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The AVuPUR project (Assessing the Vulnerability of Peri-Urban Rivers) : experimental and modelling strategy

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Due to the development of urbanisation and the associated pollutions, peri-urban rivers face an increasing pressure on the receiving waters and an enhancement of floods. In order to limit the risks and define adapted management scenarios, it is important to identify the key factors over which action is possible. In particular, due to the Water Framework Directive, discharge of polluted water into rivers must be limited and actions must be undertaken in order to restore the ecological quality of water. In this context, integrated modelling tools, taking into account anthropogenic effects on the water cycle are interesting as they provide ways to test and evaluate the efficiency of different management scenarios.
However improvements are still required to derive tools allowing a continuous and long term modelling of the hydrological cycle in peri-urban areas. The models must take into account the surface heterogeneity (mixture of rural and urbanised areas), and also the natural and artificial water pathways, which influence the water quality. These questions are the focus of the AVuPUR (Assessing the Vulnerability of Peri-Urban Rivers) project. Its aims are 1) to provide a better description of the heterogeneity of peri-urban catchments and of the associated water pathways using field survey, GIS and remote sensing analysis of high resolution images; 2) to provide long term detailed simulation models of the hydrological cycle in peri-urban catchments to increase our understanding of the processes involved; 3) to improve existing hydrological models with a better handling of the urbanised areas in order to derive tools usable by stakeholders; 4) to run long term simulations of the hydrological cycle using past and future land-use and climate scenarios and quantify the impact on the hydrological regime.
The project focuses on two experimental catchments: the Yzeron catchment (147 km2), a peri-urban catchment located in the west of Lyon (south-east of France) and the Chézine catchment (34 km2) located close to the city of Nantes (west of France). Both catchments are part of hydrometeorological observatories which ensures a long-term monitoring of the catchments. Both catchments experience a rapid increase of urbanisation. They are located in two contrasted climates and physiographic contexts: Mediterranean type climate and marked topography for the Yzeron catchment and oceanic climate with rather flat areas for the Chézine catchment. This will allow testing the robustness and transferability of the developed approaches.
The presentation will focus on the data which are currently acquired in the framework of the project: rainfall, streamflow, water levels in ephemeral reaches, lidar survey, geophysical surveys, infiltration tests. A diachronic analysis of land use since the 50th is also performed using satellite and aerial photographs. Some work is also planned to determine future land use scenarios of urbanisation and water management. Urban data bank provided by the Grand Lyon and Nantes-Métropole services are also analysed in order to document the change in water pathways due to urbanisation. The paper will present an overview of these data and first results of their analysis in terms of hydrological functioning and water pathways. The modelling strategy, which will rely on these data, will also be presented.