A GIS-based Information System for Managing and Analysing Profile Information for the Use in the Water Management Authorities within the State of Baden-Wuerttemberg

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1. Introduction

Profile data form an important basis for the works of river authorities. These data are relevant inputs to hydrological and hydraulic calculations as well as the design of structures related to rivers or creeks (i.e. weirs, dams). The acquisition of profile data in general is expensive. This holds true in particular for profile data which have been recorded with a high degree of precision.

A survey among the river authorities in the state of Baden-Wuerttemberg, Germany and the State Institute for Environmental Protection Baden-Wuerttemberg (LfU) has been carried out in 1999 by the Research Institute for Applied Knowledge Processing at the University of Ulm (FAW) (Haase 1999) in order to identify the means by which profile data are recorded, managed and primarily used within these authorities. According to the survey there are presently approximately 51,000 profiles handled by these authorities in total. It is a common opinion that river authorities own much more profile data, but due to various reasons these were not taken into account in this survey. Approximately 40 % of the data are available on paper (i.e. plots) only, roughly 35 % of the data are stored in special data bases or on the computer file systems and the remaining 25 % are archived on other media. There is a variety of different formats that are used for storing profile data and there is no unique way of handling them which may easily result in data loss.

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Against this background the Ministry of Environment and Traffic of the state of Baden-Wuerttemberg has contracted the FAW to design an information system for the river authorities and the Institute for Environmental Protection within the state in order to store, retrieve and handle profile data in a unique way (Haase 2000). It was agreed upon that this application should be accessible via the intranet which has been build up to link the state authorities within Baden-Wuerttemberg. The system was implemented by SEMANTEC Information and Consulting GmbH from Herrenberg, Germany.

2. Overview of the Basic Services provided by the System

Special emphasis has been paid in the design process to link the profile information system to a web-based GIS in order to provide means of spatial analyses of profiles to the users. GISterm (disy 2002) has been chosen for this purpose which was developed under the auspices of the LfU and since is used as an intranet/internet gateway for assessing and analyzing spatial data.

The profile information system has been implemented in Java (JDK 1.3), the user interfaces were implemented by making use of the swing libraries. Oracle 8i serves as the data management component of the system. The communication between the database and the applet is implemented via Enterprise Java Beans.

The profile information system is embedded into the water, waste, former waste deposits and soil information system (WAABIS) which forms the main operative information basis for public authorities related to environmental issues throughout the state of Baden-Wuerttemberg. WAABIS has been designed for managing and compiling data across these authorities in order to assure the availability of high standard up-to-date data relating to environmental issues within these authorities in the state. The main idea for installing WAABIS was that although certain public authorities are responsible for maintaining certain data other public authorities need to access them in order to fulfill their assigned tasks. This specially holds true for profile data.

The profile information system comprises the following features (Mayer-Föll et al. 2001):

- All profiles are referenced to a river or creek. Therefore a session will start by selecting a river or creek either on a digital map or from an alpha-numeric list of rivers and creeks.
- User selected profiles may be edited either numerically or via a graphical profile editor. A set of metadata may be assigned to each profile (i.e. type of profile, time of the creation of the profile, precision of the data).
- Functions for overlaying user selected profiles and creating longitudinal sections based on a set of user-selected profiles are implemented into the system.

- Functions for importing and exporting profiles in various formats have been integrated into the system for the convenience of the users.
- Digital images (i.e. photographs and scanned blueprints) may be assigned to each profile and viewed by a special built-in image viewer.

3. Examples of the System

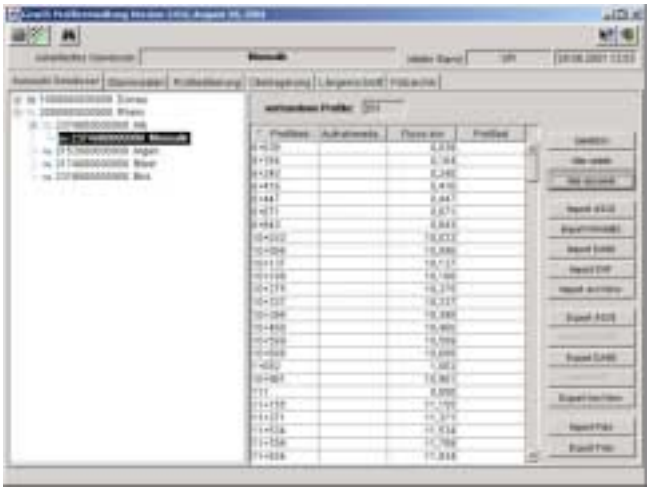

Figure 1: Selection of Profiles for a predefined River / Creek

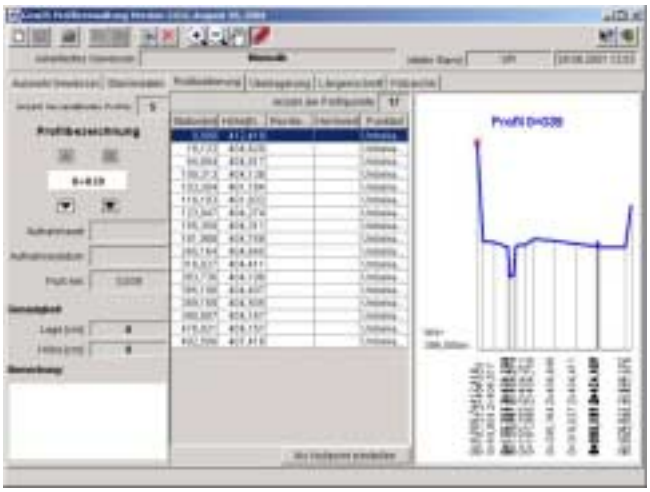

Figure 2: Profile Editor

Figure 1 depicts the user interface of the startup mask of the profile information system. The user may chose on the left hand side from a list of rivers or creeks - identified by a unique number and its name - which are presented to him in a treelike view appearing similar to the commonly known windows explorer. A list of all profiles attached to this river or creek is then displayed on the right hand side to him. He may chose a subset from this list of profiles for further analyses or processing by highlighting them in the selection list. The selected profiles may be exported in different formats (WAABIS (a special exchange format within the WAABIS environment), ASCII, DXF, ArcView (shape files) and DA 66 (Federal Highway Research Institute 1998)) for further processing, i.e. hydraulic modeling.

The profile editing tool is depicted in figure 2. The left hand side of this input mask presents an ordered list of the vertices making up the profile. The cross section of the profile is plotted on the right hand side of this input mask. The user may edit the profile either within the tabular display or by graphical means within the profile plot. Both presentations of the profile are linked, thus changes made in either of the two views are instantly reflected in the other view.

4. Summery and Future Developments

Profile data form an important basis for the works of river authorities. The acquisition of these data in general is expensive. Against this background a profile information system has been designed and implemented for the use within the river authorities of the state of Baden-Wuerttemberg, Germany. The system is accessible to authorized users via the intranet of the state authorities.

Extended GIS functions will very much enhance the analysis component of this profile information system. It is therefore planned to implement these functions with the next release of the software.

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