



Potential Impact of Climate Changes on the Hydrological Regime in the Buzau and Ialomita river basins

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For the impact study of the possibly climate changes on the runoff in the Buzau and Ialomita river basins, the WatBal model was used, which have been calibrated through the runoff simulation in 17 cross-sections for the reference period 1971 – 2000.

The analysed Buzau and Ialomita river basins covering an area of 14392 km² are situated outside the Curvature Carpathian Mountains. Due to the high variability of the climatic conditions, droughts and excessive humid periods may occur during the year. WatBal model has two main components. The first is the water balance component that uses continuous functions to describe water movement into a conceptualised basin and the second is the component that allows the calculation of potential evapotranspiration using the Priestly-Taylor equation.

For the calculation of changes in the main climatic parameters (air temperature, atmospheric precipitation, relative humidity, solar radiation and wind speed), used in the analysis of the climate change impact on the hydrological regime, there were used the simulations accomplished with a regional climatic model (regCM), elaborated by ICTP (Trieste), with a spatial resolution of 25 m.

Determination of the grid network nodes of the regional climate model regCM related to sub-basins from the Buzau and Ialomita river basins was accomplished with a methodology based on obtaining a digital map of river basins, together with related sub-basins. Overlapping this digital map over the network nodes of the grid was made by georeferencing.

The changes were calculated for the periods 2021-2050 and 2070-2099 towards the reference period, for each month, like the differences between the values of the climatic parameters corresponding to the two periods.

The mean monthly discharges at all 17 gauging stations from the Buzau and Ialomita river basins, in the above mentioned hypotheses, are estimated.

Study revealed the following changes in the components of the hydrological cycle due to the climate change:

- The increase of the evapotranspiration, especially in the summer months, due to the increase of the air temperature.
- The reduction of the depth and duration of snow cover due to the increase of the air temperature during winter time.
- The variation of the annual mean runoff recorded an increase from the plain to the mountains, standing out a tendency of smoothing during the year in parallel with a global decrease of these.
- The early occurrence of the floods and the reduction of the mixed spring floods (snow and rain) by the desynchronisation of the snow melting with the rainfall occurrence.
- The reduction of the annual mean runoff on rivers by 20-30% (2021-2050) or 30-40% (2070-2100) due especially to the increase of the evapotranspiration.