Database of measures supporting creation of management plan and programme of measures for implementing Water Framework Directive

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Overview

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Introduction

- Water framework directive (WFD), since 2000:
  - **New requirements concerning water monitoring and management.**
  - **Reporting for European Union (EU):**
    - **Measures to reduce existing deficiencies of aquatic ecosystems.**
    - **Transparency of status assessment and planning of measures.**
    - **Water Information System for Europe (WISE).**
  - **River basin management plans (RBMP) and programmes of measures (PoM):**
    - **Management plan describes aims concerning water quality and quantity to be reached in 2015.**
    - **Programme of measures defines arrangements for each river basin district.**

- Developing a central measure database for Schleswig-Holstein
  - **Initiators:**
    Ministry of Agriculture, Environment and Rural Areas Schleswig-Holstein (MLUR) and State Agency for Nature and Environment Schleswig-Holstein (LANU).
  - **Contractors:**
    Kisters AG and DigSyLand.

Introduction

- Basics
  - **All waters are structured in water bodies.**
  - **Water body categories:**
    - **River waters, lake waters, coastal waters, groundwater, transitional waters.**
  - **Measures to improve water quality and reduce deficiencies.**
  - **Compilation of measures forming a programme of measures.**
  - **Biological and chemical quality elements.**

- Tasks of measure database:
  - **Combining all existing information about each water body and the planned measures.**
    - **Water body: smallest relevant spatial unit.**
  - **Association of measures with local, regional, and supra-regional objectives as well as with estimated costs and impacts.**
  - **Controlling functions and evaluations on various spatial levels:**
    - **e.g. water body, river basin areas, or the state of Schleswig-Holstein.**

Basic conditions

- Short time frame
  - **Project start: June 2007.**
  - **First operational software version: August 2007.**
  - **In the long term additional comprehensive management tasks are to be implemented:**
    - **A two step approach was chosen.**
    - **First stage version should be operational in 2007 to meet all reporting demands in spring 2008. This version should be continuously enhanced until the second stage version will be completed.**
    - **A second stage version will be designed as a module of the KISTERS-software framework 'K3-Umwelt' to implement a long-term solution.**

Basic conditions

- Usability
  - **Comfortable and easy to use.**
  - **Short time to work productively, little training effort required.**
  - **Ensuring data protection and data security (access rights management).**

context menu for special application areas

Conceptual design: software environment

- First stage version: web application
  - **Re-use of modules developed for similar projects.**
  - **Access could be extended from internal state network to Internet, according to actual needs.**
- Software components:
  - **Apache httpd server,**
  - **Oracle 9 (optional Oracle 10) database management system,**
  - **PHP 4,**
  - **PclZip library (**http://www.phpconcept.net**).**

Conceptual design: security management

- Role based access
  - **Assignment of water bodies / working group areas.**
  - **Members could edit their 'own' water bodies.**
  - **Read access on other water bodies.**
- Administration by state authority LANU:
  - **Assignment of rights and roles.**
  - **Creating and management of user accounts.**
- Session management, locking mechanism
  - **During editing process of water body information by one user other users only have read access.**
  - **Only one login at a time by one user.**

roles

rights

assignment:
X: right granted
o: no right
E: only on 'own' water bodies

Conceptual design: basic functionality

- Integration of all relevant existing data about WFD-measures
  - **Existing water body and measure data:**
    - **More than 600 river water bodies.**
    - **34 working areas in Schleswig-Holstein.**
    - **Measure plans created by the local working groups, drafted in maps (using Geographical Information System ESRI ArcView).**
    - **Additional digital assessment forms (Microsoft Access application).**
  - **Central data transfer of local data:**
    - **Upload of GIS files.**
    - **Transfer and combining all relevant measure-related data.**
    - **Management of additional documents and information.**
  - **Adding water body information using various data sources.**

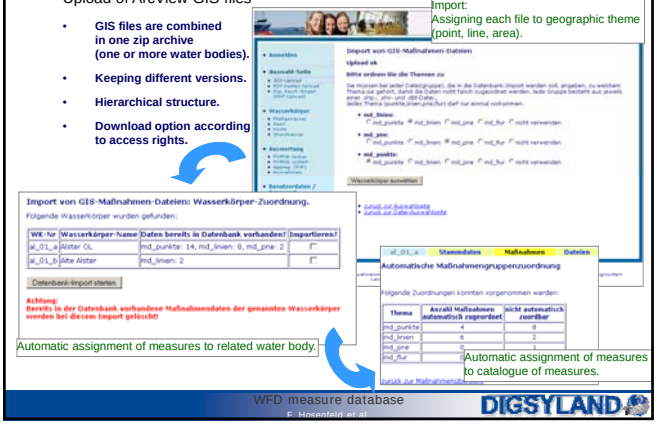
Conceptual design: data model

- Data model distinguishes three types of information:
  - **System management, controlling information,**
  - **water body related information,**
  - **measure related information.**
- Water body categories:
  - **Widely uniform structure, complemented by category-specific properties (like GIS information for river waters).**
- Catalogue of measures
  - **Assignment each measure to a standardised catalogue of measures.**
  - **Catalogue of measures describes technical and topical properties as well as relations to other classification schemes:**
    - **Impacts,**
    - **significant pressures,**
    - **reporting templates,**
    - **Water Information System for Europe (WISE).**

Implementation: data upload

- Upload of ArcView-GIS files
  - **GIS files are combined in one zip archive (one or more water bodies).**
  - **Keeping different versions.**
  - **Hierarchical structure.**
  - **Download option according to access rights.**

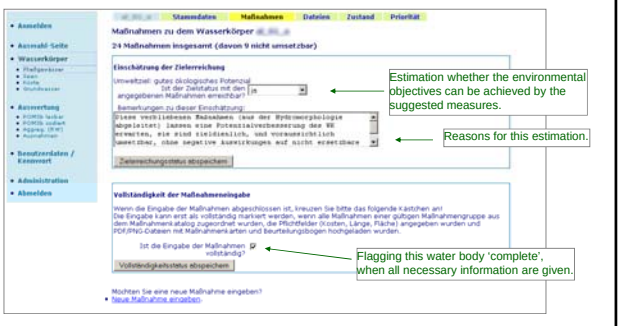
Import:
Assigning each file to geographic theme (point, line, area).



Automatic assignment of measures to related water body.

Automatic assignment of measures to catalogue of measures.

Implementation: measures of a water body



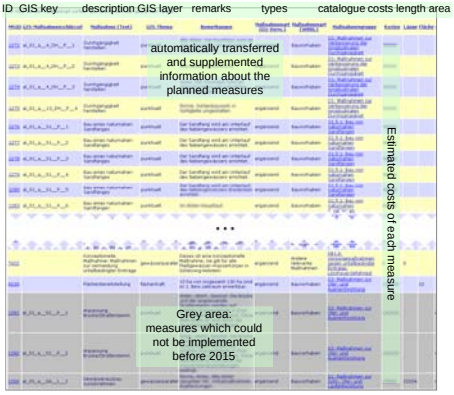
Estimation whether the environmental objectives can be achieved by the suggested measures.

Reasons for this estimation.

Flagging this water body 'complete', when all necessary information are given.

Original data partially concealed.

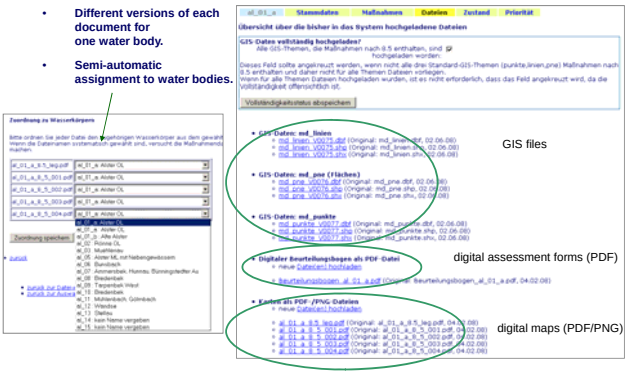
Implementation: measure information



Implementation: document upload

- Uploading additional documents

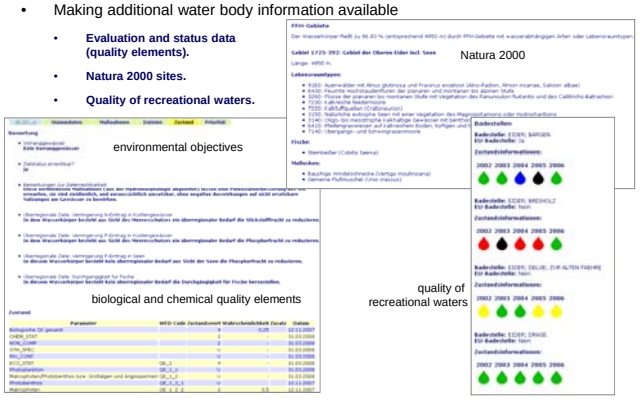
  - **Different versions of each document for one water body.**
  - **Semi-automatic assignment to water bodies.**



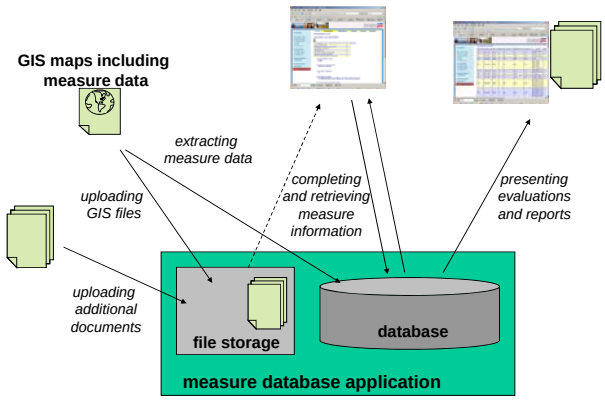
Implementation: water body information

- Making additional water body information available

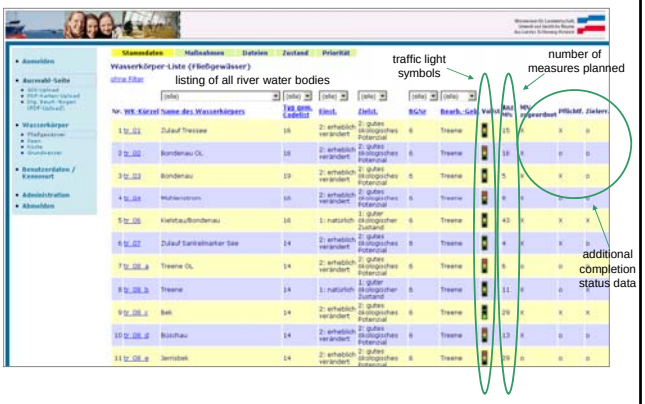
  - **Evaluation and status data (quality elements).**
  - **Natura 2000 sites.**
  - **Quality of recreational waters.**



Implementation: data flow and organisation



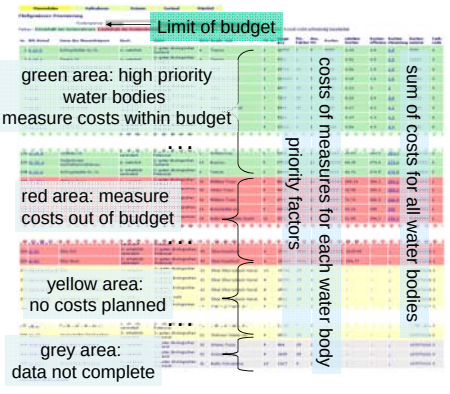
Implementation: checking completion status



Implementation: evaluations and reports

- Evaluations
  - **Various lists and tables which can be sorted and filtered.**
  - **Computation of priorities:**
    - **Controlling the planning of measures, based on cost efficiency, type and amount of measures as well as on water-body-related parameters.**
    - **Priority assignment constitutes the base for all reports and evaluations.**
  - **Evaluations according to different criteria offering various topical and spatial levels of aggregation.**
- Reports
  - **Reporting template for programme of measures.**
    - **Status of measure planning according to EU specifications.**
  - **Rule-based determination of exemptions to be requested and their justifications.**
  - **Generation of tables for the river basin management plan.**

Implementation: priority assignment



Implementation: evaluations and reports

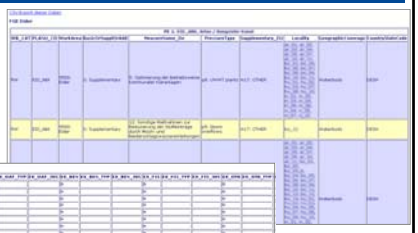
spatial aggregation levels

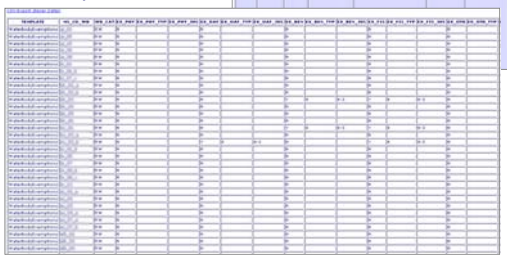
various measure-related properties

various water body properties

Implementation: evaluations and reports

- Reporting template for programme of measures
- Reporting template for exemptions:
  - **water bodies which will not achieve their environmental objectives in 2015.**





Conclusion

- Desired goals were achieved.
  - **Operational use after short development time.**
  - **Management of more than 2700 measures in Schleswig-Holstein.**
  - **Web application offers access to all persons responsible and enables support by external experts via Internet.**
  - **Little training time necessary (about 0.5 days).**
  - **Very high acceptance by all users.**

Water body category	Number of water bodies	Number of measures
River water / transitional water	607	2030
Lake water	73	227
Coastal water	40	70
Groundwater	64	404

approximate figures, May 2008

- Disadvantage of the current solution:
  - **No GIS functionality, no management of geographic information, decoupling of spatial and topical information.**

Conclusion

- Administrative perspective describes successful aspects:
  - **Important step forward in implementing the water framework directive in Schleswig-Holstein.**
  - **The central database allows for the first time access to data on water body status and planned measures *for all involved partners at any stage* of the planning.**
  - **The tool improves the transparency of reporting details and decision from all partners.**
  - **Reduction of misunderstanding and discussion due to lack of data.**
  - **The application is used to store queries for national reporting requirements and thus saves much time for data management.**

Outlook

- Development of second stage version
  - **Status quo analysis was performed:**
    - **Interviews with relevant partners (water authorities, associations, state agency, ministry).**
  - **Rough concept is currently prepared (Kisters AG, DigSyLand, Con Terra).**
  - **Planned for 2009: detailed concept and begin of implementation.**
- Requirements for the second stage version
  - **Integration of GIS functionality:**
    - **Coupling with main GIS applications and data.**
  - **Module of framework 'K3-Umwelt':**
    - **K3-Umwelt used widely by administrative districts.**
- Further aspects
  - **Additional application 'evaluation database' for biological and chemical quality elements is currently developed using concepts and components of the measure database (first stage version).**