



“An assessment of changes the Danube river flow along the Iron Gate gorge for XXI century”

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The research was dedicated to foreseeing the possible impacts of climate change on water resources in eastern part of Serbia, along the Danube catchment. The Danube basin is in the eastern section of the considered RCM (Regional climate model). For this purposes, the RCM EBU-POM according to the IPCC scenario A1B, was used in its representation of the hydrological balance over the Danube river basin along Iron Gate gorge, for the time frame 1961-1990 and 2071-2100.

The Danube's catchment encompasses continental climate, as it is land-dominated by advection from the surrounding land areas. This part of Danube catchment is greatly affected by the Mediterranean climate, since the Danube runoff gives a relevant contribution of freshwater flux into the Mediterranean sea and it is dependent mostly on precipitated water of Mediterranean origin. On the other, the Dinaric-Balkan mountain chains in the west and the Carpathian mountain bow in the north and east, present distinctive morphological and climatic regions and barriers.

Prior to the assessment of changes of water resources of the Danube river, including the climate change effects, there was determined the terrain's spatial regionalization. Having been aware of the climatic-hydrologic and hydrographic homogeneity of regions, the whole territory of Serbia was divided into 20 units basins. The part of Danube basin in its eastern part, was subject of the research. For this balance unit, the main components of the balance equation of the water that included into the calculation are: precipitation P (mm), flow Q (m³/s), runoff depth h (mm), evaporation E (mm) and annual air temperature T (0C).

The hydrological balance has been computed in two different, but in principle equivalent ways. The first approach, which has a more hydrological nuance, relies on establishing relationships between annual averages of the hydrological balance parameters (E , P , T) for the time frame 1961-1990 in order to get relevant coefficients. The second approach, which is more typically meteorological, relies on the calculation of the E for the time frame 2071-2100 by using the previous coefficients. On the basis of the assessment of climate units in the XXI century and with help of the established relationships, the water flow of Danube river and runoff depth were defined for this century.

The results according to this model, show that the river flow of the Danube, in this part of its basin, will decrease over 50% with a great consequences to the dams Iron Gate I and II, their accumulations and ecosystems. Furthermore, if we take into account predictions made by IPCC which say that the south-east Europe will face temperature growth of 0.2 degrees in the next two decades for the range of SRES scenarios, makes the whole problem much more complicated and alarming. Results also show that precipitation's peak in the early summer months and in November, which gives more often a secondary maximum, is the typical feature of the observed climatology of the precipitation of the Danubian region. The minima of precipitation are also clustered in two periods of the year, namely February and the summer months. The latter minimum is a signature of the influence of the typical Mediterranean summer.

As an output of all that, as has been mentioned above, this part of Europe will face with worse conditions (high temperatures, droughts) in a region already vulnerable to climate variability, than those of 2003 when Europe

was hit by an incredible heat wave. Reductions of water availability, hydropower potential, summer tourism and general crop productivity are certainly appearances which are to be expected in this area.

In turns of the results, one question has arisen: Should we adapt to the climate change, or should we mitigate it? Maybe, the answer is in mitigation while doing adaptation. According to the Danube river in this region, the works for fighting reservoir related bank erosion in order to preserve the dam and accumulation have already been started. Also protection of the natural resources and the ecosystem, which urged the performance actions of restoration of nature and reintegration of temporarily occupied lands and landscape improvement (like maintenance of verdure spots), started to happen. Pushing and raising the problem of climate change to the surface, what should be reality and the global prime issue, is a way to get community involved in order to preserve its existence.