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Web-based GIS and a measure-data-base as tools for a Decision Support System for integrated Water Resource Planning in small catchment areas.

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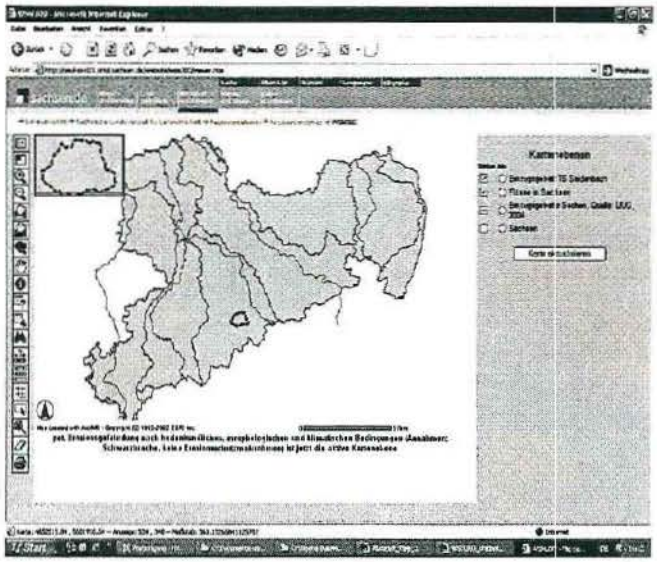
The European Water Framework Directive (WFD) asks for river basin management plans as a basis of integrated water resources planning. A multitude of water-management measures and also computer-based models to simulate the effects of these measures are available today. Nevertheless integrated planning for small catchments is rather the exception and well-founded support for decision-makers facing multi-objective problems is lacking. For these reasons a Decision Support System (DSS) for measure planning in small catchments up to 300 km^2 is being developed. It addresses decision-makers in water and land resources management practice. The project is sponsored by the German Environmental Foundation. Three different case studies are carried out to verify and improve the DSS in different catchments. More information can be found via the Internet through the link www.wsm300.de. This abstract refers particularly to the case study 'Saidenbach' in the mountains "Erzgebirge". This is a catchment area of a drinking water dam which has a strongly agricultural character. The objective of the poster-presentation is to show the possibilities of two different tools which were developed and will be tested in this case study.

One problem of integrated planning is the lack of data and information about achieving these data. A web-based GIS was developed for the solution of this problem (Figure 1). The software used ArcIMS© is a framework for publication of geodata and geoservices on the internet and can be a uniform platform for distributed GIS. With the help of this interactive tool the decision makers will be able to get an overview about the spatial and thematic specification of the data basis. It is also possible to use this tool for information of the public, environmental education and for improving the acceptance of measures and the commitment referring to results achieved by computer models and intended plannings. The created environment information system is an enhanced GIS, which was built for the description of the status of the environment regarding loads and risks. It shall be used to improve the utilisation of existing information through supporting the communication about environmental facets (Bill and Fritsch 1991). The advantages of the used software ArcIMS© are lower time and financial input for the clients, accessibility of the information for the general public, the use of the Open GIS Consortium standard and the possibility of a central information update (ESRI 2003). Otherwise the disadvantages are the limited functional range through the specialisation oft the software and a reduced rate of the data transfer in comparison to a local GIS.

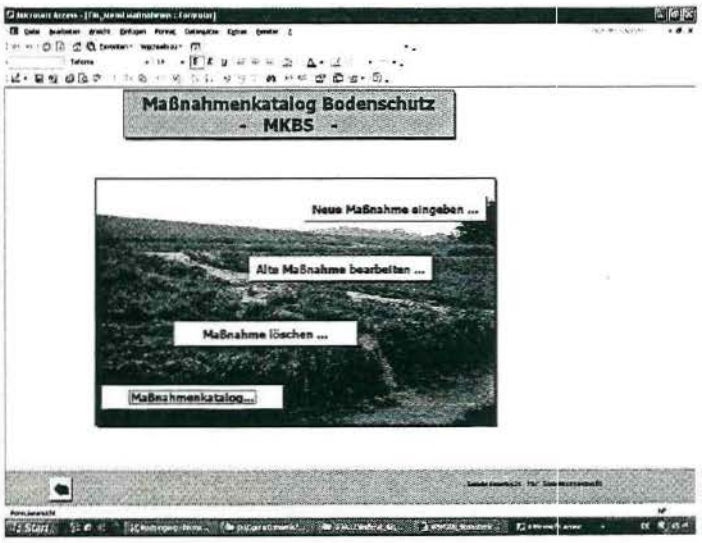
For the case study 'Saidenbach' available information at present are the location of the catchment area (subcatchments, receiving stream, water bodies), the administrative structure (cities, administrative district), the soil (soil classification, type of soil, depth etc.), the climate (distribution of the precipitation), the relief, the land use and the results achieved by computer models (risking of soil erosion and nitrogen leaching). The potential user of the system needs no own GIS software but simply a standard Internet-browser. The use of this system through the Internet will be available in october of 2004. The current use is only available via the Intranet of the Saxon State Ministry for the Environment and Agriculture (SMUL) by the use of the hyperlink http://smul-as-021.smul.sachsen.de/Website/wsm300.



The used technology of the web-based GIS offers good possibilities for the supply of nearly every interested user with geographical information with high up-to-dateness. In comparison to a conventional map the client can use the map in any way due to the fact that the section and the measuring unit are free selectable. This allows combining of information in many ways. Through these new forms of using maps (e.g. results achieved by computer models) you can also involve user-groups who were not interested in maps formerly (Herrmann 2001).

Figure 1: Web-based GIS 'Saidenbach'

Another problem in the moderation process of river basin management is to find the optimal measure or scenario for the improved development of water and soil resources management in a catchment. For the most measures detailed information (specialized books, publications etc.) is available. Comprehensive and comparative descriptions are rare. For this reason a data-base of measures (based on MS ACCESS) was built, containing information about preconditions, effects, cost - level etc. (Figure 2). It is also connected with information about legal aspects and government support. The intention of this tool is to provide the users (decision-maker, engineering company etc.) with an overview about the potential available information from different parts of agriculture based on an integrated soil and water resource protection. The 73 actual available measures are divided in the parts soil erosion, soil structure, reduction of nutrient leaching and crop protection products. These parts are divided in the partitions management (external), technique and planning (internal). At present this database is only a local application but in the future it will be integrated in an Internet application.



The core of this data-base is the search for an optimal measure on the basis of cost-level, efficiency ratio, acceptance-level and a keyword. With this tool also less-known and new or innovative measures will be highlighted and discussed to improve catchment development plans. Through the measure data-base one can get a comprehensive look at the latest recommendations on best management practises.

Figure 2: Data-base of measures for soil and water protection

Literature

Bill, R., Fritsch, D. (1991): Grundlagen der Geoinformationssysteme. Karlsruhe

ESRI (2003): Schulungsunterlagen ArcIMS. Kranzberg

Herrmann, C.M. (2001): Webmapping – Thesen, Beispiele und Tendenzen. In: Kartographische Nachrichten, Heft 6