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Impacts of Climate Changes in Ukraine on Hydrological Regime and Water Resources: Assessment and Measures of Adaptation

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Results of implementation of the National Climate Program of Ukraine in the area of researches of climate changes on hydrological regime and surface water resources are presented. The researches have been carried out for major plain rivers of different natural zones of Ukraine.

Researches showed that there were no large changes of mean annual flow discharges for long-term period. The trend of increase or decrease of mean annual flow has not been revealed.

Other results are obtained for mean monthly and seasonal discharges (snow spring flood in March – May, summer – autumn low flow in June – September, winter low flow in December – February). An increase of discharges has been revealed for northern rivers in all months, except for April and May. The large increase of river flow has taken place in winter months.

A tendency of decrease of mean flow for period of spring floods for the most rivers has been revealed. Maximum spring discharges became less approximately on 25% - 40%. There was an increase of discharges in a winter low flow period.

Investigations of a runoff for Carpathians rivers have shown an increase of mean annual flow on 13- 27%. Since 1975 a frequency of high floods has increased for the Carpathians rivers. During last years 6 – 10 high floods have been formed annually.

The assessment of possible changes of hydrological regime until 2030 has been carried out by Ukrainian hydrologists using the approaches developed in the State Hydrological Institute (Russia). There are essential peculiarities in possible hydrological changes for northern and southern plain rivers.

The 15-25% rise in annual runoff for northern rivers is expected. Particularly, important changes are to be expected in a distribution of runoff by seasons: a rise in winters and a fall in springs. Unfavorable changes are expected for rivers of forest – steppe and steppe zones - decreasing of mean annual runoff up to 30-50%. There may be changes in distribution of river flow during hydrological year; about 50% of annual flow will pass in winter months. An increase of risks of meteorological and hydrological droughts in the steppe zone and in the southern part of forest – steppe zone is projected. The region most prone to a rise in river flood frequency is the Ukrainian Carpathians. Generally, a negative impact of climate changes on hydrological regime is expected to outweigh a benefit for the most of regions.

The most likely affected sectors by negative impact are: agriculture, industry, drinking water supply, human settlements, river ecosystems. In order to eliminate a possible negative effect on water resources, the adaptation strategies addressed on the national level will have to incorporate a number of legislative, organizational and technical measures aimed at protecting the water resources. The development of integrated water resources management is the essential terms in order to achieve adaptation measures across socio-economic, environmental and administrative systems.

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