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Integrated monitoring and modelling for flood management in an urban Swedish catchment

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Flooding in urbanised areas can affect a large number of people in a multitude of ways, e.g. through damages to buildings, property and infrastructure and in extreme cases through loss of lives. The consequences can also be considerable for aquatic ecosystems, which are already altered by urbanisation. Storm-water management and flood-protection planning therefore need to consider a range of local stakeholder interests and other aspects in an integrated way.

The Riseberga Creek catchment in eastern Malmö, Sweden, is a highly urbanised catchment that repeatedly suffers from floods. To reduce the negative consequences of flooding, an integrated approach to solving these problems is needed that takes into account the large range of interests from local stakeholders as well as environmental and economic values. Several local stakeholders and researchers are working in a project, GreenClimeAdapt, which aims at finding and demonstrating solutions to the flooding problems in this area.

The aim of this study was to first understand and quantify the present flooding problems and then identify and evaluate measures for reducing them. This was carried out through combined monitoring and modelling of the hydrological behaviour of the catchment and the hydraulics of the creek. A hydrologic model, calibrated to a high-resolution acoustic doppler discharge gauge, was used to estimate the variability in discharge along the river as well as uncertainties in these simulations as a result of data and model uncertainties. Modelled discharges for selected return periods were then fed into a hydraulic model to study inundations and evaluate the effect of possible measures for flood reduction such as open storm-water ponds and increased meandering of the river. The most suitable locations for measures were identified and will later be analysed with respect to practical constraints on implementation such as land-ownership and costs as well as possible future changes in climate and land-use.