



DOCTORAL RESEARCH TOPIC:

Evaluation of ecological flow in the context of anthropogenic activity and climate change

RESEARCH FIELD:

Environmental Engineering (T 004)

BRIEF DESCRIPTION OF RESEARCH TOPIC:

Anthropogenic activity significantly impacts ecological water quality. Hydrotechnical structures (HS) are one of the most widespread pressures affecting the ecological status of water bodies. The interruptions of the river continuity, changes in river hydromorphology, hydro-peaking and variation of flow regime are consequences of the effect of HS. Ongoing climate change processes additionally affect the hydrological conditions of the lower reaches of HS. These changes are responsible for the degradation of habitats, leading to a considerable loss of biodiversity. Ecological flow (e-flow) is widely used as a management measure of HS for balancing the needs of humans and water ecosystems. In implementing the EU Water Framework Directive (2000/60/EC), the Member States must include the concept of e-flow and its requirements based on the European Commission Guidance Document No. 31 (Technical Report – 2015-086) into the national legislation. In the current time, Lithuanian national law regulates only the environmental flow which is described as a discharge of 80% or 95% exceedance probability of the mean minimum discharge of 30 consecutive days of summer-autumn (V-X months) low-flow. Environmental flow satisfies only the minimum requirements of the aquatic ecosystem and does not take into account their needs as it is calculated as a statistical dependency. Such practice of the calculation of environmental flow leaves a possibility of hydropeaking for the owners of hydropower plants, therefore the environmental flow is insufficient to comprehensively implement the EU Water Framework Directive. For this reason, the assessment of ecological flow (e-flow) at the Lithuanian level would help to make a smoother transition to the sustainable management of water resources and to provide recommendations for the determination of e-flow in climate change conditions. Therefore, the aim of proposed dissertation topic is to evaluate the e-flow in Lithuanian rivers and to determine its patterns in the future according to the newest climate change scenarios, and to provide recommendations to national legislation on the guidelines for the determination of e-flow. The obtained results will allow to evaluate the e-flow more precisely in Lithuanian rivers taking into account the needs of aquatic ecosystems, consistent patterns of changes of river runoff in the past as well as the future projections in the 21st century and their uncertainties under climate change conditions.

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