

Hazardous hydrometeorological phenomena under climate change conditions

A.S. Merkushkin

Center of Hydrometeorological Service under the Cabinet of Ministers
of the Republic of Uzbekistan,
72, K. Makhsumov str., Tashkent, 100052, Uzbekistan
asmerk@meteo.uz

The global warming contributes to increasing number of the recurrence of extreme and hazardous hydrometeorological phenomena. By virtue of the climatic conditions and peculiarities determined by the orography and relief, the mudflow development rate in the Central Asian region is considerably high. Under changing climatic conditions, which have long-term positive air temperature trend, the liquid component share in water balance in whole regions is growing and moisture exchange over vast areas becomes more intensive. This leads to increasing precipitation intensity, while the positive trend of air temperature causes more intensive melting of the ice cap and prolongation of the melting period. Such climatic changes will increase risks associated with the growing rate of mudflow development.

The threat related to mudflow development will certainly increase because the mudflow activity in the Uzbekistan territory is extremely high exactly in the regions with maximum population density (40 % of all the mudflows occurred in the Namangan, Fergana, and Andijan provinces). In general, for Uzbekistan the number of mudflows may be expected to rise by 2030-2050 by 19-24 % as compared to the present-day situation. Also, prolongation of the mudflow-hazardous period, destruction of banks in flood plains and low fluvial terraces, deformation of river channels, mudflow mass sedimentation, ice clogging, and high water-level rising are expected.

Especially hazardous mudflows occur during the breakthrough of high-altitude and glacial lakes; these are not many in number, but the damage caused by mudflows of this genesis is the highest (Shakhimardan, 1998). More than 300 high-altitude and glacial lakes located in the Kyrgyzstan territory endanger the areas and population of the Fergana Valley. Under the conditions of mountain glaciation degradation, the probability of the breakthrough of such lakes will increase.

Global warming will further contribute to the increase in the number of extreme weather conditions in the region, viz. periods with droughts and high summer temperatures, to change in the water resource formation regime, which may result in additional adverse consequences in the Aral Sea basin and, particularly, in Prearalie. Surface water quality in terms of salinity and microbiological indicators deteriorates in dry years. The frequency of severe drought in Prearalie in connection with dramatic climate warming has increased. Especially adverse conditions emerge in hydrological drought years in lower reaches. Because of expected future reduction of water resources in the flow formation zone and increase of water consumption in all sectors due to climate change and intense population growth in the region, the risk of drought can heighten considerably.

Extreme natural phenomena happen on a regular basis, but the heaviness of their consequences fully depend on the degree of the readiness of a country or particular region to withstand natural disasters. Therefore, the adaptation plans should include the development of actions plans and programs aimed to prevent drought and reduce the risk for agriculture; development of early warning system and security against drought consequences; development of the measures and actions aimed to reduce the risk of hazardous phenomena by improving forecasting and warning.