



DOCTORAL RESEARCH TOPIC:

Effects of land cover change on river hydrological processes in the past and under climate change

RESEARCH FIELD:

Environmental Engineering (T 004)

BRIEF DESCRIPTION OF RESEARCH TOPIC:

Changes in land cover due to deforestation, draining of swamps, changes in cropland and grassland have a significant impact on the hydrological processes of rivers and the state of ecosystems. Deforestation reduces water retention and increases the risk of flooding. The shrinking of wetlands hinders the natural filtering of water. Urbanisation of grassland areas increases surface runoff of rainwater, and climate change exacerbates all these changes. Rising air temperatures and increasingly difficult to predict extreme precipitation events in different regions are increasing the influence of human-induced land cover on hydrological processes, which can alter the occurrence and magnitude of the effects of floods, droughts and other extreme hydrological phenomena. This topic is important from the point of view of sustainable water management and helps to understand the impact of human activities on hydrological processes. The influence of the mutual interaction of land cover and climate change on hydrological processes in the past and in the future has not yet been extensively studied, so this research remains highly relevant in the context of today's climate change and extremely rapidly intensifying human economic activity. Moreover, current research based on hydrological modelling rarely considers land cover changes. Therefore, this topic would draw attention to the important aspect of forest volume, wetlands, agricultural land changes and climate change and how these factors interact with each other to more accurately predict future hydrological conditions of rivers, potential impacts and associated risks, and develop recommendations for adaptation measures in water management and environmental protection policies. The aim of this study is to assess the impact of land cover change on river hydrological processes in the past and under climate change conditions and to provide recommendations for adaptation measures to minimise potential negative impacts. To achieve this goal, the following tasks are set: 1) Assess the emergence of different hydrological processes in the past due to land cover changes; 2) Investigate the influence of land cover changes on river discharge formation by applying hydrological modelling; 3) Assess the uncertainty of the hydrological model due to land cover changes; 4) Assess the impact of climate change and land cover changes on river discharge formation processes and associated risk management under different SSP climate scenarios. This topic would help to assess the broader influence of land use, land cover and climate change on river hydrological processes, which are of great importance for national water management and environmental protection policies.

SCIENTIFIC SUPERVISOR:

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