as a result of discussions in the international fora emphasized, from the outset, a different role of developed and developing countries in relation to the climate change. The different role should have conditioned a different level of responsibility. Over time, a number of policies and concepts developed. For instance Joyeeta Gupta in her book "A History of International Climate Change Policy" (Gupta 2010: 636) identified five basic stages of a comprehensive policy approach to the climate change. For these stages, there is typical a certain scientific basis, actors and their coalitions, the resulting agreement, as well as the supporting key events and major trends. By this, they try to articulate the leadership paradigm (Framing the problem; Leadership articulated; Conditional leadership; Leadership competition; Leadership during recession), which is accompanied by five major tendencies: (i) increasing complexity of the definition of the climate change issue ranging from the environmental questions to the development ones; (ii) inability of developed countries to reduce their emissions and to generate funds to be used in order to deal with the initial problem and their obligations, (iii) engagement of various other social partners in the discussions and, in particular, the escalating use of the market-based mechanism in the system, (iv) intensive research of alternative solutions, such as the identification of the appropriate national mitigation actions for the

[9]The UNEP was established in 1972 with the aim to provide the leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

[10]The first Assessment Report on Climate Change was issued by the IPCC in 1988, the second in 1996, the third in 2000 and the fourth in 2007. The works on the fifth report started in 2010, and the Synthesis Report is due to be completed in November 2014.

[11]These conferences are marked in order of its proceedings as COP-1 COP-2, etc. The last such conference (COP-16) was held in December 2010 in Cancun, Mexico.

developing world contributing to the mitigation of emissions from the deforestation and forest degradation, and the usage of geo-engineering solutions (v) research of the solutions outside the system – to mobilize sub-national policies on the climate change, the disputes settlement and the development of biofuels . A further analysis of the concepts gets beyond the objective of this paper.

Agreements/regimes

In addition to the preparation of the UNCED, there were negotiations launched on the platform of the Intergovernmental Negotiating Committee set up under auspices of the UN General Assembly, which in 1992 resulted in the adoption of the UNFCCC[12] and in 1994 in its ratification. The convention, on the one hand, became a legal and organizational base ensuring the continuous support to the process of negotiations; the framework for obtaining a new and updated information on the climate change; the motive for the process of gradually shifting all countries to applying such strategies and policies, which should deal with the aspects of climate change and lead to the innovation of national legislation (public law), which are often an obstacle to declare an agreement of the state in international negotiations. On the other hand, it divides the world into developed and developing countries, without having clear criteria for the classification, which became a major obstacle in the subsequent periods, when some states denied a change in their status and their inclusion among the developed countries (for developed countries, a binding commitment to reduce the greenhouse gas emissions was determined). Provisions relating to the development assistance and technology transfer are formulated vaguely allowing different interpretations.

The targets defined in a non-demanding way to reduce the greenhouse gas emissions on the side of the developed countries, the assistance to developing countries, which in effect created a space for the growth in emissions, and a considerable emphasis on the mitigation measures despite the growing belief that adaptation is becoming an ever urgent priority, resulted in the year 1997 in Kyoto (COP-3) to the adoption of another very important document – the Kyoto Protocol. When the United States of America decided in 2001 not to ratify this document and initiated a number of bilateral and multilateral activities relating to the climate change with countries in other parts of the world (e.g. the Asia-Pacific Partnership on Clean Development and Climate Agreements), the dynamics of political negotiations changed. Only thanks to the European Union, which has exerted all efforts to persuade other countries to ratify the document and then to implement its provisions, the Kyoto Protocol could enter in 2005 into force.

The Kyoto Protocol (KP 1997) did not involve fundamentally any new long-term goals and priorities but it rather built on the previously adopted basis of the UNFCCC. However, it firstly set binding targets for reducing the greenhouse gas emissions[13] in the developed countries for the period 2008–2012. Together they should achieve the emissions reductions of 5.2%. The protocol offered a number of conceptual processes, allowing the countries to choose their own appropriate and adequate policies. The protocol also includes five mechanisms – the Joint Fulfilment (JF), the Joint Implementation (JI), the Clean Development Mechanism (CDM), the Emissions Trading (ET) and the Financial Mechanism (FM). The JF allows countries to adopt a common task to be commonly implemented. The JI allows investors from the developed countries to implement projects in other developed countries (mainly in the economies in transition) with the possibility to gain the emission credits (Emission Reduction Units) in the amount corresponding to the reduction of the greenhouse gas emissions in the country receiving the investment. The CDM allows the investors to invest into emission credits (Certified Emission Reductions), particularly in developing countries. The ET allows developed countries to buy any unused emissions allowances from other countries. In connection with the CDM, a special financial fund was created to finance the adaptation, based on the 2% levy on the CDM projects and it shall allow for the implementation of the agreement.

An weakness of the Kyoto Protocol is that it set very modest goals for the developed countries and

[12]In addition to the UNFCCC, the UNCED adopted the Rio Declaration on Environment and Development, which includes 26 principles determining the approach to global problems; the agenda of its activities for the 21st century, called Agenda 21 that among other things explains how to achieve sustainable and balanced economic development; and the Convention on Biological Diversity and Convention on Forest Principles.

[13]According to the Annex A of the Kyoto Protocol, these are carbon dioxide, methane, nitrous oxide and three new gases, which were included earlier in the basket of the greenhouse gases: hydro fluorocarbons, perfluorocarbons and sulphur hexafluoride.

moreover it allowed for the trade of permits between the countries when reducing the greenhouse gas emissions as well as for the delay the implementation of the objectives to be postponed by 8–12 years. Moreover, it encoded the beliefs about the ability of the market to address and resolve the problem as such. The Kyoto Protocol was also not able to resolve all pending issues of that time that were related to the start of the mechanism and warranty of the related processes of enforcement. Those then became part of the agenda of the subsequent COPs and resulted in the adoption of the Marrakech Accords in 2001. The accords covered operating provisions for the flexible mechanisms – the JI, CDM and ET, and the elaboration of a compliance regime (Gupta 2010: 645).

The COP held in Montreal in 2005, as well as the Conference of the Parties to the Kyoto Protocol, decided to launch another (second) stage of the negotiating commitments (UNFCCC 2005). The following conference organized in 2007 in Bali adopted the so-called Bali Action Plan (UNFCCC 2007), which became the impetus for the subsequent two-year process "to promote a post-Kyoto agreement on a shared vision, adaptation measures, mitigation measures, technology development and transfer, and financial assistance and investment to be adopted at Copenhagen in 2009" (Gupta 2010: 646).

The Conference of Parties in Copenhagen took place from 7th to 19th of December 2009 in the atmosphere of a general distrust emerging as a result of questioning and criticism of the Fourth Assessment Report of the IPCC and the ongoing global financial and economic crisis. The aim of the Copenhagen conference, attended by the leaders of most countries, was to achieve an ambitious agreement on the immediate global action to combat the climate change, representing a kind of the post-Kyoto protocol. The initial Copenhagen agreement was proposed by a group of countries which are responsible for 80% of the production of the global greenhouse gas emissions. The document included a political commitment to limit the rise of the global temperature on the Earth, the challenge for the states to submit their national plans for reducing the emissions, as well as the promise of the short-and long-term financing in favour of developing countries. Thus it was a kind of framework for the adaptation for developing countries, a mechanism to accelerate the technology transfer, a program capacity-building and provisions to reduce the emissions associated with the deforestation and agriculture. The Conference therefore started the process of a possible consensus in four key areas: the mid-term reduction of emissions in developed countries, the commitment of developing countries to reduce emissions, funding of actions needed and a proper climate control system.

Although the final document from the Copenhagen Conference (so-called Copenhagen Accord) was not formally adopted as a decision under the UN Framework Convention on Climate Change, the participants agreed on the need for a common and long-term approach when dealing with the impacts of climate change and they got closer to an agreement on how to further proceed at the global level. From the practical point of view, the Copenhagen Accord adopted a declaration that the increase in the global average temperature should not exceed 2°C relative to the pre-industrial level. This made it a sort of a breakthrough after the previous refusal of countries to quantify any long-term abatement goals. Since there were no medium-term and short term goals, all countries were invited to make a voluntary offer for a further reduction in the greenhouse gas emissions. Within the meaning of the Action Plan from 2007, those were mainly the so-called Nationally Appropriate Mitigation Actions (NAMAS), which should be adopted by developing countries "in the context of sustainable development, supported and enabled by the technology transfer, financing, and capacity-building, in a measurable, reportable, and verifiably manner" (UNFCCC 2007). As for funding, developed countries committed themselves to creating a climate fund worth 30 billion USD for the period 2010–2012 under the so-called fast-start financing and then a 100 billion pledge by 2020. Developing countries are expected to report every two years on their mitigation actions which become an immanent part of their domestic measurement (UNFCCC 2010a: 5–7). That shows that the climate change issue got in the forefront of the governmental political agenda of virtually all states.

At the turn of November and December 2010 (29.11. to 11.12.), there was held in Cancun, Mexico, already the 16th Conference of Parties to the United Nations Framework Convention on the Climate Change counting 193 countries. Due to the fact that in Copenhagen, a political rather than legally binding agreement was made, the paramount objective of this conference was to regain the credibility and trust in the international negotiating process and to set out concrete steps to allow for a global agreement to be adopted in 2011 in Durban. The Cancun Agreements (UNFCCC 2010b), a set of documents which to a large extent transpose the content of the Copenhagen Accord, are formally official UN documents. Despite the fact that the Cancun Agreements, do not, alike the final statement from Copenhagen, they contain specific obligations of the participating countries to reduce

the emissions of greenhouse gases and they represent the willingness of the countries involved[14] to keep the international climate change negotiations on track and provide a set of action-oriented decisions on many different areas.

For the first time, the international community officially acknowledges a goal in the UN document that global warming must be kept below 2°C compared to the pre-industrial temperature and acknowledges also other emission reduction targets, which appeared as non-binding in the Copenhagen Accord. However, the parties were not able to stipulate further reduction goals that would be in line with the scientific evidence. The document also calls upon countries to adopt more ambitious pledges, which would translate by 2020 in the reduction of the greenhouse gas emissions by 25–40% compared to the 1990 levels and that meant the end of the debates over the so- called reference year (level). Nevertheless, it is up to the decision of each participant which year it chooses to express its individual objective. An important part of the Cancun output is also the confirmation of the establishment of a new, so-called Green Climate Fund, which should help developing countries to adapt to the climate change and to invest in carbon-free technologies. The Cancun Agreements, however, do not specify individual sources of funding amounting to 100 billion annually by 2020. The Climate Fund will have twenty-four-member bureau with an equal representation of both developed and developing countries. An important progress was also achieved in terms of enhancing the technology development and transfer to ease the emissions reduction and the adaptation to climate change. The new adaptation framework and the newly established committee should help developing countries to adjust to the impacts of climate change. The parties also agreed on launchig a "REDD+" mechanism enabling the action to reduce emissions from the deforestation and forest degradation. With the financial and technological support coming from the developed countries, developing countries are to develop national strategies for the forest protection and to propose an appropriate monitoring mechanisms.

On the contrary, as stated by Patočka (2011), the negotiators failed to find an immediate agreement in terms of reducing emissions. Developed countries undermine the adoption of new commitments by strengthening the participation of developing countries (especially in the case of large developing economies) in their implementation. Developing countries represented in the G-77[15], on the contrary, still insist that the main responsibility is and thus the reduction efforts should be on the side of the rich developed countries. They have a larger share of the so- called historical emissions and that is why the obligations of poor countries should only be made exclusively on the voluntary basis. Thus a key discrepancy between the parties is whether to extend or renew the Kyoto Protocol for the second period. The main opponents of the second period are primarily Japan, Russia, Canada and the U.S., which argue that there should be a new agreement that will commit all major emitters to reducing emissions, or their growth, and which will be the only legal basis for resolving the problem. Developing countries, on the other hand, are willing to accept a new agreement only under the condition of the co-existence of the Kyoto Protocol negotiated for the second period. China remains on the side of developing countries and stresses that it will accede to a voluntary commitment, which will draw on the UNFCCC. So the EU can play the role of a mediator, as it is, under certain circumstances, willing to accept both options i.e. the second period of the Kyoto Protocol or the adoption of a new agreement.

The fact that the parties left open the future of the Kyoto Protocol provided a room to resolve more modest goals. The Cancun conference thus indicated that the negotiations at the UN level make sense and that there is a political will to tackle the issue of reducing the greenhouse gas emissions and global warming. Further negotiations are expected as a part of the preparations for the conference held in South Africa at the end of the year 2011.

Tendencies/addition

From the historical process of the various attempts for global governance, it is evident that the meetings held at the global level as well as the recommended procedures of the negotiations can ensure that the partial questions of the related issue under become a part of the agenda of global institutions and within

[14]The Agreements were accepted, on one hand, by China and India, on the other hand, by the U.S., the EU and Japan. Only Bolivia out of all the countries did not support the Agreements, the information of which is to be a part of the documentation.

[15]G-77 is the largest intergovernmental group consisting of developing countries, which was founded in 1964. Its main aim is to shape and promote common economic interests, strengthen their joint negotiating capacity on all major economic issues within the UN framework and to promote South-South cooperation.

the political processes, they are continually pushed forward despite of different views of the policy-makers who form them. The UNFCCC includes all aspects that allow the negotiating process to develop and modernize, and to have at its disposal new scientific information and use it for political decisions. From the above mentioned, it is clear that the formal UN negotiations are accompanied by parallel negotiations among countries at both regional and bilateral levels, which should support (but may have a retarding effect) the global negotiations on climate change. The process of dealing with the impacts of climate is increasingly influenced by the engagement of local authorities active in the field of development aid (however, the lower levels of governance are not examined in the context of this paper). This corresponds also with the fact that there is an increasing number of disputes on different legal bases resolved by national courts.

Climate change becomes a problem of growing significance. The recession that began in 2008 and will last several years, can on one side mean that the non-competitive and sometimes environment-harming industries close down and this, compared to the times of economic boom, will slow down the growth of the greenhouse gas emissions in developed countries. On the other hand, we are dealing with a global problem, although making an agreement depends on the will of states to take far-reaching measures. There is no way how to force a national authority to adopt such goals that would fully correspond to the outputs of scientists and to implement their recommendations. Also the drop characterized by the leadership paradigm and real leadership implied a lack of quality in the leadership of developed countries and the reluctance of developing countries to take the practical emission reduction measures. The market-based mechanism deals with the climate change in a typical way – rather than to emissions reductions, it leads to the attempts to maximize profits. It can also be noted that such mechanism was probably more successful in raising public awareness of the climate change issues than public institutions operating within a given scheme.

In the recent years, which means essentially in the global financial and economic crisis, we can take notice of some new facts. Due to a number of challenging views published on the web sites or in newspapers, the scientific legitimacy of the issue of climate change as well as the urgency of the appropriate action was affected. In this situation, the EU is probably one of the last strong players, who share the only viable strategy – leading by dialogue. This means that the EU explicitly accepts unconditional goals in order to show goodwill, while other developed countries accept obligations being adjusted to the actual efforts of other developed countries or to the offers of developing countries. The failure of the United States to demonstrate their leadership led to the situation when many other countries just gradually adjust.

In connection with the end of the COP-16, the UN General Assembly (UN 2010) established a new intergovernmental body – the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES), which is expected to be able to offer appropriate policies both to reverse the negative trend of natural decline in biodiversity and to highlight its importance for the national economies. As is quite obvious, the loss of biodiversity represents, as one of the results of the climate change, the biggest environmental threat, which leads to economic losses and the deterioration of living conditions. The IPBES should also increase the public awareness of biodiversity and make it more considered by the political decision-making processes. A special attention should be paid to the diversity of ecosystems influenced by mining mineral resources, agriculture, forestry, and transport and tourism industry. The IPBES started its operation in early 2011, i.e. practically at the same time when the "International Year of Forests" and the "International Decade of Biodiversity" were launched.

CONCLUSION

Climate change is a reality of today and the impacts of both human activity as well as the anthropogenic emissions can be proven. However, one cannot confuse the climate variability in the horizon of several years or decades with the climate change occurring in the spell of several tens of thousand years or more. This confusion can lead to an incorrect choice of strategy and governance as well as to a bad choice of specific measures. The variability of the climate elements is dependent not only on time but also on space, as reflected in a variety of interests and approaches of the countries (local governments) to address the impacts of climate change.

The currently ongoing global negotiations on a new global agreement on the climate protection could be concluded at the Conference of the Parties of the Framework Convention on Climate Change and the Kyoto Protocol in Durban. The COP-15 and COP-16 held in Copenhagen and Cancun significantly contributed to the fact that the climate change issue has moved to the top of the governments´ political agenda of many states, i.e. exactly to the place where it could be addressed. Now it is necessary that the countries

handle the negotiations cautiously bearing in mind a collective benefit, since they actually must cope with the climate challenge. Developed countries can now revitalize the negotiations on raising the level of the joint reduction of emissions in the range of 25–40%. If they fail to agree, they will need in future to reduce the emissions even more. Y. de Boer (2010) believes that "multilateralism is the only tool the world has for the adoption of international laws, regulatory measures, standards and market mechanisms at global level. All existing instruments to combat climate change are a result of the multilateral process ... Building new structures would require time and financial resources that the world simply does not have."

Every country should have at its disposal a national strategy (program) for adaptation to the climate change together with an appropriate climate policy. National strategies should specify working measures and practices that ultimately lead to a reduction in the greenhouse gas emissions of the country. Reaching this goal can be realized under the condition of full and timely use of the properly selected instruments. Even if all the technological, capital intensive and administrative measures are being implemented properly and when using the best available technology, it can be of a limited effect if the state does not accept the measures leading to the change in people's behaviour and which bring about the additional emission reductions. In other words, the state must motivate people to change their behaviour and establish the conditions when an environmental friendly option is easily accessible to the public.

Climate policy must be based on realistic and achievable goals, with respect to economic relations, energy security and the promotion of science, research and development of new technologies. The search for new solutions leads to new problems such as the pressure on the use of biofuels, the pressure on denying the nuclear energy and preference of hydro-energy. The purpose of this policy is the natural inclusion of the climate protection criteria into all major decision-making processes. However, its scope is broader. If there are already measures and tools that (among others) lead to the systematic reduction of the greenhouse gas emissions, then the climate protection policy contributes to their enhanced implementation, monitoring, evaluating and adjusting the parameters, so that they become even more effective.

Developing countries have only a little responsibility for the current concentrations of the greenhouse gases in the atmosphere, but the impact of the changing climate will in the first place affects the poorest and most vulnerable among them. The needs of developing countries are different – for small island developing states and the poorest countries, the priority lies in a successful adaptation, while the large developing economies prioritize an access to modern technologies and the countries which are very rich in tropical forests have the greatest incentive potential in stopping the deforestation. Every developed country should therefore recognize its share of responsibility for the global climate change and at the UN level actively cooperate in the transfer of the environmentally sound technologies, the adequate financial contributions to the existing and emerging international funds and the initiatives in the field of climate protection and adaptation, and to take into account the criteria of climate protection when considering its development policy and cooperation.

REFERENCES

Barros V. (2006): Globální změna klimatu (Global Climate Change). 1st ed. Mladá fronta a. s., Prague; ISBN 80-204-1356-1.

De Boer Y. (2010): Klimatická změna: Jak dál po Kodani? (Climate Change: What Next After Copenhagen?). OSN, Praha. Available at www.osn.cz/zpravodajstvi/zpravy/zprava.php?id=1578 (accessed October 2010).

Gupta J. (2010): A history of international climate change policy. WIREs Clim Change, *1*: 636–653.

IPCC (2007): Metz B., Davidson O.R., Bosch P.R., Dave R., Meyer L.A. (eds.): Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York; ISBN 978-0-521-88011-4.

IPCC (2010): Intergovernmental Panel on Climate Change. Available at http://www.ipcc.ch/organization/organization.shtml (accessed January 2010).

Jeníček V. (2010): World population – development, transition. Agricultural Economics – Czech, *56*: 1–15.

Klimánek O. (2010): Zpráva Mezivládního klimatického panelu (Report of the Intergovernmental Panel on Climate Change). Available at www.scinet.cz/zprava-mezivladniho-klimatickeho-panelu-5600-nevedeckych-citaci-strach-katastrofy-a-politicke-motivy-indie-z-panelu-vystoupila.html (accessed November 2010).

KP (1997): Kyoto Protocol to the United Nations Framework Convention on Climate Change. United Nations, 37 ILM 22.

Lapin M. (2004): Zmeny a zmena klímy, scenáre klimatickej zmeny (Changes and Change of Climate, Scenarios of Climate Change). Bratislava: FMFI UK, Oddelenie metrologie a klimatologie. Available at www.dmc.fmph.

uniba.sk/public_html/ climate/climate.html (accessed October 2010).

MŽP (2009): Shrnutí politiky ochrany klimatu České republiky (Summary of Climate Protection Policy of the Czech Republic). Ministerstvo životního prostředí ČR, Praha. Available at http://www.mzp.cz/C1257458002F0DC7/cz/news_tz090507pok/$FILE/ Shrnuti%C3%AD%20POK.pdf (accessed October 2010).

Patočka P. (2011): Cancún zachránil vyjednávání, nikoli však klima (Cancun saved negotiations, however not climate). Glopolis, 11.1.2011.

Pretel J. (2010): Globální klimatická změna (Global Climate Change). Available at http://gnosis9.net/view.php?cislo clanku=2010020014 (accessed October 2010).

UN (1983): Process of preparation of the Environmental Perspective to the Year 2000 and Beyond. A/RES/38/161. United Nations, General Assembly, Distr. General, 19 December 1983. Available at http://www.un.org/documents/ga/res/38/a38r161.htm (accessed December 2010).

UN (1992): United Nations Framework Convention on Climate Change. New York, United Nations, 1992. FCCC/INFORMAL/84 GE.05-62220 (E) 200705. Available at www.unfcc.int/essential_background/convention/background/items (accessed December 2010).

UN (2007): Climate Change 2007: Synthesis Report. An Assessment of the Intergovernmental Panel on Climate Change. Valencia, 12–17 November 2007. Available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf (accessed December 2010).

UN (2010): UN General Assembly approves creation of an Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services. Available at http://www.un-ngls.org/spip.php?article3177+Intergovernmental+Science-Policy+Platform&ct=clnk (accessed January 2011).

UNFCCC (2005): Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention. Decision/CP.11. Available at http://unfccc.int/files/meetings/cop_11/application/pdf/cop11_00_dialogue_on_long-term_coop_action.pdf (accessed November 2010).

UNFCCC (2007): Report of the thirteenth conference of the Parties, Bali. Available at http://unfccc.int/meetings/cop_13/items/4049.php (accessed November 2010).

UNFCCC (2010a): Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009. Copenhagen Accord. FCCC/CP/2009/11/add.1, 30 March 2010: 5–7.

UNFCCC (2010b): Outcome of the work of the Ad Hoc Working Group on long-term Cooperative Action under the Convention. Draft decision/CP.16. Available at http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_lca.pdf (accessed January 2011).

WCED (1987): Our Common Future. Report of the World Commission on Environment and Development. Annex to General Assembly dokument A/42/427, Development and International Co-operation: Environment, August 2, 1987. Available at http://www.un-documents.net/wced-ocf.htm (accessed October 2010).

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