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PREFACE

JACEK A. JANIA and ZBIGNIEW W. KUNDZEWICZ

The present issue of *Geographia Polonica* reviews a sample of results obtained through implementation of the Integrated Project entitled "Extreme meteorological and hydrological events in Poland (The evaluation of events and forecasting of their effects for the human environment)". The project, launched by the Ministry of Science and Higher Education of the Republic of Poland in 2004, has as its aim an analysis and spatio-temporal assessment of main extreme meteorological and hydrological events in Poland, using all the available data within an interdisciplinary framework that relates to climatology, hydrology, oceanology, geomorphology, human geography and the economy. In the context of global-scale studies, it is very important that the relationships between extreme events in Poland and trends to ongoing climate changes be determined. The studies presented are devoted to a range of weather-related extremes, such as intense precipitation, floods, and geomorphic hazards like landslides and debris flow, storm surges, droughts and extreme winds, as well as the impacts of all of these on human existence (health and death hazards, economic damage). The major obstacle in conducting these scientific studies has been considerable difficulty with the accessing of basic observational data from the meteorological, hydrological and other stations run by governmental institutions. Recently, a better understanding of the importance of the problem of natural extremes by some governmental bodies in Poland has given

cause for hope that the problem of the commercialised delivery of observational data for scientific and educational purposes can be resolved. Despite such major problems with access to complete (gap-free) series of data, especially in digital form, research work within the project framework is being continued with.

A milestone for the Integrated Project was the convening of a conference on "Extreme hydrometeorological events in Poland and their impacts—A European context" in Warsaw on 7–9 December 2006. This provided an opportunity for selected interim results from the project to be presented, and made subject to extensive discussion. The participation at the conference of speakers from other European countries made the forming of a broader perspective possible, allowing the Polish findings to be seen in the context of results from elsewhere, e.g. via projects funded by the European Commission, and global-scale considerations. Information on the subject matter of the conference may be found in Jania and Kundzewicz (2006). The event was organized by the Faculty of Earth Sciences, University of Silesia and the Institute of Geography and Spatial Organisation, Polish Academy of Sciences.

The present volume is a collection of individual contributions rather than a complete review of the project. The issue starts with a stage-setting contribution by Kundzewicz and Jania (2007), reviewing extreme hydrometeorological events and their impacts in a nutshell, on a range of scales (from the

global down to the regional). In the next paper, Donker (2007) reviews the vital problem of access to, and the re-use of, environmental data in the public sector in European Union countries. This has been a problem of paramount importance in Poland. Indeed, a lack of affordable access to hydrometeorological data has jeopardized the attainability of the original objectives of the present Integrated Project. Next, Matczak *et al.* (2007) deal with the economic dimension by reviewing valuation of losses caused by extreme weather events, with particular emphasis on flood damages. Approaches based on restoration value and market value, and methods addressing indirect tangible losses and intangible damage are reviewed.

The subsequent ten papers are related to the analysis of observational records. The final three papers then deal with various aspects of mathematical modelling and forecasting.

A very important part of the study of extreme hydrometeorological events relates to the detection of changes in long time-series of observational data. Three papers, by Przybylak *et al.* (2007), Uscka-Kowalkowska *et al.* (2007) and Arażny *et al.* (2007) thus deal with extremes in such long time-series of meteorological variables extending between 1951 and 2005. Przybylak *et al.* (2007) seek changes in the index of climate extremes. Since Polish meteorological data were not available at affordable cost, the following two papers deal with the results of an NCEP/NCAR reanalysis carried out in the USA. The studies cover the region of Central Europe. Uscka-Kowalkowska *et al.* (2007) examine the variability to global solar radiation, while Arażny *et al.* (2007) study mean and extreme wind speeds.

Floods have continued to be a major weather-related hazard in Poland, with several destructive events having occurred even since the truly catastrophic deluge of July 1997. Łajczak (2007) examines the impact of human activity, and river training in particular, on the flood risk in the Upper Vistula River Basin, over a longer time-scale of a few centuries. Absalon *et al.* (2007) study the

impacts of the anthropogenic modification of drainage basins on flood patterns. They consider the urbanised and industrialised areas of the Upper Silesia Industrial Region in the 19th and 20th centuries, with particular reference to the Kłodnica River Basin. Marosz (2007) sketches the methodological background to studies of historical floods in Gdansk (including events dating back to the pre-observational period), as well as the usage of GIS in analysing and reconstructing historical floods.

The further two papers examine droughts in parts of Poland. Judging by annual precipitation and the variability thereto, meteorological and hydrological droughts and low flows (streamflow droughts) are to be seen as frequent phenomena during which water availability may achieve extremely low values. Tomaszewski (2007) analyses temporal and spatial patterns to the hydrological droughts and low flows occurring in central Poland (in the basins of the Warta, the Pilica, and the Bzura). Ciepielowski and Kaznowska (2007) deal with recent hydrological droughts (2003–2005) in the Białowieża Primaeval Forest, the largest and most unique National Park in Poland.

The next two contributions deal with geomorphological hazards capable of being triggered by extreme rainfall events. Kotarba (2007) discusses geomorphological instability processes in the Tatra Mountains and compares them with the activity of debris flows in other high European mountains. Smolska (2007) reviews the geomorphological impact of extreme rainfall events in the Suwałki Lakeland (NE Poland), on the basis of soil-erosion measurements.

Two papers are devoted to aspects of mathematical modelling in the analysis of extremes and their impacts. Kundzewicz *et al.* (2007) review alternative approaches to the modelling of the impacts of hydrometeorological extremes, discussing such aspects as: model taxonomy, the trade-off between accuracy and complexity, uncertainty, and barriers relating to data (i.e. existence, accuracy, credibility and availability). Kowalewska-Kalkowska *et al.* (2007) present the

application of the M3D_UG numerical model developed at the Institute of Oceanography, University of Gdańsk, to a *post-hoc* analysis of storm surges along the Polish (southern) Baltic coast.

The final paper, by Szwed *et al.* (2007) examines model-based projections of climate (weather) extremes in Poland, in relation to both intense precipitation and hot and dry spells. A comparison of model-based information for the control period (1961–1990) and for the future projection horizon (2070–2099) is made.

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