Gis-Based Monitoring Systems.

Zoltàn Csaba Béres

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Béres Csaba Zoltán
University of Pécs/RT TD&ICT

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Nowadays GIS (Geographical Information System) is more and more becoming a part of everyday life, it appears as a well applicable, concrete tool in the hands of researchers and participants of economic life. Due to this fact GIS applications are becoming more and more specific, and with the help of the wide-ranging applications of these tools independent fields of research and application are being outlined. However, GIS results and tools that can be available in a wider and wider range can be adopted in different ways in different subfields. One of these special applications is GIS-based monitoring systems used in recultivation.

The primary task of monitoring is to describe and monitor the current state according to the monitored points of views, and GIS gives the latest information about the spatial relations of these states. The other important feature of monitoring is to measure, collect and process information of time relations. According to these pieces of information GIS makes it possible to create models and analyze empiric relations effectively not only in space but in time as well. The expectations with these are that they could be used in the monitored fields and processes as much as in solving similar tasks.

Monitoring can touch different fields. The following figure shows a special time-space scale connected to monitoring systems.

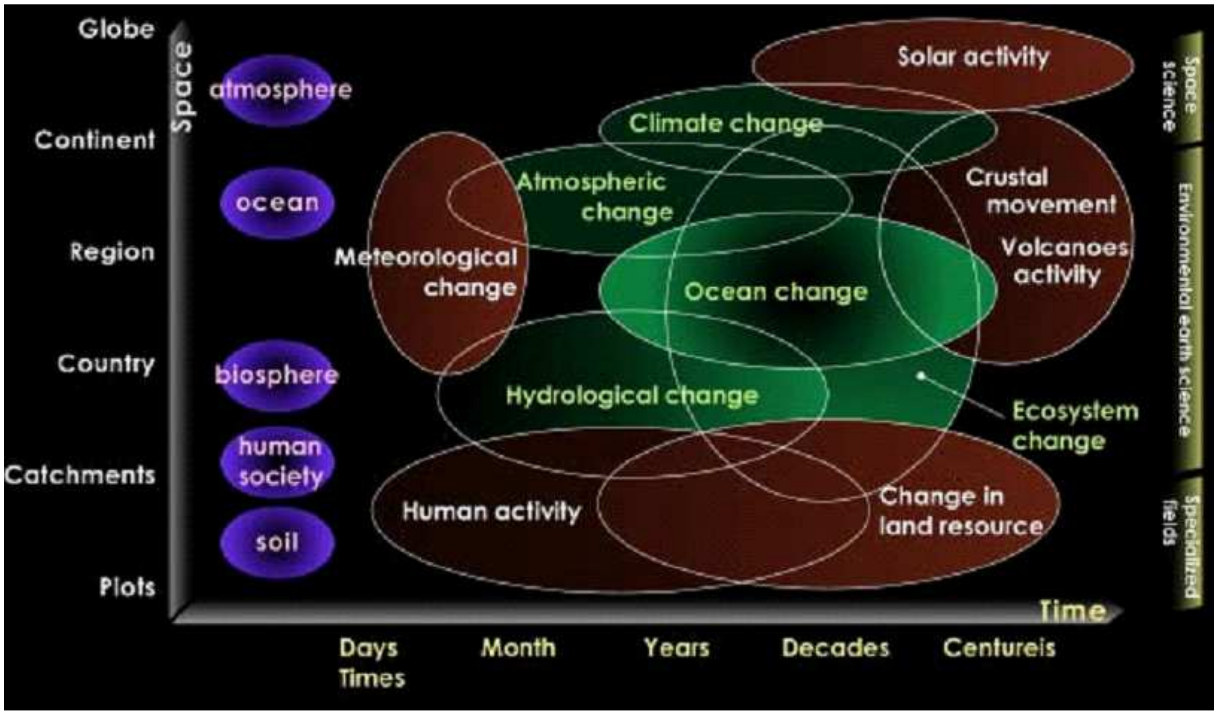

Figure 1 (based on Center for Global Environmental Research National Institute for Environmental Studies, Japan)

Both GIS and monitoring systems work with huge data base, so one of the primary tasks is to store data in the most optimal form in order to satisfy forthcoming needs. Since data come

from different scientific fields we have to integrate professional knowledge from wider scale to provide efficient solution and to provide the cooperation of different subfields. Besides the quality features of data, such as logical consistence, coverage, attribute accuracy, up-to-date data have to be provided.

Planning the system we have to plan on the life-cycle of the monitoring, therefore we especially have to take into consideration further technology-followings, the possibilities of building in new technologies. A flexible system that is capable of integrating further demands has to be built (scalability). It is true for developing both the hardware and the software architecture. A portable system has to be built because of technology-following and changing. Required availability and appropriate response time have to be provided. It means that the time between measuring data and evaluating has to be within the required time interval. An adaptable system has to be built. We have to seek for applications of regular solution that make it possible that the given system without essential or only with minor changes (e.g. client change, software component or version change) can be adapted anywhere else.

Case study
Project no. NKFP-3/050/2001 about 'Complex waste disposal and recultivational technology and developing and applying monitoring system'
The main scope of activity is focused now on the recultivation of slurry reservoirs and the spoil-banks, which are the biggest and most expensive part of the programme. One of the main scopes was to develop an integrated solution of biotic and abiotic monitoring system. During the project a new methodology of biotic monitoring had to be developed and a new recultivational technology had to be formed.

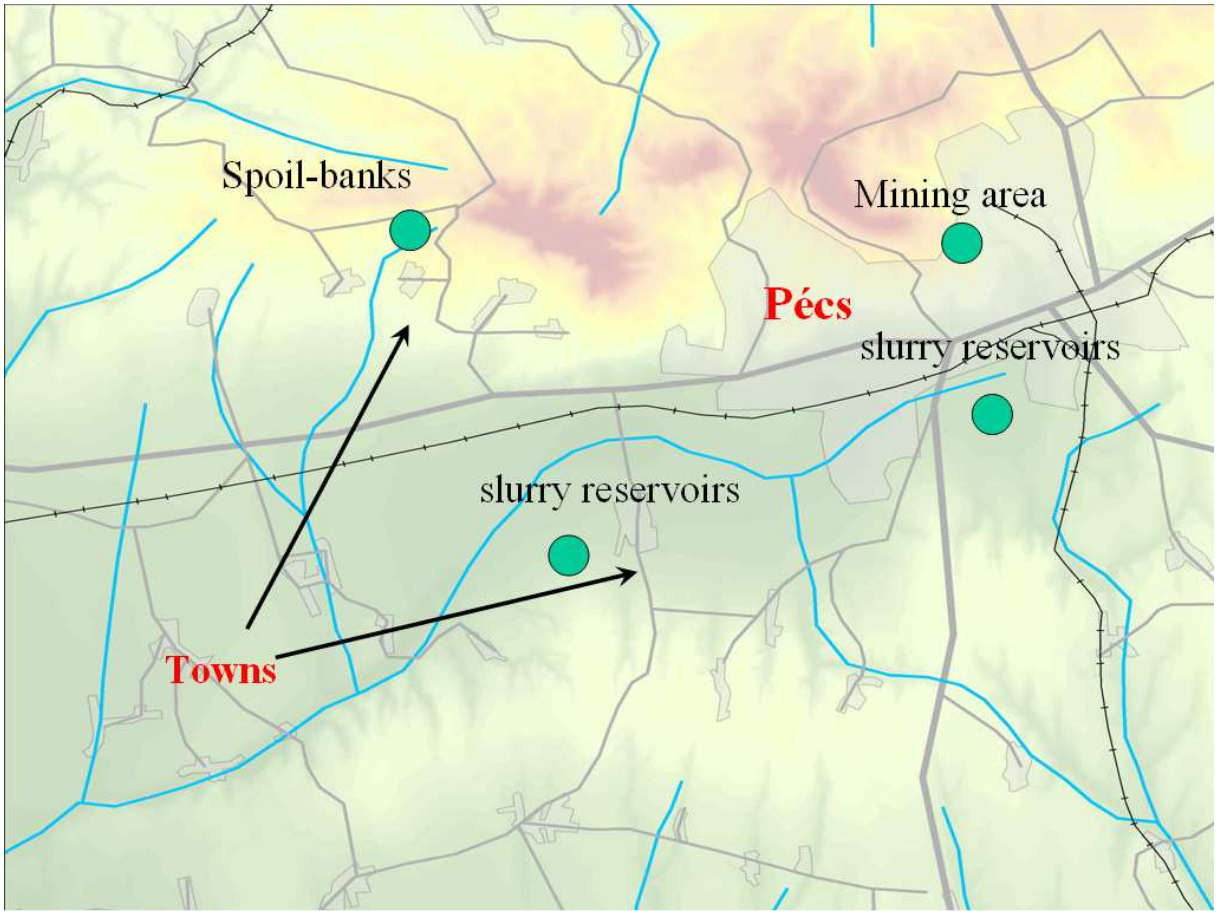

Figure 2 (Spoil-banks and slurry reservoirs near Pécs, Hungary)

Problems emerged as in the South Hungarian region, Pécs area, mining (coal-mining) intensely appeared since the 19th century, and it had a history of uranium mining for more than 40 years. The major mining company employed more than 7,000 people in the 1980s. Nowadays only some hundreds are employed and it will disappear soon. The other main problem is that there are settlements in the immediate neighbourhood of the recultivated area. Therefore giving accurate, measured information about radiation levels and pollution, etc. is very important for the people living in the area. People must be informed about the plans and the alternatives of the solutions and future perspectives of economic and social utilization. Some of the results are the following: we could do the measuring, process data, evaluate them and develop a new recultivational technology. We have developed a GIS-based monitoring system (biotic and abiotic) and we have given ideas of further utilization (e.g. industrial park, leisure park, forestation, reforestation, partly use as building material). This project is still going on and it is expected to finish in a few months.