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Use of pre-processed crowdsourced images and videos for improving flood modelling

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Decision making processes regarding flood analysis and management require data. As floods are rare events data availability is always a challenge. In the natural environment there are many multifaceted structures and variables which makes it challenging to access and collect data by traditional means, creating scarcity in data availability. One recent alternative is the possibility of collecting data through crowdsourcing. Data collected through such approaches are new and there is a need to explore in what way such data augment and enrich available datasets when used in analyzing and especially modelling of floods. This type of data collection may be less costly compared to traditional methods, and, more importantly, creates awareness among citizens regarding flood management needs.

This work introduces the research carried out for integration of crowdsourced data in flood modelling, which is part of the SCENT project, funded by the European H2020 research programme. Data is collected by citizens through a mobile phone app in the form of photos and videos during organized campaigns conducted in two pilot study areas. The first pilot is in the Danube Delta in Romania, which is a natural wetland, and the second one is the predominantly urbanized Kifisos catchment in Greece, located around the capital Athens. This presentation is focused on the Danube delta case study.

The Danube Delta, which is regularly flooded, is made up of a large network of interconnected canals and lakes, and is a home for abundant variety of species with rich biosphere. Human interventions over the years have resulted in artificial canals that transformed river cross-sections, altered inundation patterns and disrupted water circulation patterns, which adversely affects the species biodiversity of the delta. In order to study the inundation patterns in the region, 1D/2D hydrodynamic models are developed. The models are initially built with data coming from existing monitoring network.

Following the citizens' data gathering campaigns, collected images and videos are processed to obtain variables such as water depths, velocities, river geometry and roughness from land use/land cover, which support the improvement of the developed flood models.

Processed crowdsourced data are integrated into models in two ways: first is the integration of geometric data such as river cross-sections and roughness for improved model setup and the second is the use of water depths and velocities for model calibration and validation. Through several model instantiations, using combinations of datasets (regular and provided by citizens) the model results are analyzed to assess the contribution of crowdsourced data to model improvement. Results of these analyses show that uncertainties associated with crowdsourced data are still present, which makes the approach challenging, but collection of data at alternative periods and locations, not covered by regular monitoring, brings model improvements.