



DOCTORAL RESEARCH TOPIC:

Research of patterns of hydrodynamic and sediment transport processes in reservoirs

RESEARCH FIELD:

Environmental Engineering (T 004)

BRIEF DESCRIPTION OF RESEARCH TOPIC:

Hydrotechnical structures disrupt the integrity of the river, creating artificial barriers to the migration of sediment. The discontinuity and the associated lack of sediment in the system can have adverse consequences downstream or downdrift. Discontinuity in sediment transport can also have implications for morphological processes such as erosion. Sediment-dependent habitats and species may be starved in some cases, preventing the achievement of good ecological status or potential. On the other hand, the sediment retained behind structures such as dams can reduce reservoir capacity or compromise the use of structures. Reservoir sedimentation not only affects the reservoirs themselves and their suitability for producing electrical energy, but also gives rise to issues of dam safety and downstream sediment deficits and river bed erosion. At the moment, there are not enough studies on sedimentation processes in reservoirs.

Therefore, this study could be useful not only from a theoretical but also from a practical point of view in addressing the issues of sediment migration in the reservoir. Hydrodynamic and sediment transport models based on field studies for the selected pilot reservoirs will significantly facilitate the solution of environmental tasks aimed at improving the status of these water bodies. The aim of this study is to investigate the hydrodynamic and sediment transport patterns of the reservoirs in Lithuania by using field observations and hydrodynamic modeling, and to develop recommendations for the improvement of the condition of the reservoir on the basis of these studies. The study will be carried out in 5 steps. In the first step, a database of Lithuanian reservoirs and to develop criteria for the selection of pilot objects (reservoirs) for the study of hydrodynamic and sediment migration processes will be established. In the second step, a methodology for evaluating the hydrodynamic and sedimentation processes in reservoirs will be developed. In the third step, the sedimentation status of the Lithuanian reservoirs will be assessed, and the field surveys of the hydrodynamic and sediment dynamics processes of selected pilot objects will be performed. In the fourth step, conceptual numerical models of the reservoirs will be developed, and performed their calibration (using field surveys data) and modelling of hydrodynamic and sediment transport processes under different hydrometeorological conditions. In the last step, recommendations will be prepared to improve the condition of the reservoirs, taking into account hydrodynamic and sediment dynamics aspects. The PhD student will have the opportunity to present the results of this research at international conferences and participate in the project "LIFE22-IPE-LT-LIFE SIP Vanduo".

SCIENTIFIC SUPERVISOR:

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