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Threat Resulting from the Occurrence of Hydrological Droughts in Poland

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1. Introduction

Poland is considered to be a country with poor water resources and one of the few European countries threatened with water deficit. Factors responsible for this situation can be divided into two groups:

a/ natural factors of which the most important are:

b/ factors resulting from the historical development of Poland:

One of the negative features of Polish climate is a periodical appearance of atmospheric and hydrological droughts. In its initial phase of development, a drought, first of all, exerts negative effects on the proper course of crop vegetation. Intensification of this phenomenon also causes disturbances in proper functioning of other sectors of national economy.

This paper presents definitions of low-flows and hydrological droughts together with the methods of drought identification applied in Poland. Characterisation of drought-spells which occurred in Poland during 1951-2000 period will be given as well as the specification of regions most threatened with the hydrological drought occurrences.

Legal regulations concerning the system of early warning against drought and procedures implemented in Poland also will be shortly discussed.

2. Core

The research of hydrological droughts was based on the daily flows analysis of some 70 water-gauges placed throughout the whole area of Poland. All the catchments with the area over 300 km^2were included in the analysis. The notion of "low-flow" was introduced to denote a flow lower than the multiyear mean low-flow at a given measuring point. Subsequently , the term "hydrological drought" was adapted to indicate a period during which low-flows were noted at at least 15 measuring points for at least 21 days. Periods of low-flows occurring in summer (called summer-autumn low-flows) and those occurring in winter (called winter low-flows) were analysed separately because of their different origin.

Thus identified hydrological droughts were characterised according to the following parameters:

- the lowest flow and the mean flow of the low-flow,
- the first and the last day of the low-flow occurrence,
- duration of the phenomenon,
- the volume of water shortage during the low-flow.

On this basis, the typical time of hydrological drought occurrence was identified as well as regions of different degrees of drought threat potential.

3. Conclusions

The spatial distribution of the occurrence of drought spell periods in Poland is quite unfavourable from the economical point of view, especially for agriculture, because a major part of our agricultural potential is concentrated in regions most threatened with the possibility of occurrence of this phenomenon.

Periods in which low-flows are noted in Poland fall into summer-autumn and winter months. The dominant type of low-flows, both in respect to frequency and time-span of the phenomenon, is summer-autumn low-flow. The analysis of the frequency distribution of low-flows during the whole analysed multi-year period does not allow to conclude definitely if the threat of their occurrences has increased or decreased during the last years.

Despite the frequent occurrences of atmospheric and hydrological droughts in Poland, the problem has not as yet gained an appropriate recognition in our country. There are no definitive legal regulations. Most of the efforts of the state administration and other institutions dealing with water management are concerned with the problem of flood causing excess water.

Atmospheric and hydrological drought monitoring is regulated in Poland by the statue "Water Law" of July 18, 2001. According to it, state hydrological-meteorological service is responsible for preparing and issuing warnings against destructive elements, including droughts. This follows the world-wide tendencies in this matter. Nonetheless, because there are no executive laws accompanying the above mentioned statue, there is no early warning system for this phenomenon. Moreover, the lack of agrometeorological protection constitutes an additional and substantial obstacle in the promulgation of the drought threat.

4. Literature

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