HISTORY AND FUTURE DEVELOPMENT OF RAINFALL-RUNOFF CHARACTERISTICS ON THE OUTSKIRTS OF PRAGUE

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The article presents a rainfall-runoff study of six catchments on the outskirts of city Prague from 1920 up to today, with a perspective to 2050. Due to a non-existing long-term monitoring the study was achieved by rainfall-runoff modelling using HEC-HMS. The key model inputs were accurate land-cover maps. These were created for each of 5 past periods by partial digitizing, analysis and combination of several historical maps and datasets. Two future land-cover scenarios were proposed. In contrast to the expectations a non-monotonic course of CN values was discovered, meaning an ambiguous development in runoff volume throughout the assessed history period. In contrast a definite trend in impervious area expansion and their impact was identified. In particular the extent of so called connected impervious areas was found to be the key factor. Unfortunately this parameter is still hard to quantify in the urban areas due to a lack of data detailed enough on this particular aspect of land cover. The analysis of peak flows showed considerable uncertainty due to temporal patterns of rainfall intensity. The range of simulated peaks is comparable with the rainfall volumes increase caused by the expected climate change. The impact of expected continued urbanisation was pronounced especially in the catchments with enough land available for development. Predicted peak flows were found to increase in the future scenarios in all cases, however not always they reached their historical maximum. Differences in future scenarios are tend to decrease with higher return periods. The Vinorsky creak model suggested a potential of climate change (increase in rainfall amounts) compensation by suitable land-cover and land-use management. The overall development of peak flows throughout the history and projected future was found to be specific for each catchment, therefore it is hard to generalize and transfer to another locality. This suggests the necessity to establish a detailed mapping of urban land covers and water structures and individual approach when assessing particular catchment.