



# The HERMA and the Argonauts Programs: Practices and Problems of Heritage Mapping in River Environment (Hungary)

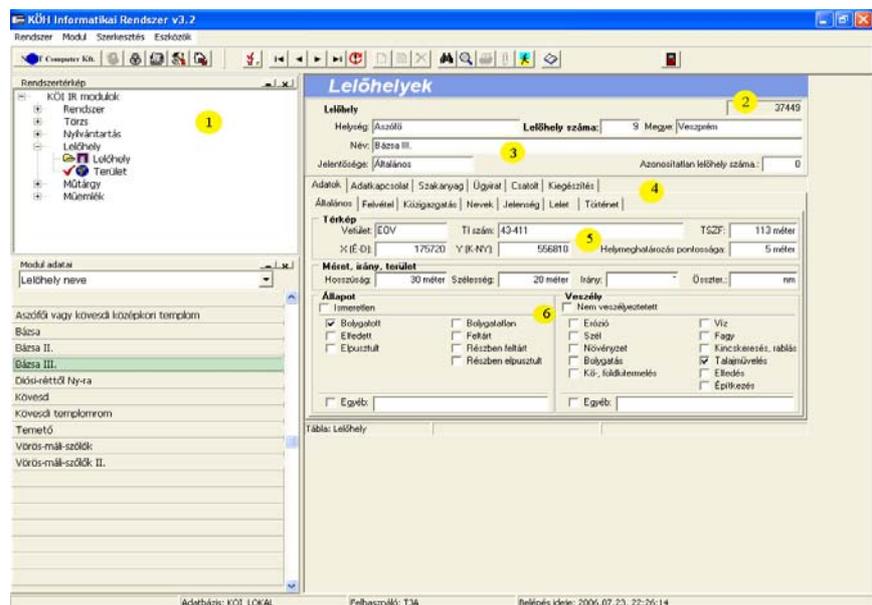
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## 1. Introduction

The National Office of Cultural Heritage has been founded by the decree 190/2001 of the Hungarian Government in 2001 for the protection of archaeological heritage, historical monuments and listed art objects. The Documentary Directorate of the Office is responsible for the national information system of the mentioned cultural heritage (CH) elements.

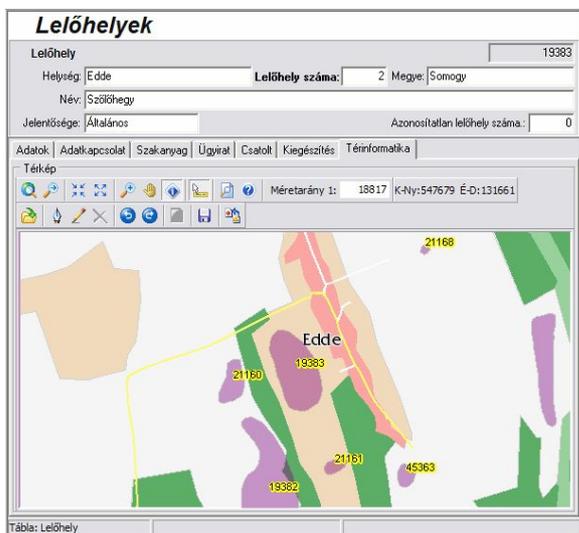
The base of the system is an SQL database, which contains the organised data of CH objects and sites (Figure 1). The work has been started in 2000, actually we have 55.000 archaeological sites, 11.000 historical monuments and 18.000 listed art objects in the inventory. The data is arranged in modules (Figure 1.1) (there are general modules: system administrator information, property information, registered data sources, and professional modules: archaeological sites, historical monuments, listed art objects. All registered items (site, monument, object, bibliographical information, document, activity etc.) have an individual identification number, which is automatically generated and can't be modified (Figure 1.2).

The main field (Figure 1.3) contains administrative data (county, settlement, site name, protection level). The connected information is organised into folders, “ears” (Figure 1.4) which could be opened by clicking on them. These folders contain cartographical data (Figure 1.5), information on actual state and danger (Figure 1.6), archaeological features and their dates, bibliographical and archival sources, past and current research activities and administrative acts etc.

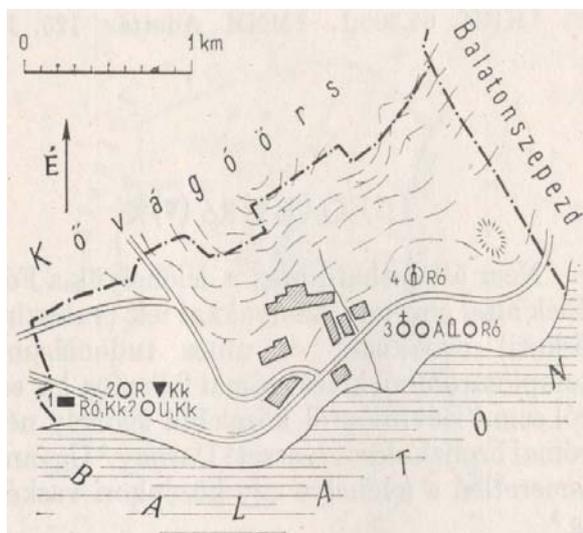


1. The modules and fields of basic data of the national CH data base in the case of an archaeological site.

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2. GIS representation of the polygons of archaeological sites at Edde in the national CH system.



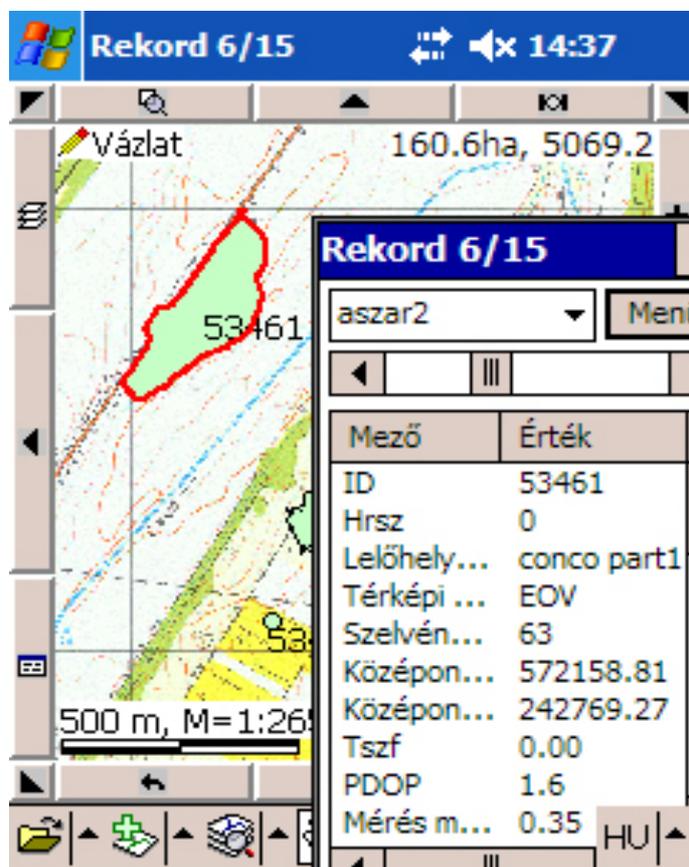
3. An example of an archaeological map from 1966 (Révfülöp, Veszprém county, after Bakay et al. 1966).

The data base has been supplemented by an ArcView based GIS system. The aim of this project was to visualise the cartographical data (using polygons) of CH sites. This work is still in progress; only 8.000 archaeological site has been digitalised. The polygons have been digitalised from graphical representations on 1:10.000 topographical maps and connected to the database by the individual registration number (Figure 2.). This process highlighted the problems of accuracy and reliability of existing information. The charts of the topographies published in the '70 are sketch maps and is not able to use for GIS. In those years – due to the Cold War – use of topographical charts was restricted by the army. It means that we had to start a programme to control the sites on the field.

## 2. The HERMA programme

The HERMA is the abbreviation of HERItage MApping, which summarises the next step in the development of the information system. About 13.000 of the registered 55.000 sites requires identification by field survey, and we estimate that there are ca. 15-25.000 sites not discovered yet. To answer the challenges caused by development projects (motorway construction, industrial areas in suburban zones and office towers, shopping and entertainment complexes in urban environment) we have to continue the digitalisation of CH sites (archaeological sites and historical monuments).

One of the basic elements of the HERMA is a mobile GIS system for on site data collection and documentation. We have started an experiment by a PDA+GPS system completed by a GIS software (we use Digeterra Explorer, a Hungarian product, which is compatibles with the usual CAD, .shape and .map formats). The software enables us to use the raster-format topographical map as a background for on-site mapping (Figure 4.). We register the polygon of the site by the GPS (accuracy ca. 3-5 m, 0,3-0,5 mm on the 1:10.000 topographical map!). The produced file is compatible with the GIS in the office, so it is possible to download and upload GIS information. Using the mobile device it is also possible to compile the national site registration formula



4. The polygon of an archaeological site captured by mobile device.

on the site. The records are registered in a form using the terminology and structure of the SQL data base, this makes available to import the registered data (containing information about the date and type of the site, geographical description etc.) into the national database.

The HERMA also aims to help decision making by means of integrating the national CH information system with other national systems: the central governmental portal (from 2006, in progress), the system of National Directorate General for Disaster Management (from 2004, in progress) and the national propriety register (planned). The latter is especially important in the protection of the built heritage in historical urban centres and the archaeological sites in the growing suburban areas. The digitalisation of propriety register maps is in course (Agrarian Ministry), and we have made the first experiments to combine these maps with the CH GIS (Figure 5). The use of the satellite image based national agrarian parcel identification system (from 2006, in progress) could also help in the monitoring of the sites.

A part of the information system is planned to be published on the Internet to help public access to CH. This includes basic information, descriptions and photos (especially in the case of historical monuments).

### 3. The Argonauts Program

The Argonauts Program is the framework of the underwater archaeological researches in the Drava - Sava region.<sup>1</sup> These rivers are the tributaries of the Danube, and have their sources in the South-eastern Alps. The ancient legends of the Argonauts have different versions for their returning after stealing the Golden Fleece. There are reconstructions of this *Via Argonautica* following the Danube, then the Sava, or the Drava then arriving to the Adriatic Sea. These descriptions surely refer to existing ancient trade routes. The program was originally a bilateral cooperation between Croatia and Hungary, but Austrian, Slovenian, Serbian and Italian researchers (countries of the Alps Adriatic Working Community) signed their interest to join in.

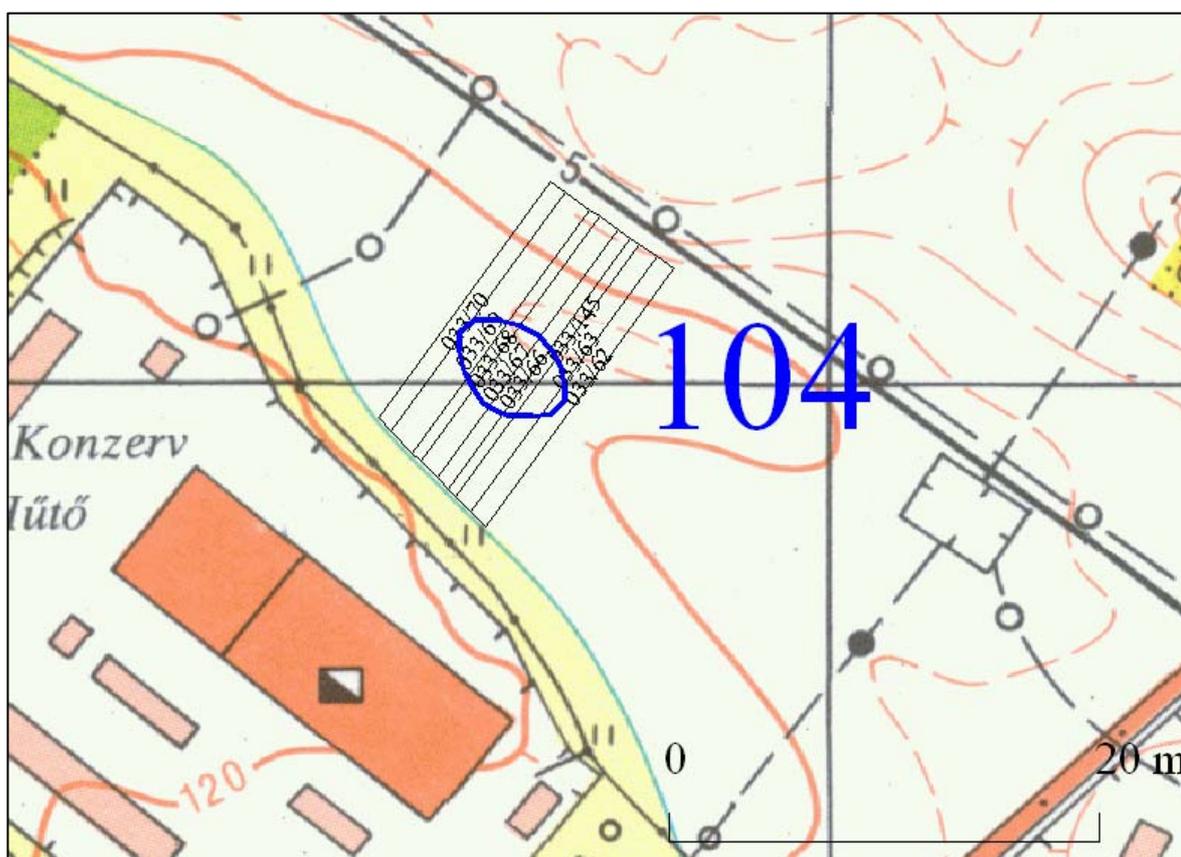
The aim of the program is the mapping and researching the CH of the region, especially the underwater archaeological sites to understand the role of the rivers in local communication, trade, economy, society and culture. The river environment causes many problems in our researches.<sup>2</sup> The evolution of the rivers (meandering, island formation, changing of the river beds) makes the topographical survey extremely difficult. Sites once stood on the river bank are now kilometers away from the actual course. To resolve the problems we have started to use aerial photography. The archive of the National Museum of Military History, which contains material from the early '50s to mid '80s, is accessible for researchers; and in the framework of cooperation we started to scan the once military secret aerial photos. The scanned orthophotos comes to be geo-referred by the use of topographical maps, and the ancient meanders, river beds could be mapped with high accuracy (Figure 6.).

It is extremely difficult to survey in the river: strong currents, low visibility makes diving dangerous. The use of the GIS data mentioned above, and the accurate research of ancient cartographical evidences (Figure 7.) could help to concentrate research activities to areas of potential archaeological interest. New technologies, like high resolution sonar, or seismic-radar survey could also help in the process of archaeological mapping. Only the combination of these technologies (including GPS) and direct underwater research can produce an accurate site map and information, useful also for topographical CH mapping.

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<sup>1</sup> Tóth 2006.

<sup>2</sup> Tóth 2006a.



5. Combined map of the national CH and propriety register systems (produced by R. Magony, National Office of Cultural Heritage).

#### 4. Integrating the Argonauts Program into the HERMA

The HERMA is a long term, composite program of national level. To carry out its purposes it is necessary to divide the main program into sub programs and projects, like system integration projects, or regional survey programmes. The Argonauts Program is one of these regional sub-programs. The main goal of the latter is the possibility of international cooperation, and by this exchange of technologies and ideas. The documentation systems and data collecting and documenting criteria are the same as in the case of the HERMA. The results of the program will be incorporated into the national information system. The HERMA is also the means of protection and exploitation of CH resources: based on the data it will be able to establish cultural roads, public access to CH will reinforce national and regional identity, the international character of the program could establish cross border links and joint projects (tourism etc.).



6. Photo-mosaic of the Drava valley at Drávatamási combining military photography, topographical chart and GIS of ancient river beds and underwater sites (site 19519: a group of logboats). (produced by P. Szócs, National Office of Cultural Heritage).



7. The area of Drávatamási on the so-called 1<sup>st</sup> military cartography (late 18<sup>th</sup> century), red spot: site 19519.

## References

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