

nofdp transnational study

for both river systems Dommel & Mark
crossing the border between Belgium and the Netherlands

English Summary: Results of the NOFDP Transboundary
Studies

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Province of Noord-Brabant

Results of the NOFDP Transboundary Studies

Summary

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Appendix A SWOT points of transnational cooperation

1. Introduction

In contrast to the past decades when flood protection mostly referred to technical measures, the recent severe floods have led to a much more comprehensive attitude. Therefore, flood and drought damage prevention should pool on both technical and non-technical solutions. The hydrological cycle including ecological interactions as well as human demands have set the framework for managing riverine systems. The challenge is to harmonize and to weigh the various conflicts of interests.

In 2004 the Hessian Ministry of the Environment, Rural Development and Consumer Protection (Germany) and the Province of Noord Brabant (The Netherlands) initiated the Interreg IIIb Nature Oriented Flood Damage Prevention (nofdp) project based on the demand to meet requirements related to nature development, flood protection and spatial planning concerning the implementation of investment projects. One of the goals of the nofdp project is to develop an Information and Decision Support System (IDSS) which will assist in developing flood management strategies and will facilitate a balanced view on the issues of spatial planning, water management and ecological development within the regional water systems situated in the North-west European territory.

To gather valuable experience for the development of the IDSS on transnational studies, cooperation between water managers within transnational river basins and transnational modelling, the nofdp project has defined the project “Transboundary Studies”. This project has been assigned to HydroLogic, Econnection and Witteveen & Bos.

1.1. Aim of the Transboundary Studies

The developments in water management, on a national as well as on an European level, ask for a river basin-wide approach. Especially in transnational river basins a solid cooperation between the water managing organisations of the relevant countries is required. This is also the case for the Mark and Dommel river basins, which are partly situated in The Netherlands and partly situated in Flanders, Belgium (Fig. 1).

For a successful management of these river basins, it is important that Dutch and Flemish water organisations cooperate. The objectives of the Flemish-Dutch Transboundary Studies on the Dommel and Mark river basins are:

- To bring in sight how to optimize Flemish - Dutch transnational cooperation on water management and spatial planning addressing nature oriented flood and drought damage prevention;
- To gather experience with transnational modelling for the development of the nofdp IDSS.
- To calculate planning scenarios including the issues of nature oriented flood and drought damage prevention within the transnational basins of the Mark and Dommel;
- To communicate possible measures to water managers and decision makers from Belgium and The Netherlands;
- To develop instruments for river basin -wide interactive communication with stakeholders and citizens on nature oriented flood damage prevention.

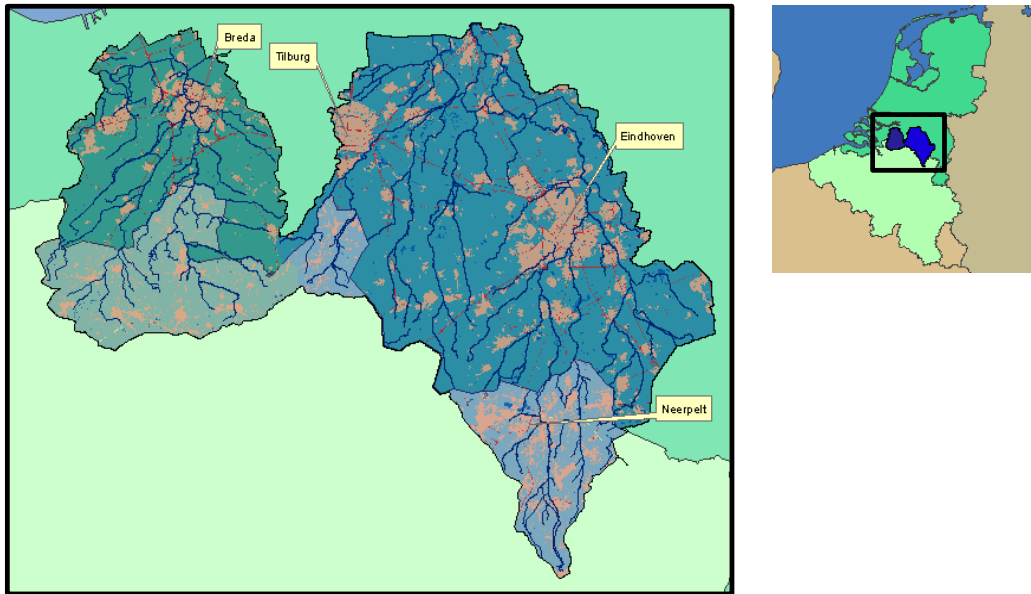


Fig. 1. Location of the research area of the Transboundary Studies: the Dommel and Mark catchments.

1.2. Approach

To reach the objectives described above, the transnational study has been divided into four phases:

1. SWOT analyses on transnational cooperation within the Mark and Dommel catchments.
2. Inventory on existing data, models and methods available for the development of the transnational model.
3. Development of a transnational model to assess nature oriented flood and drought damage prevention measures.
4. To communicate project results to Dutch and Flemish water managers and decision makers.

The approach and results of each of the four phases of the Transboundary Studies are extensively described in separate reports (available in Dutch). This report summarizes the approach followed and main results per phase. In the concluding section of each of the four phases, the lessons learned and experiences gathered for the IDSS development are described.

In order to optimise the internal communication within the project group, an Internet-based collaborative platform was created at the start of the project. This platform contained a shared calendar including the dates of relevant project meetings. Furthermore, relevant documents and information concerning the Transboundary Studies were placed on this platform and could be easily accessed by project members. In this way the project team always had access to the latest versions of the released documents and were always be up-to-date with the latest agreements on meeting and project planning.

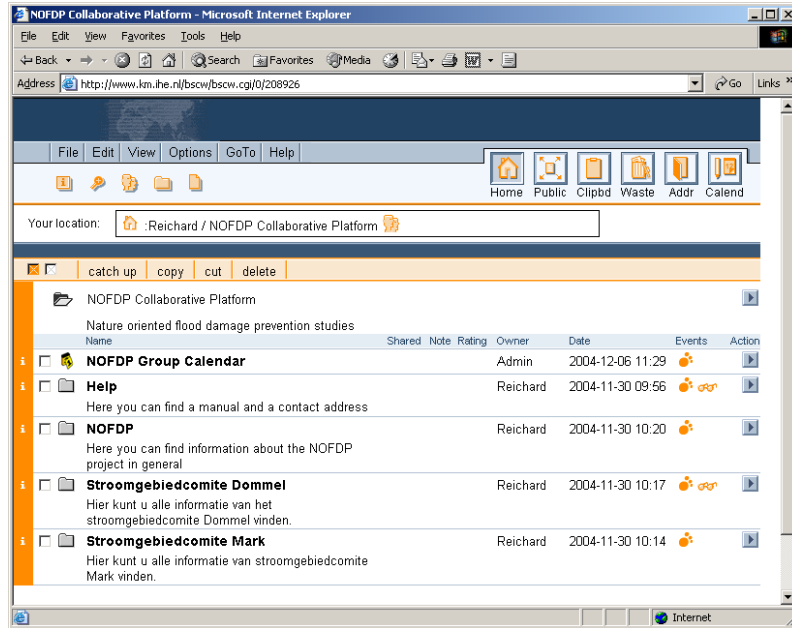


Fig. 2. Collaborative platform for the project members.

2. Phase 1: SWOT analyses on transnational cooperation

2.1. Aim and approach

The aim of phase 1 is to obtain an overview of potential strengths, weaknesses, opportunities and threats (SWOT) concerning transnational cooperation within the Dommel and Mark catchments, taking into account local and European directives as well as present-day policies. Therefore an inventory was carried out to get insight into the Dutch, Flemish and European directives and policies concerning water management and spatial planning and the role of the responsible organisations.

2.2. Results

All information gathered on Dutch, Flemish and European directives, policies and responsible organisations, are stored in an online knowledge base, which is accessible through the website www.waterzondergrenzen.org. More information on this knowledge base is given in section 5.2 (p.13). The main Strengths, Weaknesses, Opportunities and Threats (SWOT) have been summarized in 21 topics, which are placed in the SWOT diagram of Fig. 3 and which are also presented in Appendix A. Detailed information on the content of these SWOT points can be found in the final report of phase 1 (available in Dutch). This section summarizes the main results of the SWOT analysis.

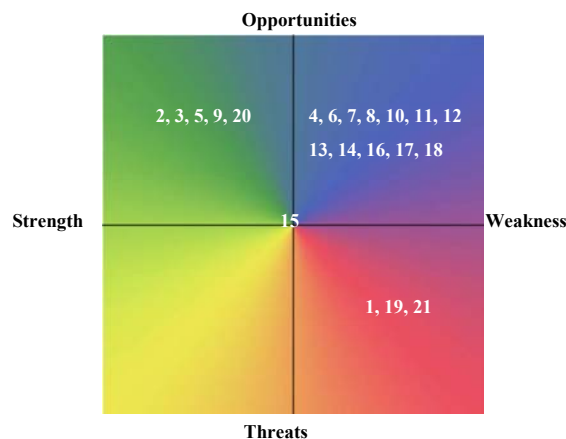


Fig. 3. The resulting diagram with 21 SWOT points.

Fig. 3 shows that most of the SWOT points can be found in the upper part of the diagram (weakness/opportunity, strength/opportunity). This means that many opportunities exist for Dutch and Flemish cooperation. For example, the presence of European directives (SWOT point 9) are a great opportunity for improved transnational cooperation. These directives lead to synchronization of Dutch and Flemish water and spatial planning policies and directives. As a result, Dutch and Flemish water managers will have more common ideas, approaches and standards which will simplify and improve communication between them. Current weak point is the adjustment of legal frameworks and standards concerning water quantity and water quality (SWOT point 10). An example is given for the implementation of the European Framework Directive. Despite the fact that the framework is equal for The Netherlands and Belgium, both countries have applied the framework differently. As a consequence, the Dutch and Flemish results of the European Framework Directive are not (yet) comparable.

Cross-border river basin committees such as the Dommel and Mark committees (SWOT point 5), and European projects (such as nofdp), strongly promote transnational cooperation, because better insight is obtained in the structure and policy of neighbouring countries and important communication networks are created. Furthermore, great opportunities can be achieved by better communication between governmental organisations, water managers, citizens and stakeholders (SWOT point 11, 12 and 13). As mentioned before, the harmonization of Dutch and Flemish water policy caused by European directives, will simplify communication. Current point of attention concerning Dutch – Flemish communication is the absence of a regularly updated contact list with relevant persons. At this moment for example, it is often unclear which colleague of the neighbouring country should be addressed in case of a general question or a calamity. A list accessible through a website for example, containing the responsible Dutch and Flemish contact persons including their expertises and tasks, would be very helpful. However, it is important that relevant persons will be familiar with this website or list, and that sufficient attention will be paid to update the list regularly.

An opportunity lies in the field of real-time availability of transnational data (SWOT point 17). It would be valuable for example, to make current and forecasted weather or discharges of the Dommel and the Mark available on a website. In this way better insight is gained in the situation of the whole catchment so that in the framework of operational/short-time flood management, better decisions can be made on a river basin level. The development of transnational models, databases and operational/strategic decision support systems (SWOT point 4) will support the definition of suitable measures on a river basin level by making it possible to harmonise and weigh various conflicts of interest. During extreme situations an operational DSS will provide real-time information and will save this information in a joint and shared database. Based on current and forecasted river-basin-covered information on precipitation, discharges and water levels, suitable measures can be defined which will minimize damage caused by flooding or drought. During these extreme events, communication between Dutch and Flemish water managers is very important and could take place by using the DSS. This will prevent the loss of precious time by searching the responsible person of the neighbouring country.

Two main points are considered as a threat. First of all differences in Dutch and Flemish policy and organisational structure will always lead to misunderstandings between the Dutch and Flemish water managers (SWOT point 1 and 21). By paying more attention to identifying the main differences and to the communicate about these differences through for example a website, the negative impact of this threat can be minimized. Another threat for Dutch and Flemish cooperation on optimal nature oriented flood and drought damage prevention is the lack of space for water and nature (SWOT point 19). The scarce space should be used optimally. By means of durably multipurpose space usage, negative impact can be minimised.

2.3. Conclusions

During phase 1 of the Transboundary Studies insight is gathered in directives, policy and the organisational structure of The Netherlands and Flanders. All results are made accessible through a web-based knowledge base. Based on the knowledge gathered, opportunities for better transnational cooperation are identified and directives are given to materialize these opportunities. Furthermore, this inventory has resulted in an overview of the pitfalls of Dutch-Flemish transnational cooperation. The main conclusions of the SWOT analysis are:

- Many opportunities exist for Dutch and Flemish cooperation;
- Differences in cultural and organizational structures are and will be important obstacles;
- Development of transnational data, models and instruments (DSS) are helpful and necessarily;
- European directives and projects are important tools to improve Dutch –Flemish cooperation;
- Communication between Dutch and Flemish water managers and spatial planners is a meriting point of attention; a website will help improving communication.

3. Phase 2: inventory on available Dutch and Flemish data and hydrological models

3.1. Aim and approach

The aim of phase 2 is to assess the availability of data and models for the Mark and Dommel catchments. Therefore, an inventory on the availability of GIS data, hydrological data, relevant databases, literature and ecological, hydrological and hydrodynamical models was carried out. Furthermore attention was paid to the applicability of these data for the development of the transnational model of phase 3.

3.2. Results

In total 42 Dutch and Flemish hydrological, hydrodynamic and ecological models, applied within the transnational river basin, have been found and examined during phase 2. For each model, an extensive description has been given on the type of model, the processes modelled, the developer, the owner/contact person, the costs and the website on which more information about the model can be found. A similar research has been carried out on 33 databases and 67 GIS-maps. The GIS-maps were also checked on their reliability, quality and completeness. All results of phase 2 have been collected in an Excel database (available in Dutch), which is accessible through the knowledge database of www.waterzondergrenzen.org.

This inventory showed that within the Mark and the Dommel river basins more than 40 hydrological, hydraulical or ecological models are used. Models in which the three layers spatial planning, ecology and water management are integrally modelled are not yet available for this region. It appears that almost every institute or organization has its own favourite model. For the Dommel and Mark catchment, currently no area covered, transnational model exists. All the 40 models available for the Dommel and Mark catchments differ from each other in goal, scale, research area, parameters used and reliability. Therefore, the existing models cannot be easily combined for the development of the transnational model of phase 3.

On overall, equal national maps are available for the Netherlands and Flanders (e.g. soil, DEM, land use, topography). The translation method from real information into map units differs strongly per country. Although there are differences in Dutch and Flemish geo-data, there are also some resemblances. The most important one is that geo-data are stored on the same scale and in the same format (as ESRI shapes or grids).

National geographical data for The Netherlands as well as for Belgium are generally not freely accessible. These data have to be obtained by governmental organizations and can only be used if the concerning organisation owns the data and is willing to share it. It is difficult to determine, which organization owns the required data. Therefore, collection of Dutch and Flemish data is time consuming. It also appeared that regional and local geo-data is often very person-dependent. When finally the right person is found, it still takes a lot of time to collect it. Furthermore it appeared that the quality and reliability of the data was not always clear. There are good central clearinghouses, which provide metadata for national data, but for data on regional and local scale good metadata is often absent.

GIS-maps and databases, which cover both the Dutch en Flemish part of the Mark and Dommel catchments were hardly found. An exception on this, are the European CORINE maps. Because of the global scale of these maps, they are not suitable for use within local and regional model studies.

3.3. Conclusions

During the data and models inventory of phase 2, it became clear that a wide variety of models exists within the Mark and Dommel catchments. However, these models differ a lot from each other and they can not be easily combined for the transnational model in phase 3. First of all, these models have been developed with a different goal and on a different scale. Furthermore most of the models do not integrate the different fields of the water system ecology, hydrology and spatial planning. Therefore it is not possible and desired to just make a coupling between these models during phase 3 of the Transboundary Studies. Other reasons for why a coupling should not be made:

- The existing models do not cover the entire area of the Mark and Dommel catchments; to develop an area covered model, extra models should have been made;
- The required input data for these models are often not available;
- Not all of the models are free to use. First of all, a license for the software is needed. Furthermore these models are owned by different organisations who are not always willing to make this model available for different studies;
- The coupling of different kind of models will be a time consuming and task.

It was concluded that a new model for the entire area, should be developed during phase 3 of the Transboundary Studies. This model should be based on available GIS data in both The Netherlands and Flanders and on well-accepted methods.

4. Phase 3: development of a transnational model EcoDSS

4.1. Aim and approach

The aim of phase 3 is to develop a transnational model to perform scenario calculations for various conditions of water storage and water conservation to assess the consequences of these measures on nature and agriculture. Furthermore, the model should be suitable for communication with participants.

4.2. Results

During the data and models inventory of phase 2, it was concluded that a new GIS model based on existing and well-accepted methods, should be developed during phase 3 of the Transboundary Studies. At the beginning of phase 3, an inventory has been carried out to find suitable methods for the calculation of flood and drought damage taking into account hydrological and ecological developments. The analysed methods were assessed on the basis of the following criteria:

- The input data required for the method should be available for the entire Dommel and Mark catchments;
- The method should be well known and well accepted;
- The methods should be valuable for and applicable within the nofdp IDSS;
- The method should preferably combine the three layers: spatial planning, ecology and water management;

On the basis of these criteria, the following 3 widely accepted, Dutch STOWA (Dutch Organisation for Applied Water Research) methods were selected: “Waterlood”, “Knowledge survey Water storage and Nature” and “Knowledge survey Water storage and Agriculture”. These 3 methods mainly consist of knowledge tables, which describe on the basis on general available area characteristics such as soil type, ground water level, land use, nature type, inundation characteristics, the suitability of nature and agriculture for two types of flood and drought prevention measures: water storage and water conservation (Fig. 4 and Fig. 5).

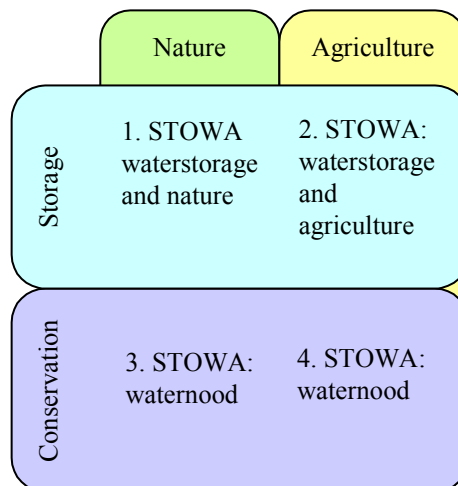


Fig. 4. The 3 STOWA methods used to analyse the consequences of water conservation and water storage on nature and agriculture.

Within the Netherlands and Belgium, water conservation and water storage are the most common flood and drought prevention measures. During water conservation (number 1 in Fig. 5), discharge of water is delayed by e.g. more infiltration and setting up weirs. As a result, extra water will be stored in the unsaturated zone and ground water levels will rise. During water storage water is stored on the surface level, accidentally in flood sensitive areas or intentionally in predefined storage/retention areas (number 2 in Fig. 5). “Water discharge”(number 3 in Fig. 5) is the least popular measure, as it often causes extra water problems downstream.

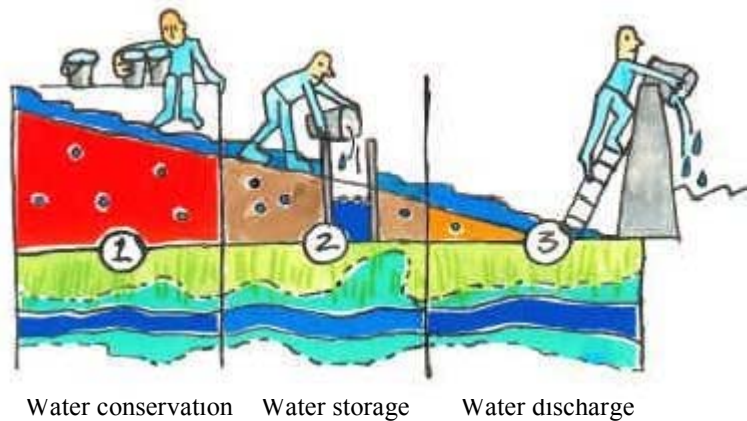


Fig. 5. The measures analysed by the EcoDSS: water conservation and water storage.

During phase 3 of the Transboundary Studies, a transnational model called EcoDSS has been developed. The EcoDSS combines the STOWA knowledge tables with several national available data layers containing information on nature, soil, land use, elevation, ground- and surface water characteristics to determine the suitability of agricultural and natural areas for the measures water storage and water conservation. As the STOWA methods are developed for the Dutch situation, translation tables were needed to translate the Belgium classification of the required GIS data into Dutch classification standards. For some basic maps, e.g. the soil map, the development of the translation table was a very time consuming task, because expert knowledge of both the Dutch and Flemish classification was necessary to translate more than 1000 soil classes. Other translation tables, e.g. for the land use map, were much easier to create.

The user of the EcoDSS can analyze which areas within the river catchment are suitable for the conservation and storage of water, from an ecological and agricultural point of view. In the analysis the user can vary the characteristics of measures, such as inundation depth, period of inundation and flood frequency for water storage, and ground level change for water conservation. After the user has filled in these criteria, the EcoDSS shows for the whole Dommel and Mark catchments, which nature and agriculture locations are suitable for this defined measure (Fig. 6). The EcoDSS classifies a location as “suitable” as long as the defined measure will not cause significant drought or flood damage to the existing naturetype of croptype. Depending on the extent of flood or drought damage caused to the existing landuse, the EcoDSS classifies an area as “unsuitable” or “very unsuitable”. The EcoDSS is a very functional instrument for optimising effective nature oriented flood and drought damage prevention measures and to select areas where these measures will not cause damage to existing or developing agriculture and nature. Because of its user-friendly interface, the instrument can be used for communication on measures with stakeholders and citizens.

User input: water storage characteristics

- Season
 winter

- Inundation depth
 < 0.5 meter

- Inundation duration
 < 7 days

- Frequency
 < 1 x per 50 year

EcoDSS output: suitability of nature and agricultural areas for the water storage measure

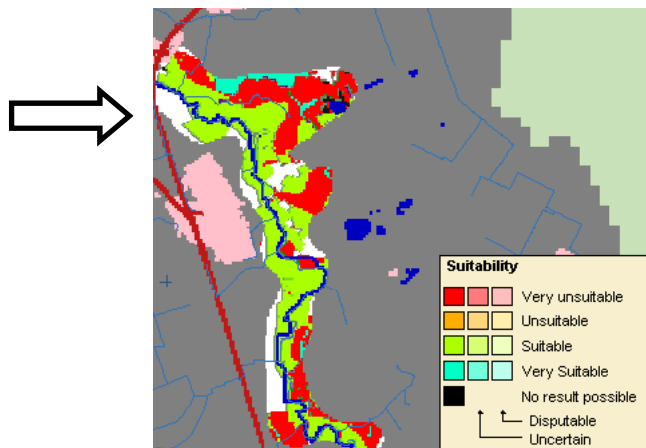


Fig. 6. EcoDSS input and output.

During two meetings with several local area experts it appeared that the EcoDSS gave reliable results for more than 80% of the Dommel and Mark catchments. The experts found the EcoDSS a very functional tool for integrating ecology and agriculture within their water management. Because the EcoDSS analyses the whole (transnational) river basins of the Mark and the Dommel, the model functions only on a regional scale. On the one hand this scale matches well with the spatial data available for the catchments and the need for a first well-considered selection of measures; on the other hand the degree of abstraction does not fit to take unique local area features into account, like seepage, small terrain elevations and individual ecological entities. Just as in the case of the Dommel and the Mark basins, local data and expert knowledge is needed to check the first results.

The EcoDSS is implemented in both an ArcMap extension and a webbased version to meet the users' needs (Fig. 7). The ArcMap extension enables further analysis of the results using basic and additional maps and ArcMap functionalities (zoom in, zoom out, identify tool, adapting legends, etcetera). The web-based version (accessible through www.waterzondergrenzen.org) enables all interested water managers within the Dommel and Mark catchments, to use the EcoDSS.

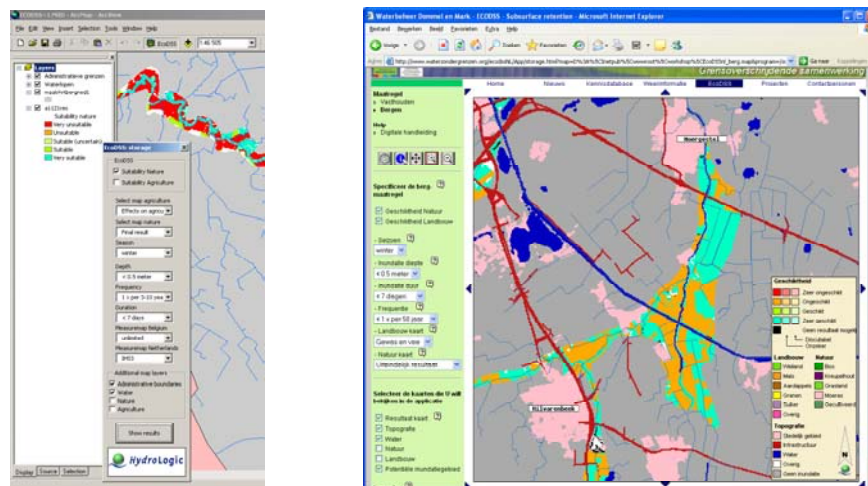


Fig. 7. Two versions of the EcoDSS: ArcMap version (left) and webversion (right)

Both versions of the EcoDSS contribute to the (transnational) search for areas where measures for flood and drought prevention can be taken, without causing significant damage to existing or developing nature or agriculture. More background information (available in Dutch and in English) on the EcoDSS can be found on the website www.waterzondergrenzen.org.

4.3. Conclusions

The EcoDSS is a valuable tool to gain quick insight in the potential of Dutch and Flemish areas for water storage and water conservation from an ecological and agricultural perspective. In the search for effective nature oriented flood and drought damage prevention measures, the important first step is to select areas where flood and drought measures will not cause damage to existing or developing agriculture and nature. In the next stage, detailed hydrodynamical models, based on more detailed data, can determine to what extent the measures in these areas will decrease the water related problems.

A GIS model based on available data and well-accepted methods appeared to be a communicative and powerful method for storing, combining and presenting spatially and thematically different transnational data, however:

- classification should be the same in both countries; because no European standards exist on GIS data storage or classification, translation tables are often needed.
- international models at regional scales require use of nationally available data.

5. Communication of project results

5.1. Aim and approach

The aim of phase 4 is to communicate the project results of the Transboundary Studies to the relevant water managers and decision makers within the Mark and Dommel catchments. Therefore, the website www.waterzondergrenzen.org has been developed to make all the results of the Transboundary Studies available through the Internet. To give publicity to this website, a transnational workshop was organised to present the instrument to relevant water managers and decision makers.

5.2. Results

The results of the SWOT analysis of phase 1, showed that a joint website for Dutch and Flemish water managers will improve transnational cooperation. This website will solve the following three bottlenecks for present-day transnational cooperation between water managers, spatial planners and ecologists within the Dommel and Mark catchments:

1. At this moment the policy concerning water management or spatial planning of the neighbouring country is often unknown. Insight in each others policy and organisational structure will cause a better understanding of decisions and will simplify communication.
2. At this moment it is often unclear which colleague of the neighbouring country should be addressed in case of a calamity. A list with the responsible water managers including their expertises and tasks would be very helpful for this. It is important, however, that all water managers are familiar with this list and that the list will be updated regularly.
3. At this moment no central document exist which shows the recently finished, the current or planned projects within the Dommel and Mark catchments. These projects will influence the water system and therefore it would be valuable to communicate the approach, the planning and the consequences of the projects with the relevant water managers within the river basin.

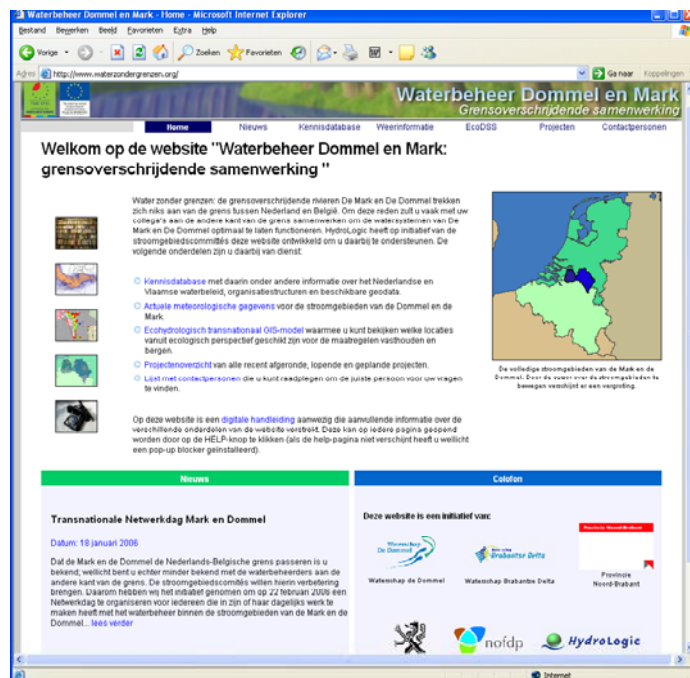


Fig. 8. The resulting website: www.waterzondergrenzen.org.

During phase 4 a website www.waterzondergrenzen.org (Fig. 8) has been developed to present all results of the Transboundary Studies and to solve the 3 points of improvements for better transnational cooperation mentioned above. The website contains the following parts:

- A knowledge database containing the results of phase 1 and 2 of the Transboundary Studies (Fig. 9): more than 200 documents (.doc, .pdf, url's) on Dutch and Flemish water management, water policy, organisational structure, data availability and hydrological models. Through the following three search criteria's: location (Belgium, The Netherlands), category (water storage, water quality, groundwater, space for water, transnational cooperation, landscape and nature) and subject (directive, policy, GIS, database, model, SWOT) an overview of documents, which meet the user criteria, is given. The user can open and/or download the selected documents from this website.
- Latest news on Dutch – Flemish transnational cooperation. On this page announcements for relevant events, new projects or meetings can be placed. Furthermore, reports of relevant events can be downloaded.
- The following real-time weather information and forecasts for the Dommel and Mark catchments is presented: 3-hours and 24-hours radar information for the Dommel and Mark catchments, 10-day weather forecast and the 10-day forecast of water excess or water shortage based on a so called waterbalans model. This information will help water managers to get insight into the weather and water system situation of the whole catchment and not only the situation of their own management area. Furthermore it van also be very useful for transnational cooperation on flood and drought damage prevention.
- The webbased version of the EcoDSS which, from an ecological point of view, enables the analysis of the suitability of natural and agricultural areas for the storage and conservation of water.
- Contact addresses of water managers working in the Mark and Dommel area. The addresses are structured in four working fields: water quantity, water quality, ecology and other. With this list it is always clear which water managers on the other side of the border are responsible and can be contacted for questions regarding these four working fields
- Overview of current and recently finished projects within the Mark and Dommel catchments. All projects are situated on an interactive map. By clicking on a project, relevant information on the project, such as the goal, the planning, the approach, the project leader and the contact person can be found.

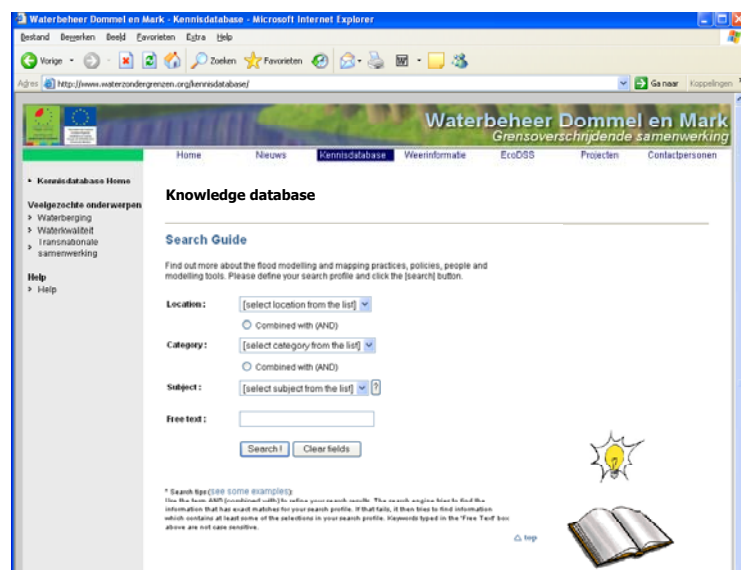


Fig. 9. The knowledge base with the selection criteria location, category and subject.

A help-function has been developed to support users of the website. The help functions can be opened from all webpages of the site and supplies extended information concerning all pages and functionalities of the website.

The website was presented to the Dutch and Flemish water managers of the basins of the Rivers Mark and Dommel during a transnational workshop “Networkday” in Lommel (Belgium). More than 40 water managers from Flanders and The Netherlands were present. The goal of this workshop was to improve transnational cooperation by meeting the water managers on the other side of the border, to talk with them about current threats and opportunities, to define solutions, measures and projects to improve transactional cooperation, to present the website www.waterzondergrenzen.org and to discuss about the role of this website.

The participants were very enthusiastic about workshop and the existence and the functionality of the website. They expect the website to contribute to an improved transnational cooperation.



Fig. 10. Interactive group sessions during the Networkday.

5.3. Conclusions

During phase 4 of the Transboundary Studies, the website www.waterzondergrenzen.org has been developed. The content and functionality of the website has been determined by:

- The results of the SWOT analysis of phase 1 of the Transboundary Studies;
- The results of several meetings with the Mark and Dommel cross-border committees during which the content of the website has been discussed
- The results of several meetings with Dutch and Flemish water managers.

During the network day it became clear that the website is a valuable instrument to improve transnational cooperation within the Dommel and the Mark river catchments, as long as:

- the website will be kept up-to-date (list of projects, contact addresses, news page, knowledge base);
- the website will be promoted so that all water managers know where to find it and how to use it;
- water managers are stimulated to deliver all relevant information to improve the content of the website.

The relevant organisations will sign a maintenance contract for the website to ensure its existence and value.

During the Transboundary Studies more than 400 pages have been produced with valuable experience for the development of the IDSS and with valuable information for an improved transnational cooperation. It is a well known fact, that hard copies of reports are often not read. The web-based knowledge base appeared to be a successful instrument to share the knowledge gathered during this project:

- because the instrument is web-based, the information is now accessible for everybody.
- by filling in a few search criteria the user only gets relevant information he or she is really interested in.

6. Literature

The nofdp Transboundary Studies resulted in the following reports and products:

Reports

- Endreport phase 1
- Endreport phase 2
- Endreport phase 3
- English summary of the nofdp Transboundary Studies

Products

- Excel database: models within the Mark and Dommel catchments
- Excel database: data within the Mark and Dommel catchments
- MS Access knowledge base containing all results from the transboundary studies
- Website: www.waterzondergrenzen.org

Appendix A SWOT points of transnational cooperation

1. Differences in structure and culture of Dutch and Flemish policy and organization.
2. Harmonization of laws/policy.
3. Similar policy intentions.
4. Cross-border decision support systems.
5. Cross-border consultation bodies.
6. Influence of other policies on water policy.
7. Harmonization of cross-border information.
8. Harmonization of legal frameworks.
9. European directives.
10. Harmonization of objectives/standards concerning water quantity and water quality.
11. Communication with citizens/stakeholders.
12. Communication between Dutch and Flemish governmental organisations.
13. Communication between Dutch and Flemish water managers.
14. Insight in structure/policy of neighbouring countries.
15. Translation/adaptation of national/international directives.
16. Data collection/ telemetric aspects (quantity/quality).
17. Cross-border real-time information during extreme situations.
18. Cross-border communication between water managers in extreme situations.
19. Space for water and nature.
20. European projects.
21. Different type of interests within water management.