

Assessment of Water Reservoir Impact on Local Climate Parameters

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The environmental impact of the water reservoir is evolving against the background of ongoing global climate variations. Due to the complexity of assessing its regional, especially local characteristics, the effect of these variations on the environment, in particular climate change, can be separated if the climate parameters of this background are pre-examined. Otherwise the environmental impact assessment of the water reservoir would be incorrect, which would adversely affect both scientific and public opinion. Such a background should be preliminarily investigated and calculated for a specific reservoir construction site, with sufficient advance.

Indicators and parameters of the water reservoir impact on the climate were defined as a template. Such key indicators include the following meteorological elements: air and water temperatures, atmospheric precipitation, wind speed and direction, and humidity. Their numerical implications are: air temperature above 2.0 m above sea level, altitude of flyger reduced to 2.0 m above ground level, °C; The magnitude of the water temperature is measured in the 0.1 m surface layer of the surface, °C; wind speed and direction, in m/s and in degrees; atmospheric precipitation, mm; Air humidity in millibars (mb). Water reservoir settings include: volume, mirror cover, levels, maximum and average depths, as well as maximum and average length-widths.

Impact assessment of the reservoir on climate against the background of current climate fluctuations carry out by analogy and mathematical statistics methods. Water reservoir impact methodology has been developed which combines two methods: Investigation of local background parameters created by the current climate; Separate the local effects of reservoir climate from local background parameters. The most reliable method of reservoir impact on climate is mathematical-statistical analysis of long rows created by the data of its hydrometeor stations operating in its area. The results of the analysis shall be adjusted taking into account the background characteristics of the current global climate change. If there are no such rows, or they are "statistically short," the "analog" method is used. Such an analogue reservoir is selected according to the similarity of environmental conditions. Where there is no analog reservoir, the projected reservoir climate impact can be assessed using the following general provisions: if the reservoir is created in poor precipitation and warm climates, it cools and moisturizes the climate, and conversely, at high humidity and temperatures, the comfortable climate settings deteriorate proportionally to the size of its mirror area; such changes are maximal in the 200–300 m coastline, significant up to 400–500 m, further away its impact is virtually discernible; Depending on the height of the reservoir, the impact depends on the boundary terrain and the mirror settings. According to the existing measurements on the mountain reservoirs, which are bordered by high and large inclines, the impact of the reservoir and the level of condensation on average reaches 500–700 m.

Acknowledgements: This work was supported by Shota Rustaveli National Science Foundation of Georgia (SRNSFG) within the scientific grant FR-18-009.

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