

MANAGEMENT OF SPATIAL DATA IN MULTIDISCIPLINARY PROJECTS

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ABSTRACT

During the last decade the production of information on the natural environment has increased dramatically. More and more it appears that the decision making process on physical planning depends on timely, accurate and up-to-date information. Just purchasing GIS hardware and software will not be sufficient. In order to benefit from the advantages of digital information several items have to be addressed such as:

- a) Define project objectives and needs
- b) Logistics
- c) Back up system
- d) Meta information system

Based on experiences with spatial data management in two projects as far apart as The Netherlands and Bangladesh the mentioned project steps for spatial data management is illustrated. A well-defined archiving and back up system is the backbone of all (spatial) data management.

1. INTRODUCTION

Already in early times man climbed high places to inspect the environment. Based on their observations decisions were made in relation to hunting, camping and defence. Since then the planning and use of natural resources and the environment has become ever more complex. During the last century the attitude slowly developed from surviving and conquering nature into sustainable land use planning.

For this kind of integral planning a magnitude of information is needed from technical, social, economical and ecological origin. With this increasing number of factors involved, the planning process has also become more difficult. More over the concept of integral, sustainable land use planning is putting a high demand on information management. The timely availability of correct data has become essential for most decision-makers. More and more this data is nowadays available in digital form. It is part of the planner's task to combine data from different origin into an integral approach. Figure 1 is illustrating the different types of spatial data and integration.

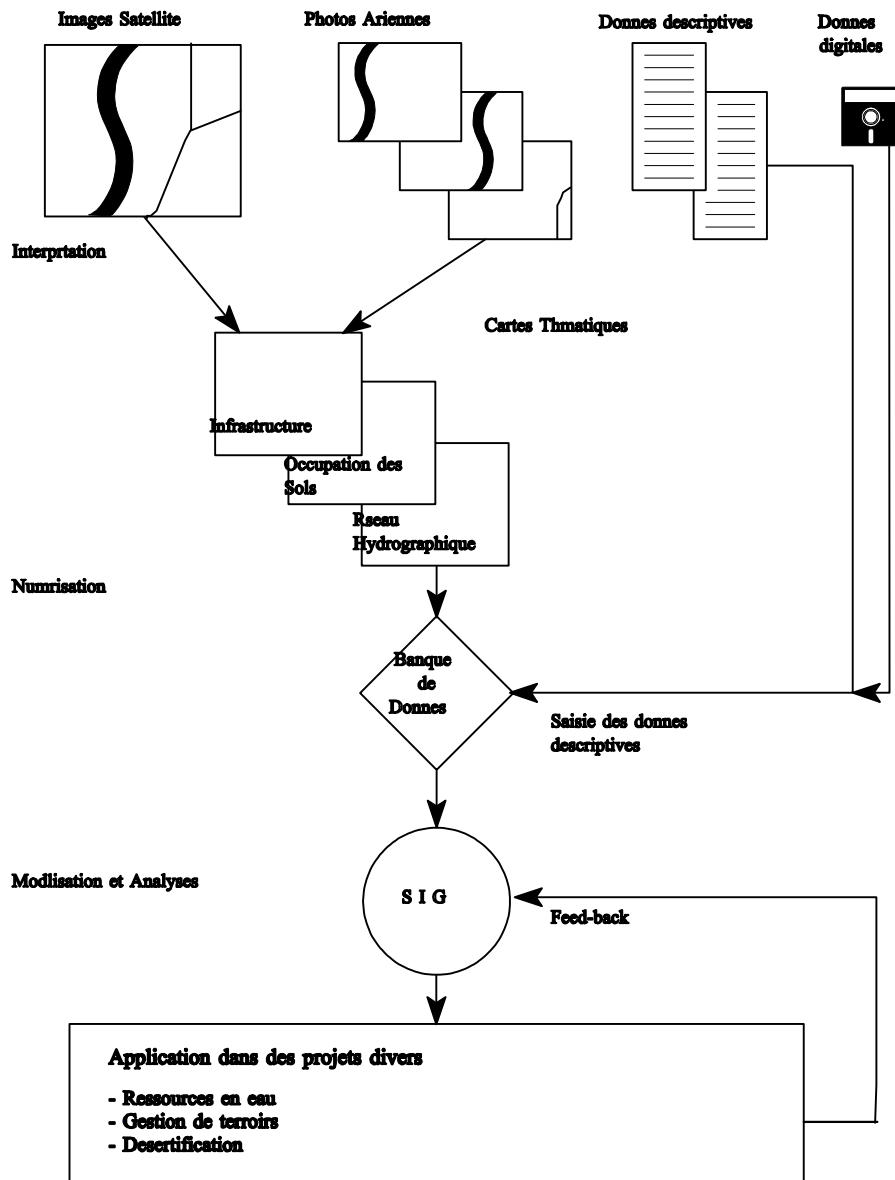


Figure 1. Combination of data sets

Very often the set up and use of a Geographical Information System (GIS) is playing a central role.

2. DIGITAL DATA MANAGEMENT

Several distinct advantages are related to the use of digital information such as:

- combination of different types of data
- easy re-use of data (monitoring/scenarios)
- flexible scale and layout of presentations
- easy accessibility (for instance internet)
- Quality control of data input/output

To fully exploit these advantages good management of spatial data is needed. In practice several steps have to be taken into account:

- a) Define objectives and needs
- b) Logistics
- c) Back up system
- d) Meta information system

Ad a) define objectives and needs

First step for optimal data management is the inventory of the project objectives (short term and long term) and the subsequent needs for data. This will form the base for an information plan in which the producers and consumers of data are clearly identified. In the plan also time constraints, data quality and quantity are addressed.

Ad b) logistics

A functional design of the needed hardware, software and expertise is also based on the information plan. Very often a modular approach is suggested so that the information infrastructure can be extended according to the needs of the project. Here it has to be taken into account that purchasing hardware and software is the easy part of the job but that implementation of the system in the organisation will be more difficult.

Ad c) back up system

Re-use of data starts with a good back up procedure and system. The main function of a back up system is insurance of data availability. However all available data in the project will have to be archived in such a way that it can be found back easily. This will require some kind of database structure and setup of different directories for different types of data and information. Figure 2. is illustrating this important task



Figure 2. Archiving information

Ad d) meta information system

After screening and classification of base data, intermediate results and end results the information will be stored in a meta information system. A meta information system can be considered as a database of databases. It will provide an index on the available information, its origin, quality, restriction in re-use etc. Without a good meta data base the accessibility of the data archive will be minimal.

3. EXAMPLES

3.1 Solid Waste Dump Site Volgermeerpolder

Just North of Amsterdam a large solid waste dumpsite has been used from 1900 until the early 70 Th. Besides household waste also waste from chemical industries was dumped on the site. In the 70 Th it became clear, that environment was polluted with hazardous chemicals. At first the Municipality of Amsterdam decided to close and isolate the dumpsite awaiting a large scale soil remediation and clean up actions.

Due to the location of the dumpsite in a low lying wet polder area the site rapidly transformed into an interesting natural wetland. Figure 3 is giving an impression of the Volgermeerpolder.



Figure 3. Impression of Volgermeerpolder

Recent studies revealed that the spatial distribution of the toxic waste was not as wide spread as earlier studies suggested. In stead of a large scale physical clean up (a million dollar investment) IWACO advised the Environmental Service of Amsterdam (Milieudienst Amsterdam) to set up an early warning monitoring system in combination with a controlled groundwater drainage system. With minimal adaptations and work the site will be transformed in a valuable wetland and nature reserve.

The success of the whole project heavily depends on information management. In the study and design phase all kind of data was gathered and combined into an integral land use plan. Information consists of base data (topographical maps, aerial photos, DTM), chemical data (soil samples, groundwater samples), ecological data (landscape, vegetation) etc. All together these data sets are used for the design of a monitoring network with observation wells all around the dumpsite. By taking groundwater samples at regular time intervals the existence of pollution (type, quantity and location) can be identified at an early stage. Before the polluted groundwater can reach the surrounding environment the constructed groundwater drainage system can be put to work in order to isolate and clean up the pollution. Figure 4 illustrates the design of the monitoring system.

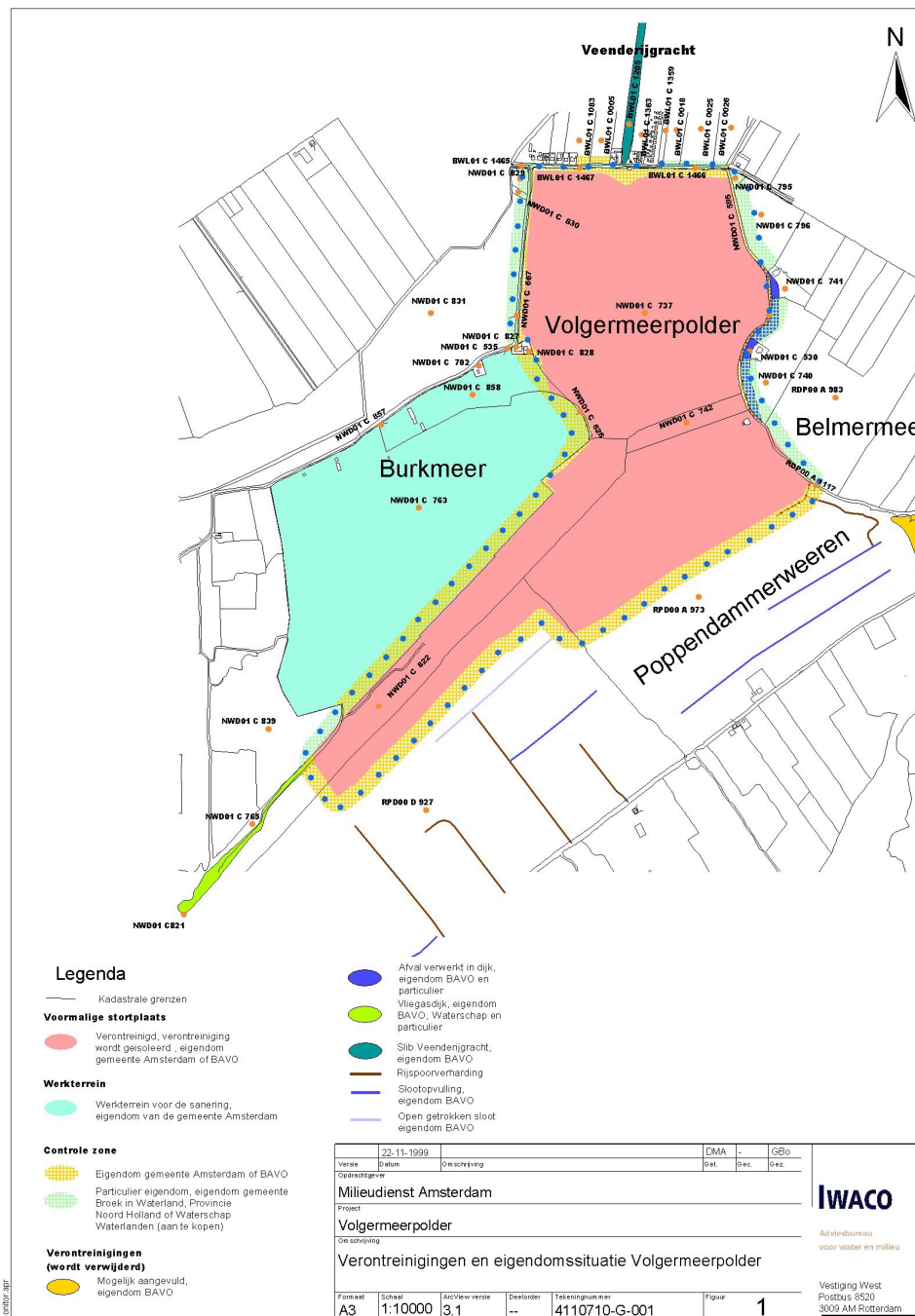


Figure 4. Volgermeerpolder monitoring system

Since the dumpsite is located close to Amsterdam in a vulnerable area the local population is extremely concerned. The Environmental Service of Amsterdam is fully aware of this and good communication with the public in relation to the project approach and developments is deemed very important. For this reason all main results of the (study) project are

visualised in GIS and published on a special internet web site. Interested civilians can contact the Environmental Service in case they want further information.

3.2 Set up of a National Water Sector Database in Bangladesh

General social and economic development in Bangladesh is intertwined with the availability or accessibility of the country's natural resources. Of these resources land and water are crucial to any development strategy and some of the most difficult to manage. The many rivers that dominate Bangladesh's landscape pose numerous hazards during flooding, while land is scarce. Surface water pollution, arsenic contamination of groundwater, the development of irrigated agriculture, reductions in dry season flows and the increased salt water intrusion combine to impede the country's development.

Decisions on how to use Bangladesh's land and water resources historically involved donor-run and funded projects and programs. But these resources are national responsibilities that require careful planning and management. Decision-makers at all levels of government and the private sector need the kind of reliable, up-to-date information on the state of Bangladesh's natural resources.

EGIS is the centre for environmental and geographical information services for land and water management in Bangladesh. One of its main objectives and tasks is to facilitate sustainable management of the country's land and water resources. EGIS has developed the framework for a national-level spatial database and is committed to an ongoing, collaborative effort to upgrade and update this important resource.

EGIS is the repository of the WARPO/EGIS national water sector database. This is a compilation of data collected from BWDB, SWMC, BBS, SRDI, SPARSSO, LGED, BARC, SOB, BRCD, DPHE and other organisations. The database includes also data generated by EGIS itself through different studies. Existing data are continually being upgraded and new data themes are being added to provide a consistent and standardised database for land and water resources planning and management on both national and regional scales. EGIS capacity to develop and manage spatial databases is used to technically support databases at other organisations in the field of environment, fisheries and public health sector. Figure 5 illustrates the type of data stored in the national database.

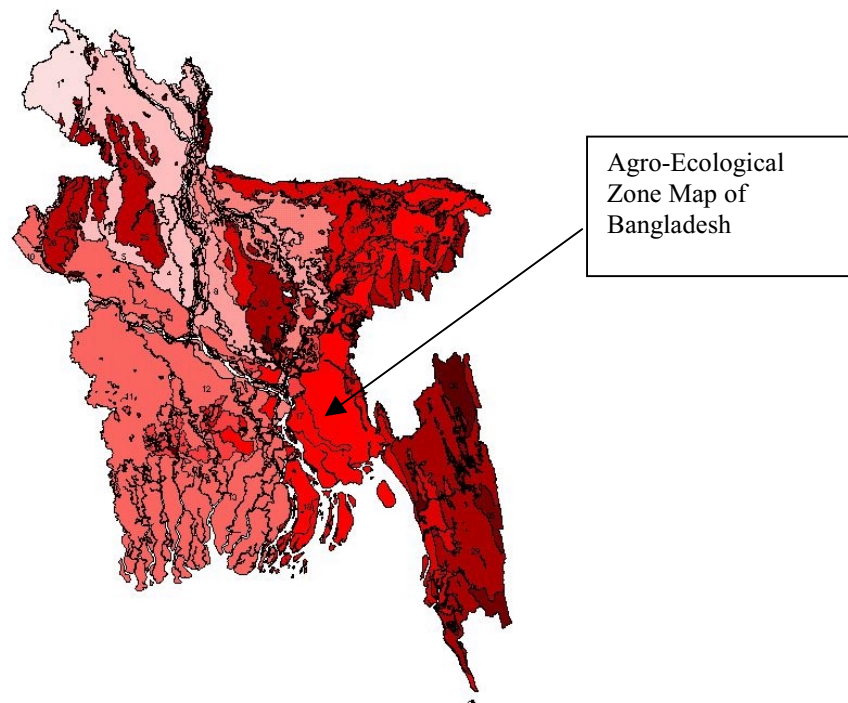


Figure 5. Impression of data from the Bangladesh National Level GIS database

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