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FOREWORD – CLIMATE CHANGES AND THEIR IMPACTS

Discernible human impact on natural environment started from 10 to 6 thousand years ago, at the beginning of Neolith, when people commenced deforestation, farming and extensive animal husbandry. These changes caused acceleration of the cycling of matter (water, carbon, nitrogen, and phosphorus) and energy, which was superimposed on the natural climate variability. There were warmer or cooler, as well as drier or wetter intervals. In effect of natural disasters – floods and droughts – people suffered destruction and hunger, and sometimes were forced to leave their living places. They started to store water in order to become independent of the variability of precipitation and river runoff.

Demographic growth, increasing energy consumption, development of agriculture and industry, and continuation of deforestation led to the increasing rate of atmospheric concentration of carbon dioxide and other greenhouse gases in last centuries.

Finally, in recent decades, global warming and its consequences became a well visible fact. We observe accelerated melting of glaciers and permafrost, gradual sea-level rise, inundating atoll islands and encroaching into river deltas, desertification, and increase of frequency of extreme events, such as heat waves, droughts, floods, and hurricanes.

Twenty years ago, in 1988 the Intergovernmental Panel on Climate Change was established. In intervals of 5–6 years it reports on climate change, its impacts, mitigation

and adaptation. International scientific community established also research programs, therein the IGBP (International Geosphere Biosphere Program). Polish National Committee of IGBP was formed, whose initial result of activities was a special issue of KOSMOS published in 1993.

Since then, the symptoms of climate change have become much stronger. In Poland, there have been a number of large floods and droughts. Every year, there are local, intense precipitation events and violent winds, even tornadoes. Hot summers and mild, snowless winters challenge the water management, agriculture, and the whole spatial economy. Gradually, programs are being conceived that adapt Polish economy and the society to the need of mitigation of the progressing climate change and adaptation activities. It is necessary to act locally, while thinking globally. In order to mitigate the global warming, it is necessary to reduce the emission of greenhouse gases, and in particular carbon dioxide to the atmosphere, by restricting the combustion of fossil fuels. Effective water management is necessary, which can cope with elevated variability of precipitation and water levels.

On the international level, the United Nations Framework Convention on Climate Change (UNFCCC) was ratified by the majority of UN Member States. Annual conferences of parties to the Convention serve as the forum to negotiate concrete steps, that should be taken for protection of the Earth's

climate. The Conference of Parties held in Kyoto in 1997 resulted in the Kyoto Protocol – concrete obligation of countries to reduce emissions of carbon dioxide. The host of the forthcoming Conference of Parties to the UNFCCC is Poland. From 1 to 12 December 2008, COP-14 will be held in Poznań, Poland and the number of expected participants can be even 10 thousand.

There have been a number of scientific meetings in Poland devoted to the problem area of global warming, such as the Plenary Assembly Session of the Polish Academy of Sciences on 13 December 2007. The issue of climate change becomes an attractive theme for the media, though some press publications are really biased and lead to false interpretations (on the one extreme – ignorance, on the other – catastrophism), misleading the readership. The lack of easy access to long time series of temperature data in Poland, e.g. in internet, does not help in making one's own logical judgment on this controversial issue, based on the evidence and raising the awareness of climate change. The topical area of climate change was the subject of several papers in the quarterly magazine NAUKA (issue 1/2008), available in internet http://www.portalwiedzy.pan.pl/index.php?option=com_content&view=article&id=128:nauka-12008&catid=89:archiwum-nauki&Itemid=98 and in several issues of the GLOBAL CHANGE periodical published every year by the Polish National Committee for IGBP.

Submitting this present issue of KOSMOS, upon invitation of its Editor-in-Chief, we trust that it will disseminate results of this important research area to broader public, and in particular those interested in nature, educationalists, and organizers of social and economical life in Poland.

The present issue of KOSMOS, devoted in its entirety to the issues of climate change

and its impacts consists of 10 papers. The first, climatic part starts with introduction to global climate warming (ZBIGNIEW KUNDZEWICZ). LESZEK STARKEL presents analogies from the past, creating a broader, palaeoclimatic background for present climate changes and demonstrating the differences between the past and the present warmings. RAJMUND PRZYBYŁAK discusses climate change in Poland and Europe in recent centuries. The second part of the issue devoted to climate change impacts consists of six papers. ZBIGNIEW ZWOLIŃSKI and WOJCIECH DOBIŃSKI present results of observation of the shrinking of the cryosphere, while KAROL ROTNICKI deals with observations of sea transgression and their consequences. KUNDZEWICZ reviews climate change impacts on freshwater resources, in the light of existing observations and projections for the future. ZBIGNIEW KUNDZEWICZ and PIOTR TRYJANOWSKI review extreme events related to climate and frequency of their occurrence. PIOTR TRYJANOWSKI and ANNA EKNER propose discussion of the impact of climate change on species and ecosystems, while KRZYSZTOF BŁĄŻEJCZYK and TERESA KOZŁOWSKA-SZCZĘSNA present issues of climate change impact on human health. Finally, in the concluding paper, devoted to human adaptation to climate change, PIOTR MATCZAK reviews a number of related issues, with particular reference to the practice of adaptation to changing intensity and frequency of some climate extremes.

We hope that publishing the material contained in the present issue of KOSMOS will help improve people's awareness and understanding of climate change and their impacts. It is necessary to initiate new activities, and to undertake coordinating actions. In Poland, there is still no national climate program, and the state of understanding of existing climate change and its impacts is highly non-satisfactory.

