FloodScan – improvement and simplification of hydraulic 2d-modelling

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Background

Flooding is one of the major environmental problems worldwide. The magnitude and frequency of floods are likely to increase in the future as a result of climate change. To protect society and the environment from the negative effects of floods hydraulic 2d-modelling can be applied for the identification of floodplains.

By the development of precise, time and cost efficient technologies in the area of hydraulic 2d-modelling the project FloodScan aims to establish new techniques for large scale application.

Project overview

In 2006 the LfU started with the project FloodScan, supported by the EU Life-Environment programme. The project lasts from July 2006 to December 2009 and involves the regions of the Iller/Lech-Area and the Upper Palatinate, Germany. The Bavarian Agency for Surveying and Geographic Information and the Munich University of Technology are partners of this project.

The main objective of the project is the adoption of a new, intelligent and cost-efficient technology for the precise mapping of areas that are at risk of flooding for large scale application. Moreover, the project aims to reduce the negative impacts of flood events by providing a reliable and precise information basis for regional planning authorities and by increasing the awareness of local citizens about flood risks.

Furthermore, the information of experts and authorities responsible for water management and flood protection plays a decisive role.

Data processing

Digital terrain models (DTMs) derived from airborne laser scanning (ALS) deliver excellent information on the surface structure. However, the immense data density of ALS data made it impossible to facilitate time and cost efficient state-of-the-art hydraulic 2d-modelling based on ALS data, as this requires considerable manual rework.

As a first step FloodScan refined the software algorithms for laser scanning data reduction and enhanced them with additional features and functionalities. An improved quality control of the DTMs and the automatic thinning-out of the ALS data in consideration of all hydraulic structures have been developed. Another innovatory approach in FloodScan is the classification of land cover. Therefore, multi-spectral satellite and aerial images, orthophotos as well as ATKIS data (Amtliches Topographisch-Kartographisches Informationssystem) are used to provide information on surface roughness.

Hydraulic 2d-modelling

Hydraulic 2d-modelling represents the most advanced method to receive precise information on floodplains and flood hazard areas, as the models provide precise information not only on flood borders but also on water depth, flow velocity and flood duration. In the FloodScan-models DTMs derived from ALS (foreland) and terrestrial gauged river-cross profiles (river bed) are combined. Additionally the resulting calculation mesh is filled with information on surface roughness and hydrologic parameters (discharge) help to quickly adjust the elaborated hydraulic 2d-models.

Furthermore best practice flood hazard maps will be elaborated in consideration of national and international concepts (e.g. provided by the German Länderarbeitsgemeinschaft Wasser, LAWA, or the European Exchange Circle on Flood Mapping, EXCIMAP) and in co-ordination with (inter)national experts. This will include the calculation of disaster scenarios (e.g. malfunction of technical flood protection measures). Subsequent sensitivity analysis will control the important input parameters necessary for 2d-hydraulic modelling.

The implementation of an improved web mapping service as a basis for the information of the local population will help to protect society and the environment.

Finally all technologies, software and data developed and generated in FloodScan are rechecked and concretized of their overall practicability on diverse landscapes, topographical structures, national and international scale as well as on other environmen-

tally relevant sectors.

Dissemination and Communication

Using communication and information instruments like the formative and summative evaluation of the developed maps and services, FloodScan fulfils the diverse requirements of different user groups.