

EXTRACTING 1D RIVER CROSS-SECTIONS OUT OF 2D FLOODING STUDIES

EXAMPLE FROM STYRIA AND BURGENLAND - AUSTRIA

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INTRODUCTION

Flood Forecasting Systems need to be very effective regarding calculation time. Thus, the complex and precise 2D hydrodynamic methods cannot be used in such systems because they are too time consuming. Nevertheless, 2D flooding studies deliver very important and detailed topographic up to date data that should be included in forecasting systems. Therefore a tool has been developed at Joanneum Research together with the hydrological service from the Styrian and Burgenland Region. This tool implemented in the ARCGIS GUI gives the possibility to geographically locate precisely the river cross sections. This is a huge advantage when such information must be replaced in a 1D flood forecasting model for defining flood extension for example. The tool has been applied using the most important flooding studies from the Austrian part of the Raab watershed because a Flood Forecasting System is actually under development. It is also applied to all flooding studies from the Mur watershed in Austria in the frame of a Master thesis in Physical Geography. The Tool application for extracting river cross sections saved in a database and further used in the hydraulic model from the Flood Forecasting System Raab is illustrated in the next chapter.

GENERATING RIVER CROSS SECTIONS – THE CONCEPT

Using existing 2D flooding studies data for river cross section extraction leads to several methodological options illustrated in Figure 1. The one developed for this work is the option 1 together with part of option 2.2. The Digital Elevation Model mostly created out of radar and terrestrial measurements is first transformed in an ESRI format: the *Polygon M shape file*, i.e., the irregular mesh structure is transformed in a regular DEM geometric file.

The tool allows extracting river cross sections anywhere as mentioned for option 1 below. Nevertheless it was decided to extract the profiles where terrestrial measurements were available (option 2.2). For each measured profile a geo-referenced poly-line is available which corresponds to the geographical 2D tracks (lines) of the measured points. Importing these lines together with the Polygon M shape file and further using the new tool, it is possible to extract river cross sections in a binary format “*BQP*”. For the Styria region these cross sections are saved in a Database whereas they are not saved for the region Burgenland.

After what all generated river cross sections are transformed in a Mike11 importable format. This is because Mike11 is the hydrodynamic model used in the Flood Forecasting System Raab (The Raab river flows in both Austrian regions to Hungary).

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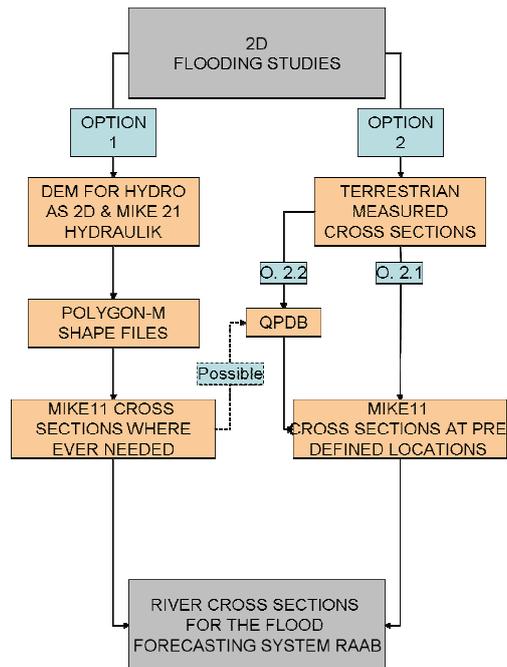


Fig. 1: Possible options for extracting river cross sections out of 2D flooding studies.

CONCLUSION

The number of river cross section imported in the Flood Forecasting System Raab can be greatly augmented when using data gained from 2D flooding studies. Furthermore, these data are mostly of high quality and recent. Therefore it is possible to import a good and actual structure of the River bed and floodplain into the hydrodynamic model.

Future tests shall be made to incorporate other information gained by the flooding studies. For example simulated flood extension for several return period (e.g. HQ30, HQ50 or HQ100) could be used to better calibrate the 1D hydrodynamic model used in the new system.

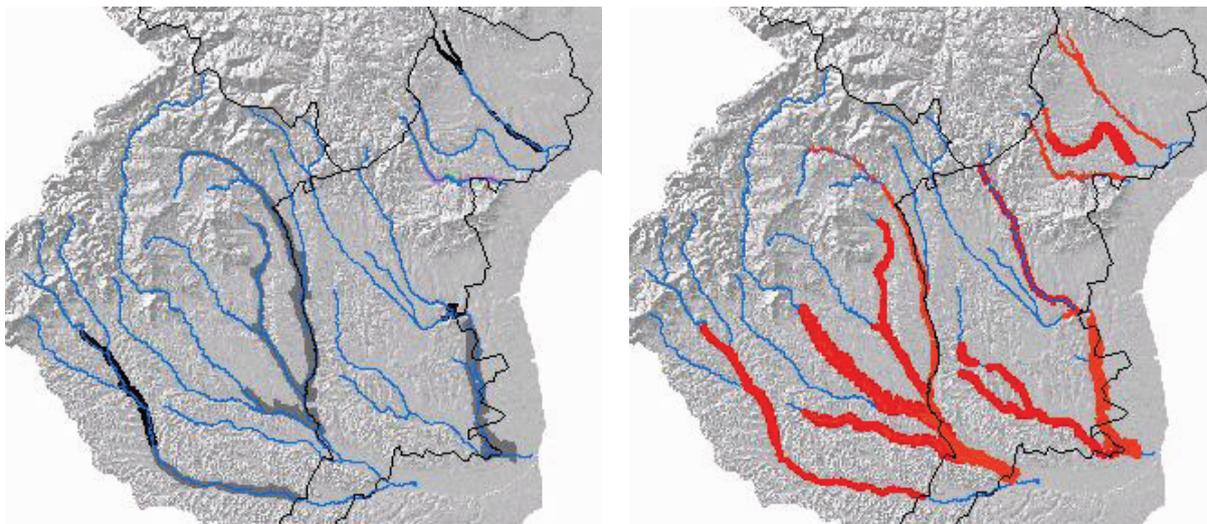


Fig. 2: 2D flooding studies (left) used to extract River cross sections for the Flood Forecasting System of the Raab (Austrian part of the watershed). The total river cross sections used in the hydrodynamic model are shown on the right side.

Keywords: River cross section, GIS, Flood Forecasting System.