# THE ROLE OF DUTCH EXPERTISE IN ROMANIAN WATER PROJECTS

Case study ‘Pilot Implementation FLIWAS in Banat region, Romania’

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August 2011

CE&M RESEARCH REPORT 2011R-002/WEM-002

ISSN 1568-4652

# Management Summary

The management of emergency situations involves considerable flows of information. The internet-based Flood Information and Warning System (FLIWAS) was developed to better manage these information flows. FLIWAS is one of the outcomes of a transnational cooperation project between the Netherlands, Germany and Ireland. It is currently used by Dutch and German partners for the management of flood-related information in the Rhine river basin. Inspired by this joint project, several partners in Eastern Europe also established a joint project on the development of a flood information system. Contacts between experts involved, initially led to the pilot implementation of FLIWAS in Slovakia. This pilot was drawn up by Dutch experts and submitted for funding to the Dutch agency Partners for Water. The first project activities were implemented in 2008. Due to several problems at the Dutch and Slovakian side, this project eventually stagnated. The Romanian National Institute for Hydrology and Water Management (NIHWM) already expressed its interest in the implementation of FLIWAS. Mid 2009, the Dutch consortium decided in consultation with Romanian partners and Partners for Water to use the remaining project funds for the pilot implementation of FLIWAS in Romania.

This report presents the pilot implementation of FLIWAS as a case study within the context of a PhD research on the application of Dutch expertise in international flood risk management projects. The analysis consists of the following components: (1) a description of the project and its context; (2) an analysis of the motivations, cognitions and resources of actors involved and the relations between them; (3) an assessment of the effectiveness of the project (from a Dutch perspective); and (4) a discussion on knowledge processes. The case study research is of explorative nature and based on qualitative methods. Data were gathered by means of observation, informal conversations (during the interactive project activities and during meetings about the project afterwards), interviews with the project partners (implementing experts) and document analysis (project documents, policy documents, legislation and the like). During the meetings, the researcher had mostly an observatory role and tried to avoid any interference with the project. By analyzing the case study in-depth, using multiple sources of evidence, we tried to arrive at well-informed explanations and conclusions.

The proposal for the implementation of FLIWAS was developed by a Dutch consortium consisting of experts of the Foundation for Applied Water Research (STOWA), the consultancy company HKV-CONSULTANTS and the consultancy company Royal Haskoning. After the project was transferred to Romania, the role of STOWA was reduced to formal project management. Operational project management and the technical implementation of FLIWAS were carried out by HKV experts. Haskoning was involved with experts of its Dutch and Romanian office and took care of communication-related activities. The consortium cooperated with four Romanian partners. The National Administration Romanian Waters (NARW) and the Directorate of Emergency Situations Management (DESM) of the Ministry of Environment and Forests (MEF) were both involved for their decision-making capacity. Experts of NIHWM coordinated the implementation of FLIWAS, they were involved in trainings and installed and administered the server. Actual implementation of FLIWAS was done at a regional water branch (RWB) of NARW in the Southwest of Romania, the Banat region. The region experienced several severe floods during the last decade. Most of them were caused by high water on the lower Timiş river. During a previous project, HKV already analyzed the flood risks along this river and prepared a hydraulic model. Some of the results of this project were also used in this project.

Project activities were implemented in the period between September 2009 and April 2010. They included five missions by the consortium to the city of Timişoara (where the main office of RWB-Banat is located) and to the capital city of Bucharest (where other partners are located). The first mission consisted of a regional and national start-up meeting and a visit to the project area.

Subsequent missions included several progress meetings, two trainings with participants of NIHWM and RWB-Banat, a meeting with regional stakeholders and an exercise during which the actual use of FLIWAS was tested in a workshop setting. The project was closed with a national conference for which representatives of other RWBs and various other stakeholders were invited. External actors were also informed about the project via promotion materials, press releases, external presentations and articles. After the final conference, further implementation of FLIWAS was also discussed separately with decision-makers during a follow-up meeting.

The pilot implementation of FLIWAS included the development of a Romanian FLIWAS environment (i.e. translation of interfaces and materials and the purchasing and installation of a server and an internet domain) and the implementation of FLIWAS for a pilot area in the Banat region. One aspect that developed different as planned was the installation of FLIWAS on a server at NIHWM. The installation and configuration of the server took more time as it was more difficult than expected. As a result, a German consultancy company could only finalize the installation of FLIWAS (on distance) on the Romanian server in March 2010 (instead of November 2009). To prevent complete stagnation of the project, it was decided to already start to implement data (i.e. geographic and hydrological information, warning levels and emergency plans) on the Dutch server. The project team initially also planned to integrate data from automated measurement stations into FLIWAS. This was not possible on the Dutch server and decided to be beyond the scope of the project. When the project was finished, Romanian data still had to be transferred from the Dutch to the Romanian server. This was never done and Romanian experts involved also had, since November 2010, no longer access to the Dutch server.

Analysis of the motivations of actors involved shows that the consortium mostly participated in order to strengthen the network and market position of their organizations in Eastern Europe. They hoped that the project would generate follow-up projects. Personal interests to participate included to test FLIWAS in another context and to contribute knowledge to international projects. Romanian experts were especially interested in FLIWAS as a tool that could improve flood risk management. Other sources of motivation included a willingness to learn and to maintain a forerunning position.

Analysis of the cognitions of actors involved shows that FLIWAS was initially perceived mostly as a tool that could help to reduce floods risks. Afterwards, actors involved especially emphasized that FLIWAS also enhanced cooperation, communication and understanding. FLIWAS is believed to be of added value also in the Romanian context. According to Dutch experts, RWB-Banat could start using FLIWAS once it arranged the automated import of data (which requires migration of data to the Romanian server) and organized additional exercises. Romanian actors had more doubts whether Romania was yet ready for tools like FLIWAS. Perceived bottlenecks include a lack of tools, trained personnel, internet access, models, flood maps and adequate automated measurement stations.

Analysis of the resources of actors involved shows that HKV was the most important project partner in terms of human involvement and expertise. HKV participated with experts that were highly experienced in the use of FLIWAS and with an expert that had context-specific experience. Valuable was also that experts of the Romanian office of Haskoning could contribute country-specific expertise. The contributions by consortium partners and most other project expenses were paid for by the Dutch funding agency Partners for Water. Of the Romanian partners, especially RWB-Banat made a considerable contribution to the project in mankind. Various departments were involved in the collection of data. The International Department played a key role in the coordination and integration of data, translation, communication and the organization of meetings. The main contribution of NIHWM was that it initiated the project and took care of the Romanian server. That the installation of the server stagnated is closely related to a mismatch between required and attributed expertise versus actual expertise. The consortium, on the one hand, only discovered

during the project that the expert involved lacked specific expertise to install the server. The NIHWM expert, on the other hand, expected more assistance in this field. Several other Romanian authorities were involved for their decision-making capacity. Regional stakeholders were consulted as they play a key role in emergency situations.

Analysis of the existing and new relations shows that some of the experts involved were already familiar with each other or cooperated in previous projects. The project contributed to the strengthening of these relations. According to most actors involved, the cooperation between various partners was very good. Dutch actors emphasized the commitment of Romanian actors but also stated that they were more awaiting as expected. Most Romanian actors enjoyed the cooperation and perceive it as a good base for follow-up projects. The main exception was that NIHWM was disappointed about their cooperation (on distance) with the German consultant company.

Evaluation of the effectiveness of the project shows that the project did not directly contribute to the solving of flood-related problems. The main reason is that none of the Romanian actors involved actually started using FLIWAS. Romanian and Dutch actors, however, prepared several proposals that include further development of FLIWAS. Analysis of the characteristics of actors involved shows that all relevant actors are motivated to further develop FLIWAS. However, there is little support to start using the current implementation. This is also not yet possible as inserted data were never transferred from the Netherlands to Romania. In addition, automated measurements are also not integrated into FLIWAS. A lack of resources play a role in this but so do cognitive and motivational factors. Although all Romanian actors involved are convinced that FLIWAS could potentially be useful in Romania they also foresee many hurdles before its practical use. Romanian actors lack the capacity and finances to further develop FLIWAS. However, the project forms a important basis for follow-up project proposals. What also played a role in this is that most of the actors involved are very positive about their cooperation and would like to continue their cooperation in the future.

An assessment of the process reveals that the institutional embedding of the project was relatively good as civil servants from national and regional authorities were closely involved. Another strength of the project was that there has been a lot of attention for the diffusion of its results. A diffusion strategy was not specified on beforehand but elaborated and implemented jointly by Dutch and Romanian actors. Stakeholder involvement was limited and should be strengthened if FLIWAS would be implemented. It is therefore also questionable whether local knowledge was sufficiently integrated into the project. As regards mutual understanding in communication, we observe that it was often very good except for the communication about geo-data and the server installation. Adaptive management was especially needed when the installation of the server took more time as expected. It was decided that Romanian data would not be inserted directly on the Romanian server but first on the Dutch server. What was not taken into account was to also subsequently transfer Romanian data from the Dutch to the Romanian server.

The case study is also analyzed from the perspective of international knowledge transfer. Knowledge transfer is understood as an interactive process that includes the sharing, acquisition and application of knowledge. In an international setting, this involves actors with diverging backgrounds in terms of socio-cultural inheritance, profession and organizational belonging. These actors can also contribute with different types and levels of knowledge. In the case study, political and procedural knowledge was especially contributed by actors with management or decision-making capacities, while substantive knowledge was mainly contributed by experts. Most general knowledge was contributed by Dutch experts, while context-specific knowledge was provided by Romanian experts. Personalization mechanisms were important for the sharing and acquiring of knowledge. What probably enhanced the knowledge transfer was that actors regularly communicated face-to-face and

collaborated actively. Codification was also needed to create input for FLIWAS and contributed to a better understanding of the project content. There were two occasions on which experts with diverging backgrounds were having real difficulties to understand each other, i.e. the installation of the server and the collection of geographic information. The first occasions confirms the importance of face-to-face communication, whereas the second example highlights that face-to-face communication is not necessarily effective. Experts with interactional knowledge tried to mediate between experts concerned. Interactional knowledge probably contributed to the knowledge transfer. However, it is likely that interpersonal aspects were more important. Some of the key experts were already having good relations and also having the ability to develop good relations. This highlights that the successful application of knowledge also depends on personal characteristics. In terms of knowledge application, the process was only partly effective. Actors only used the knowledge as a basis for the formulation of follow-up projects. What contributed to this is the close involvement of champions, which were in this case actors with management and decision-making capacities.

# Preface

It is currently already more than three years ago that I moved to Romania and started working on my PhD research project *'Applying Dutch water expertise abroad: How to contribute effectively in the Romanian context?'*. This report presents one of the Dutch-Romanian projects that I analyzed within the context of this PhD project. For me, it was very interesting to observe the implementation of the flood information and warning system FLIWAS as a pilot in Banat region in Romania. What made it even nicer is that I had the opportunity to collaborate with acquaintances of Haskoning Romania, the Banat branch of Romanian Waters and HKV. Besides this, the project also provided me with the opportunity to become familiar with new, interesting people. I therefore thank the Dutch and Romanian project team for giving me the opportunity to participate in this project. Thank you also for your openness – during the project and during the interviews – and for providing me with all kind of project documents and material. I further especially thank Job Udo of HKV for his useful comments on previous versions of this report.

This PhD research would not have been possible without the financial support of the Institute for Governance Studies at the University of Twente and the Province of Overijssel, the working place provided by Haskoning Romania and the supervision provided by the Water Engineering and Management (WEM) Department and the Twente Centre for Technology and Sustainable Development (CSTM). The following persons are involved as supervisor in this project:
- Prof. Dr. Ir. S.J.M.H. Hulscher, Professor in Water Management (WEM)
- Prof. Dr. J. Th. A. Bressers, Professor of Policy Studies and Environmental Policy (CSTM)
- Dr. ir. D.C.M. Augustijn, Associate professor in Environmental Management (WEM)

In addition to these supervisors, this project is also supported by a User Committee consisting of representatives of the Province of Overijssel, Dienst Landelijk Gebied, Deltares, Royal Haskoning, HKV, Partners for Water/Netherlands Water Partnership and the Netherlands Water Bank. I thank their representatives for their useful comments and advise.

If you have any comments or suggestions for my research, please do not hesitate to contact me. I hope that you enjoy reading this report!

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Enschede, 31 August 2011

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# List of abbreviations

The English abbreviations used in this report are summarized below. Romanian or Dutch synonyms are provided in *italic*.

| | |
|---|---|
| DESM | Directorate for Emergency Situations Management *(Direcția Managementul Situațiilor de Urgență)* |
| AFWM | Authority for Floods and Water Management |
| CIES | County Inspectorate for Emergency Situations, *Inspectoratele Judetene pentru Situatii de Urgenta (IJSU)* |
| DRBC | Danube River Basin Convention |
| EU | European Union |
| FD | Flood Directive |
| FLIWAS | Flood Information and WArning System |
| GIES | General Inspectorate for Emergency Situations (*Inspectoratul General pentru Situații de Urgență)* |
| H-RO | Haskoning Romania (a company of Royal Haskoning) |
| ICPDR | International Commission for the Protection of the Danube River |
| ICT | Information and Communication Technology |
| IT | Information Technology |
| MAI | Ministry of Administration and Interior *(Ministerul Administrației şi Internelor)* |
| MEF | Ministry of Environment and Forestry *(Ministrul Mediului şi Pădurilor)* |
| MOSES | Interreg project on flood management in Eastern Europe |
| NARW | National Administration Romanian Waters *(Administrația Națională Apele Romane)* |
| NIHWM | National Institute for Hydrology and Water Management |
| NOAH | Interreg project in which FLIWAS has been developed |
| NMA | National Meteorological Administration |
| HKV | $HKV_{CONSULTANTS}$ |
| H-NL | Haskoning Netherlands (a company of Royal Haskoning) |
| H-RO | Haskoning Romania (a company of Royal Haskoning) |
| RWB | Regional Water Branch (*Administrații Bazinale de Apă*) |
| Rijkswaterstaat | Executive agency of the Dutch Ministry of Infrastructure and the Environment |
| SGA | Water Management System |
| SOP | Sectoral Operational Programme |
| STOWA | Foundation for Applied Water Research *(Stichting Toegepast Wetenschappelijk Onderzoek)* |
| WFD | Water Framework Directive |
| WMS | Water Management System |

# 1 Introduction

This report presents the project *'Pilot implementation FLIWAS in Banat region, Romania'*. FLIWAS (acronym of FLood Information and Warning System) is an internet-based application that was developed to improve the management of flood-related information. We analyzed this project as one of the case studies in the PhD project *'Applying Dutch water expertise abroad: How to contribute effectively in the Romanian context?'*. This four-year research project investigates Dutch-Romanian (NL-RO) projects in the field of flood risk management, with a particular focus on the role of Dutch expertise. This chapter introduces the context and scope of this research and of the case study. The first section explains how this case study relates to the overall PhD research. Section 1.2 presents the strategy and methods used for this case study. Subsection 1.3 elaborates on the research process, i.e. how the investigation unfolded. The basic analytical framework which is used to analyze this case study is presented in subsection 1.4. The last section presents the outline of this report.

## 1.1 Research context of the case study

This case study report is part of a four-year research project about the application of Dutch expertise abroad. The overall objective of this research is:

> *"To provide insights in the role of Dutch expertise in handling flood risk management problems in transition countries such as Romania, by evaluating the role of Dutch expertise and the course and outcomes of several Dutch-Romanian case study projects, and how these projects are influenced by contextual factors."*

Central in each of our case studies are an analysis and evaluation of the project process and outcomes, with specific attention to the project context and the characteristics of actors involved. Related research questions are:

1. Project and context: What is the context in which this project was executed? Which actors have been involved in the project? What were the course and outcomes of various project activities?
2. Characteristics of actors involved: What were the motivations, cognitions and resources of actors involved? How did they develop during the process of interaction? How did relationships develop?
3. Evaluation: How effective was the project and which factors contributed to this?

This case study further pays specific attention to knowledge transfer processes, which includes the integration of various types and sources of knowledge. A discussion on this topic is presented in Chapter 5 and guided by the following questions:

4. Knowledge transfer: What kind of knowledge was transferred for the implementation of this NL-RO project? How did various actors and their interaction contribute to the transfer of knowledge? How did knowledge transfer contribute to the effectiveness of this NL-RO project?

Two central concepts in our research are expertise and Dutch-Romanian (NL-RO) projects. *Expertise* refers to knowledge on a particular subject, including the experiences and the skills to use this knowledge (Wesselink et al. 2009). Knowledge is in the Oxford Advanced Learner's Dictionary defined as: "the information, understanding and skills that you gain through education or experience". Expertise is a form of knowledge; it is knowledge that is gained through experience. The reason for using the word 'expertise' is that we are especially interested in the application of knowledge in a specific context. The term expertise includes the notion of wisdom, which is "the judgment, selection and use of specific knowledge for a specific context"… [and]… "relates to the ability to effectively choose and apply the appropriate knowledge in a given situation" (Bierly et al. 2000, p. 597). We further elaborate the concept of knowledge and expertise in Chapter 6.

Our main research units are *NL-RO projects*. These are projects executed in Romania, which are implemented with the support of Dutch funds and expertise. Like other change or policy processes, they are interventions in the sense that they refer to "an action taken within a social context for the purpose of producing some intended result" (Babbie 1992 p. 347). A distinctive feature of NL-RO projects, that makes them different from regular policy processes, is they aim to transfer certain concepts, methods or technologies from one country to another. We therefore refer to them as 'policy transfer interventions'. They are very similar to what Leeuwis and Van de Ban (2004) refer to as processes of extension: "a series of embedded communicative interventions that are meant, among others, to develop and/or induce innovations which supposedly help to resolve (usually multi-actor) problematic situations" (2004 p. 27). This definition shows that policy transfer interventions are, like regular policy processes, designed to resolve problematic situations. Furthermore, they involve multiple actors, i.e. individuals, groups or organizations. One of the characteristics of policy transfer interventions is that they involve actors from a transferring and a benefiting country. Transferring actors usually include external professional experts (change agents) and an external agency that subsidizes or pays for the intervention. Another distinctive feature of NL-RO projects is that they usually aim at innovation in the sense that they seek to contribute to "novel patterns of coordination and adjustment between people, technical devices and natural phenomena" (ibid p. 28). In this sense, NL-RO projects are often pilot projects that aim to test an innovation within a specific context before the innovation is implemented further (Vreugdenhil et al. 2010)

Within the context of our overall research, we intend to study several NL-RO projects and their context. Some of these interventions are studied in *retrospective* (projects that were already completed at the time of analysis) and some are studied through *real-time observations*. One retrospective study (Vinke-de Kruijf 2009b) and one real-time case study (Vinke-de Kruijf 2011) are already completed. To be expected are a case study report about 'Integrated Water Management for the Tecucel River Basin' and a report about flood risk governance in Romania. We are further planning to compare our results with a case study from Indonesia and with experiences of practitioners that have been involved in Dutch-funded international water projects around the world.

## 1.2 Research philosophy and methods

To get insight in the application of Dutch expertise abroad, we choose qualitative case study research as our main research strategy. A case study refers to "the intensive study of a single case for the purpose of understanding a larger class of similar units (a population of cases)" (Gerring 2006 p. 211). The reason for doing real-time case studies is "to investigate a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin 2009 p. 18). To study a project in its proper context is thus one of the characteristics of case study research. This includes "both the small, local context, which gives phenomena their immediate meaning, and the larger, international and global context in which phenomena can be appreciated for their general and conceptual significance" (Flyvbjerg 2004). In this report, most attention is given to the small, local or project-specific context. The wider context is described in more detail in a previous report (Vinke-de Kruijf 2009a) and in a forthcoming report (Vinke-de Kruijf forthcoming).

The main reason for studying this case study is to *understand* the role of Dutch expertise in NL-RO projects. In this sense, this research is located in an interpretative research tradition. Interpretative researchers are focusing on meanings of others and reflect on how we, as researchers, make sense of these meanings (Yanow and Schwartz-Shea 2006). Our focus on 'understanding' becomes mainly visible in the part of this report in which we view projects as 'processes of social interaction'. Our descriptions of the characteristics of actors involved are not based on brute facts (facts that exist

without any human institution), they are our interpretations. In order to arrive at this understanding, we also need to understand the project context (e.g. the water system, administrative structures, institutions or project objectives). Knowledge about the project context is mainly derived from written texts (and not from interviews and observations) and form the context for our understanding of processes of social interaction. We strive to present the project context as objective as possible. However, we also realize that they are still subjective as we selected and chose the way to present them.

This raises the question, if all knowledge presented in this report is subjective, what can be concluded from this case study? Not much if you are looking for 'objective knowledge'. We rather aim to present 'educated guesses'. The related mode of knowledge acquisition is also referred to as abduction (or retroduction). This means that we are not reasoning from the general to the specific, i.e. deducing and testing hypotheses on the basis of general theories (deduction). We are also not reasoning from the specific to the general, i.e. inferring general laws on the basis of empirical data (induction). Abduction rather holds the middle-position between the general and the specific; it is more open than deduction and more insightful than induction. Abduction aims at tentative explanations why something is as it is. The kind of conclusions resulting from abduction are suggestions – based on insights and judgments of the researcher – that 'something may be' (Van Dijk 2008, with reference to Peirce, Eco and Hanson).

To arrive at well-informed probable explanations, we are using multiple sources of evidence. Our case study is based on: (1) analysis of project reports and documents, relevant policy documents and legislation, newspaper articles and other web-based information; (2) interviews with nine project team members (semi-structured, ex-post) and several other interviews with relevant actors; (3) observations during meetings, workshops and at the end conference. Annex A gives an overview of the used project documents, interviews and observations. Annex C provides an overview of relevant news articles. To structure this information, we labelled it using scientific software (ATLAS.ti). To improve the quality of our research, we also took various 'good practices' for interpretative research into account (Van Maanen et al. 2007). First of all, our research is based on a continuous interplay between theory and practice. We started with a basic theoretical framework (see section 1.4) to which we are adding new elements (see also Chapter 5). We further tried to increase the quality of our report by asking key informants to review draft versions of our work. In addition, although our analysis is mostly based on qualitative information, we also provide quantitative information where possible. Furthermore, to increase the transparency of our research, we present the case study results in the form of a thick description (quite a lot of detail) and describe our research process. A description of our 'context of discovery' is presented in the next section.

## 1.3 Research process

This section presents how we gathered the knowledge that is presented in this case study. As the section is written from the personal perspective of the author, it is written in the first person singular.

My first acquaintance with the case study project dates back to the end of July 2009. I was at that moment still having a working place at Haskoning Romania and the director of the company (who was also having an active role in my research) informed me about the project and suggested to use the project as a case study for my research. It was an excellent case study for me as the project involved Dutch funds and expertise and focused on flood risk management. It further gave me the opportunity to participate in a project that involved my workplace mates of Haskoning Romania and several other persons I was familiar with (i.e. persons of consultancy company HKV and of the International Department of the benefiting organization in Timişoara).

In the beginning of September 2009, we were informed and invited for the start-up of the project. My agenda did not allow me to attend the start-up meetings in Timişoara and Bucharest but I attended a lunch with the team and was updated on the project by the Dutch team. I also agreed with the Dutch team that I would participate as a researcher in the project and write a case study proposal. The proposal was distributed to other project team members in October 2009. All reactions on this proposal were positive which meant that I could use the project for my research.

During the project I was regularly updated about its progress by my workplace mates and received relevant project information from other partners. I participated as observer in two meetings in Timişoara and three meetings in Bucharest. Two of these meetings were organized to discuss potential follow-up of the project. On request of the project team, I also contributed to a proposal for further follow-up of the project. Once the project was finished, I interviewed various Dutch project team members. Later, I also interviewed some of the key actors in Bucharest. I also went once more to Timişoara to interview relevant persons over there. When I already started writing this report, I still continued to interview persons involved (my last interviews were in Spring 2011). In the meantime, I was also regularly updated about potential follow-up of the project by my workplace mates of Haskoning Romania and by HKV.

The theoretical basis for this research was formed during the three years that I have been working on this topic. The additional focus on knowledge transfer is based on research of a MSc student on knowledge sharing between the (Dutch) Province of Overijssel and the (Romanian) County of Teleorman. When I was already writing this report I decided to add this theoretical scope as it fits very well with prominent role of knowledge exchange in the case study. The discussion chapter is therefore very much the result of an interplay between theory and case study.

## 1.4 Analytical framework

The description and analysis of the case study consists of three components: (1) a detailed description of (the development of) the project and its context; (2) a description and analysis of (the development of) the characteristics of actors involved; and (3) an assessment of the effectiveness of the project on the basis of process and outcome criteria. These components are elaborated, respectively, in the chapters 2, 3 and 4. The conceptual basis of these components has been elaborated in previous research reports (Vinke-de Kruijf 2009a, 2009b, 2011). Hence, we limit ourselves in this report to a short summary. This report furthers pays specific attention to knowledge transfer. This concept is explained in more detail in Chapter 5.

The first component of this case study research is a description of the project and its context. As regards the context, we distinguish between three contextual layers: (1) the wider problem, political, economic, cultural and technological contexts; (2) the structural or institutional context; and (3) the project specific context (Bressers 2009). In this report, we focus on the project-specific context that includes previous decisions and specific circumstances that form the direct input or the starting-point of a process (Bressers 2009). Other contextual factors are only discussed if they actually influenced the project. In our analysis of the project itself, we pay attention to the development of the process (actors and their interaction) and the content (development of substantive outcomes). This distinction between content, process and context is quite common to describe the development of complex, multi-actor projects over time (see e.g. Hommes 2006; Van Buuren 2006).

The second component of our research concerns a further examination of the actors involved. This analysis is based on insights of the Contextual Interaction Theory developed by Bressers (2004; 2009). The basic assumptions of this theory are that the course and outcomes of multi-actor intervention processes basically result from the dynamic interaction between the characteristics of actors involved. These characteristics are their motivations, cognitions and resources. Dynamic

interaction refers to the idea that actor characteristics shape the interaction process, are shaped by this process and are shaped by each other (see also Figure 1).

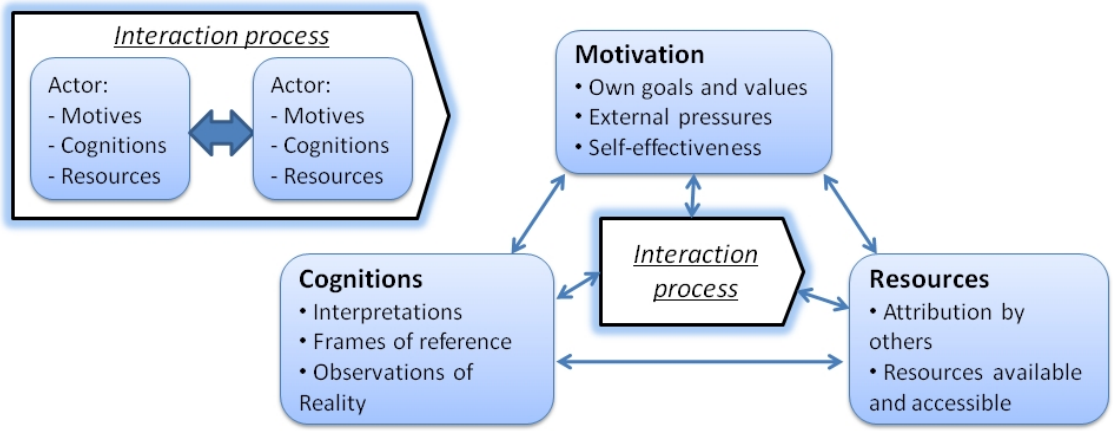


Figure 1 – The dynamic interaction between characteristics of actors involved and the interaction process (adapted after Bressers 2009)

*Motivations* refer to what drives the actions of actors involved. One source of motivation are the goals and values of actors involved. This is the extent to which the project (content or the interaction process) contributes to the realization of an actors personal or organizational objectives. External pressure may also be a source of motivation if an actor regards it as its civic duty or has financial, social or political reasons to participate. Another source may be self-effectiveness assessment, which refers to the relation between motivation and resources availability. It may positively influence a motivation if an actor believes in its capacity to contribute to the project or that the project will contribute to an actors' capacity. We focus on those motivations related to participation in the project itself and in potential follow-up actions. *Cognitions* refer to the knowledge an actor holds to be true within the context of the intervention. Cognitions are interpretations, which are influenced by observations of reality and frames of reference. We focus on cognitions about the content (the problem at stake, i.e. its nature, meaning and urgency, and potential solutions) and the project and its context (the relevance and potential of the project in dealing with particular problems, including possibilities for follow-up). *Resources* provide actors with the capacity to act and may also be used as sources of power. The capacity to act largely depends on the resources that are available and accessible. Whether these resources are also sources of power depends also on the attribution of resources to an actor by other actors involved. We focus on the following type of resources: involvement (human resources), knowledge (information and expertise), funding (financial resources) and power to get things done (institutional resources) (based on Bressers 2004; Bressers 2009; Owens 2008; Vinke-de Kruijf 2011).

The third component of our analysis concerns an evaluation of the effectiveness of an intervention. It is based on the notion that a Dutch-funded project is effective if it: (1) contributes to the *solving of water management issues* in the benefiting country (e.g. through capacity building or by influencing policies); and (2) *generates new projects* for the Dutch water sector (e.g. through an improved reputation or new knowledge). Both criteria directly relate to the reasons of the Dutch government for sponsoring the export of Dutch water management (see the National Water Plan: Min. V&W 2009). Our evaluation is based on the assumption that these (ultimate) outcomes are realized by users, i.e. actors with a role in problem-solving or follow-up projects (see e.g. Faludi and Altes 1994). Whether these outcomes will be realized can be predicted and explained on the engagement of users during the process (the project itself and follow-up actions) and the immediate outcomes of the process in terms of user characteristics. The resulting evaluation framework that describes the causal relation between process, immediate and ultimate outcomes is presented in Figure 2.

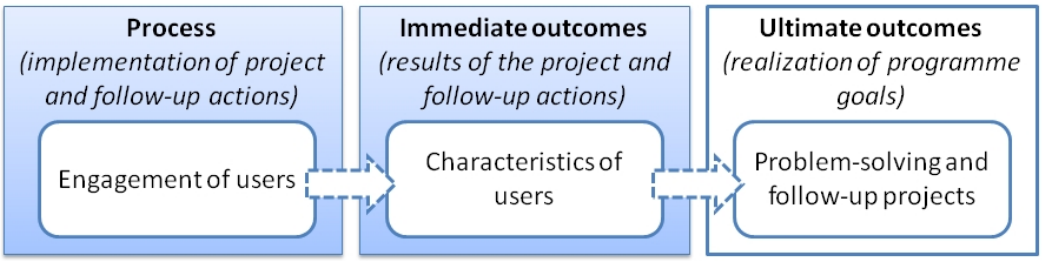


Figure 2 – Basic evaluation framework linking process and outcomes

For the evaluation of the process and its immediate outcomes, we also developed criteria which are elaborated in a forthcoming publication (Vinke-de Kruijf et al. submitted). Indicators of an effective process are:

- *Stakeholder involvement*: stakeholders are actively involved and have the opportunity to influence the process and its outcomes (power sharing) (Krywkow 2009).
- *Institutional embedding*: civil servants are actively involved, executives play an active role or are committed to the process, and politicians identify a role for themselves in the process (Edelenbos et al. 2008).
- *Integration of context-specific knowledge*: general knowledge of (external) experts (e.g. theories, models, concepts or techniques, methods and tools) is integrated with context- specific knowledge of societal stakeholders (e.g. on institutional conditions and social patterns) (Gummesson 2000; Leeuwis and Van den Ban 2004).
- *Mutual understanding in communication*: measures are taken to overcome differences in 'worldviews' or native language (e.g. face-to-face communication, translation or figurative language (Koskinen et al. 2003).
- *Pro-active diffusion strategy*: a strategy is designed and implemented (in an early stage) to use the results of the (pilot) project (Vreugdenhil et al. 2010)
- *Adaptive management*: the project plan is adjusted to internal and external dynamics (i.e. changing insights and circumstances) if necessary (Leeuwis and Van den Ban 2004; Vinke-de Kruijf et al. 2010).

The effect of an effective process on the realization of ultimate outcomes (i.e. problem solving and follow-up projects) is mediated through the characteristics of actors involved. The following immediate outcomes indicate the likelihood of the realization of ultimate outcomes (based on Bressers 2004; Owens 2008):

- *Motivating goal*: actors with obstruction or realization power support follow-up
- *Negotiated knowledge*: relevant, agreed upon and scientifically valid knowledge (De Bruijn et al. 2010; Hommes et al. 2009; Koppenjan and Klijn 2004; Van de Riet 2003)
- *Mobilization of necessary resources*: resources needed for follow-up are accessible or available (e.g. funding and expertise).
- *Positive relational experiences*: actors are willing to trust, and thus to cooperate on the basis of previous cooperation experiences.

The evaluation of the project, on the basis of the process, immediate outcomes and realization of ultimate outcomes, is presented in Chapter 5.

## 1.5 Outline

The remainder of this report is structured as follows. Chapter 2 starts with an introduction of the specific background and physical, administrative and policy context of the project. It than describes the project objectives and its implementation. Chapter 3 further elaborates on the actors involved, with a focus on their motivations, cognitions and resources. Chapter 4 evaluates the effectiveness of

the project on the basis of its process and its outcomes. Chapter 5 discusses the results of the project, with a focus on issues related to the transfer of knowledge. The last section presents our main conclusions and recommendations.

In addition to these chapters, this report also includes a management summary, a list of abbreviations, a list of references and three appendices. Annex A presents an overview of our main case study material. In the text, we refer to this material as follows: document [D followed by a document number], interview [I followed by an interview number] and observations [O followed by an observation number]. Annex B presents an overview of the participation of actors in various project activities. Annex C presents an overview of external presentations and media attention related to the project.

# 2 The case study project and its context

This chapter presents a description of the project and its content. It starts with an introduction of the project history and the Romanian context. Section 2.2 introduces the project itself, including the development of the project plan, its objectives and the project team. Section 2.3 describes the implementation of the two main project components (communication and technical implementation) and follow-up actions.

## 2.1 History and context

This section introduces the context of the case study. It starts with a general history of the case study itself. Subsequently, it introduces the relevant Romanian physical, administrative and policy contexts.

### 2.1.1 Background and history

The rationale behind the development of FLIWAS is that the management of emergency situations involves the circulation of considerable flows of information. Analysis of the floods along the Elbe in Germany in 2002 revealed that one of the major problems during emergency situations is to adequately share this information. Reliable information was available, however, it was not transmitted to the right places in the right form. With this in mind, partners from the Netherlands, Germany and Ireland initiated a transnational project called NOAH. The objectives of this project were to better manage information flows during flood events and to set up partnerships between organizations concerned with flood management. Within this project, Dutch and German project partners jointly developed an internet-based Flood Information and Warning System (FLIWAS) for the Rhine river basin (for a short description of FLIWAS, see below).

*FLIWAS concept and technology*

*FLIWAS (an acronym for Flood Information and Warning System) is an application that provides information to actors involved in flood risk management. Implementation of FLIWAS basically requires the installation of software on a web-based server and the insertion of local data. This includes hydrological information (provided by existing measurement and flood forecasting systems) geographic information, and emergency situations procedures and plans. The system structures this information, initiates actions in case of events (i.e. when actual or expected values exceed a reference value) and helps to monitor actions (users can accept actions and provide progress information). The communication module of FLIWAS can also help to send and receive information (it can be connected to mobile phones or faxes). Users can access and use the system at any location via their internet browser and also use it just locally. The system can be used during emergency situations, but also to exercise for or to evaluate events. For these purposes various scenarios and flood risk maps can be integrated into the system (De Gooijer 2010).*

FLIWAS has been developed within the NOAH project. One of the explicit goals of this project was to make FLIWAS also available to other regions once the programme was tested. For this purpose, organizations from Ireland, France, England, Scotland and Poland were having a role as observer or expert in the project. The NOAH project was funded through the European programme INTERREG IIIB and led by STOWA (Dutch acronym for Foundation for Applied Water Research) (NOAH Project Office 2006). The project began in 2003 and was planned to end in December 2006. The final conference of the project was organized in May 2008 in Amsterdam. In 2009, the (former) Dutch Ministry of Transport, Public Works and Water Management established the National Programme FLIWAS consisting of Water Boards, the executive agency of the Dutch Ministry of Infrastructure and the Environment (Rijkswaterstaat) and Provinces. In 2010, the FLIWAS application was also transferred from STOWA to Rijkswaterstaat. In addition, an international steering group was

established in which above-mentioned Dutch partners and two German federated states are represented (Website FLIWAS 2011).

The NOAH project inspired Slovakia, Hungary, Germany, Ukraine and Romania to initiate a joint project called MOSES. The aim of this project was to contribute to the development, implementation and management of a unified computer-based flood information system for the entire region. The project was connected to the European Flood Initiative and the NOAH project. It was implemented in the period 2005-2008. Planned products included the development of an information and management system at three pilot locations, an analysis of the systems in use and the construction of a nature trail to raise public awareness about floods. The project was funded through an INTERREG IIIB programme called CADSES and led by the Slovak Hydrometeorological Institute (Saxon Flood Centre 2011). During various symposia there were contacts between the NOAH project partners and MOSES project partners [I5]. The Slovak Hydrometeorological Institute decided that it also wanted to implement FLIWAS. As it lacked the project management expertise to implement such complex, international project it approached Dutch organizations involved in FLIWAS to support them with the implementation [D1].

The contacts between STOWA and the Slovak Hydrometeorological Institute resulted in a project proposal that was submitted to the Dutch programme Partners for Water (a programme that financially supports the implementation of innovative projects of the Dutch water sector abroad) in February 2007. The proposal was prepared by a Dutch consortium consisting of STOWA and the consultancy companies Royal Haskoning and HKV$_{\text{CONSULTANTS}}$ (HKV). The project aimed to support the Slovak Hydrometeorological Institute and the Slovak Water Management Enterprise with the implementation of FLIWAS and to strengthen the project management skills of these organizations [D1]. The project proposal was accepted by Partners for Water. In Spring 2008, the project began with a work visit by representatives of the Slovakian organizations to the Netherlands. During a start-up meeting, detailed appointments were made concerning the project approach and time plan. FLIWAS was also translated into Slovakian (it was already available in Dutch, German and English). Following this, external developments caused stagnation and eventual abortion of the project. These developments included: (1) delays in the development of FLIWAS, which meant that the system was later available for other regions as expected; (2) occupancy of the Dutch partners with the organization of the large-scale emergency exercise 'Water Proof' in the Netherlands November 2008; and (3) the reorganization and relocation of the Slovakian partners caused that they did no longer have the capacity to participate in the project [D3]. According to the project leader, the main bottleneck was that the Slovakian partners lacked financial resources for purchasing required hardware (a server) and human resources to implement the project. Under pressure of the Dutch partners to continue the project, the Slovakian partners eventually decided to withdraw [I5, I12]. In 2009, HKV proposed to move the project to Romania. This was also accepted by Partners for Water (see also section 2.2).

### 2.1.2 Physical context

The majority of Romania (about 97%), including the project area, is located in the Danube River basin. The Danube extends over a length of 2860 km, of which 1075 km (the lower section and the delta section) is flowing through Romania. The project area is located in the Banat region (an area of circa 18,320 km$^2$) in the Southwest of Romania (see Figure 3).


Figure 3 – Location of the Banat region in the Danube River Basin (adapted after Wong et al. 2007)

Banat region borders Serbia on the west and Hungary in the Northwest corner. The hydrological system of Banat includes seven river basins (all sub-basins of the Danube river) of which the Timiş river basin represents the largest one. The Timiş has a length of circa 240 km and its basin covers about 5,673 km$^2$. The upper part of the river basin is rather steep; it extends for circa 120 km through a mountainous area. The lower course of the river, which extends over circa 120 km from the city of Lugoj to the Serbian border, has a rather lowland character (see Figure 4). The lower Timiş river basin is the most flood-prone area in Banat region. This zone used to consist mostly of swamps and marshes. This changed in the 18$^{th}$ century when hydrotechnical works were constructed for the purposes of drainage, flood protection, navigation and extraction. Another series of hydrotechnical works – mostly reservoirs and polders to retain water – were constructed in the 1970s. The lower part of the Timiş river is the only section with dikes. Most of the other works are also located in this section (Udo et al. 2008b).

During the last decades, high discharges on the lower Timiş river caused five flood events. In 1966, the left bank of the Timiş river breached near the Romanian-Serbian border. Following a period of relatively low discharges, a series of floods occurred in 1999, 2000, 2005 and 2006. The floods of 1999 and 2006 were both having a return period of 20 years (occurrence of 5%). The 1999 flood was mostly caused by a combination of snowmelt and heavy rainfall. The 2006 flood was only caused by heavy rainfall. The floods of 2000 and 2005 were more severe and caused major inundations both in Romania and Serbia. The 2000 flood had a return period of circa 100 years (occurrence of 1%) and was caused by a combination of snowmelt, saturated soil and heavy rainfall. The flood wave resulted in two dike breaches (one around Lugoj and one near the Serbian border). Following these inundations, the dikes were strengthened. In 2005, very heavy rains in combination with saturated soil caused a series of five dike breaches. The water level did not drop for about three weeks and an area of circa 30,000 ha was inundated for a period of circa three months (Udo et al. 2008b).


Figure 4 – Overview of Banat region including the Timiş river and the Danube river

### 2.1.3 Administrative context

Romania is a parliamentary republic with a directly elected President that has the power to appoint the Government. Public administration is structured following a three-tier system: national, county and local. The national government consists of a President, a Prime-Minister and a Council of Ministers. The President is elected every five years (last election was in December 2009) and shares power with and appoints the Prime Minister. Legislative elections are organized every four years (last election was in November 2008, the appointed government fell in October 2009, the current government was appointed in January 2010). Romania is divided into 41 counties (administrative divisions). The county council is elected directly by the county population and elects a President from its members (last elections in June 2008). At county level there is also a representative of the national government, the Prefect. The duty of the Prefect is to oversee the administrative activities of the counties, communes, cities and towns. The Prefect is a high public servant with a non-political status. The County Council coordinates common interest projects and takes care of the operation of public services. Counties are formed by communes, cities and towns. At local level, every city, town or commune has a Mayor and a Local Council. Both are elected directly by the population (last elections in June 2008) (Dragos and Neamtu 2007).

Flood risk management involves all three layers of government. Leading authority in the development of flood risk policies is the Ministry of Environment and Forestry (MEF)[1]. Since mid 2010, the Ministry has a separate Authority for Floods and Water Management (AFWM) that is headed by a high public servant. The AFWM has under its authority the Directorate for Emergency Situations Management (DESM), which actually develops flood risk management policies and

[1] Following the last elections (December 2009), the Ministry of Environment is called the Ministry of Environment and Forestry. Other (recent) names are the Ministry of Environment and Sustainable Development (2007-2008) and the Ministry of Environment and Water Management (2004-2007)

strategies. MEF has several institutes under its authority, including the National Meteorological Administration (NMA). It also coordinates the National Administration Romanian Waters (NARW). NARW is responsible for the administration, operation and maintenance of the quantity and quality of Romanian waters. It is divided into eleven Regional Water Branches (RWB)[2]. The administrative borders of the RWBs correspond with the hydrographical borders of the rivers within the area. Each RWB operates through several operational units at county level, so-called Water Management Systems (WMS). Banat region is located in RWB-Banat and covers the Counties of Timiş and Caraş-Severin. The head office of RWB-Banat is located in Timişoara (see Figure 4). NARW also has under its authority the National Institute for Hydrology and Water Management (NIHWM). MEF, NARW and NIHWM are all located in the capital city of Bucharest. The organizational structure is also schematized in Figure 5.

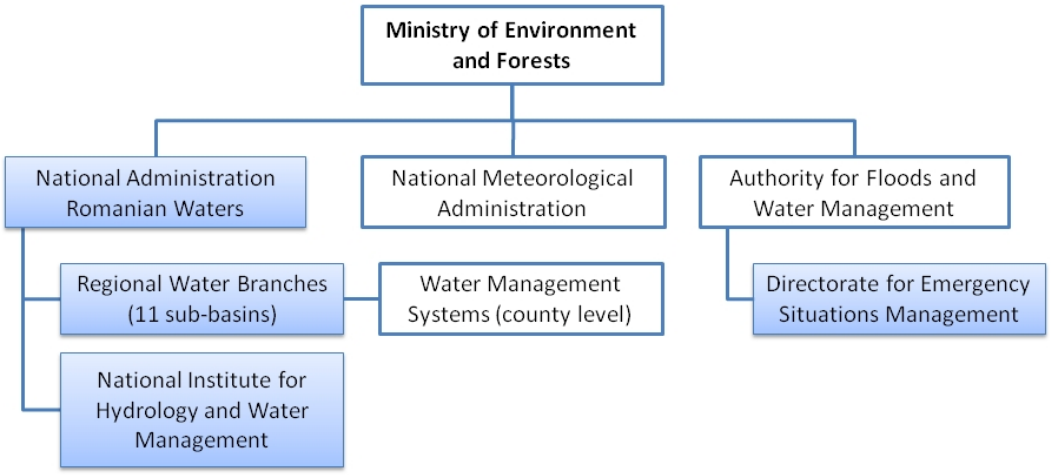


Figure 5 – Water authorities with a role in flood risk management

Besides the above-mentioned authorities, flood risk management also involves authorities (related to various ministries) with a specific role in the management of emergency situations. The overall structure for emergency situations is schematized in Figure 6. At the national level, the National Committee for Emergency Situations develops a general strategy for emergency situations, including flood prevention and protection measures. It is an inter-ministerial body with decision-makers and experts appointed by various ministries. In addition, there are Ministerial Committees for Emergency Situations which are responsible for planning and decision-making related to specific risks. At the county level, planning and decision-making is done by County Committees for Emergency Situations (consisting of the Prefect and the President of the county council, representatives from the main state agencies and other experts). These committees keep the national committee informed about potential risks and develop policies, plans and measures. It can also declare a 'state of alert' in the county or in certain localities. It has a special unit for flood defence that is led by a representative of NARW. At the local level, emergency situations are managed by local committees consisting of a mayor (chairman), the vice-mayor and other members and experts. Local committees may declare the 'state of alert' at community level. They are further responsible for informing local inhabitants and for local emergency plans and databases. They also organize local voluntary structures consisting of inhabitants that are willing to help in case of emergencies (Dinica 2007; Lucaciu 2005; Udo et al. 2008a).

Operational activities are carried out by the General Inspectorate for Emergency Situations (GIES), which is under the authority of the Ministry of Administration and Interior (MAI). GIES is responsible for monitoring, warning and information in case of (possible) emergency situations. It has a National

[2] These branches used to be called Water Directorates (until the end 2009)

Operational Centre that provides a permanent Technical Secretariat and support in case of emergencies to the national committee. GIES is operating through inspectorates (with operational centres) at county level, which are responsible for monitoring, organizing activities, informing, coordinating and controlling emergency situations. In case of emergency situations, they are supported by local volunteers (Dinica 2007; Lucaciu 2005; Udo et al. 2008a). Emergency situations management in Banat region is mostly executed by the County Inspectorate for Emergency Situations (CIES) of Timiş and of Caraş-Severin.

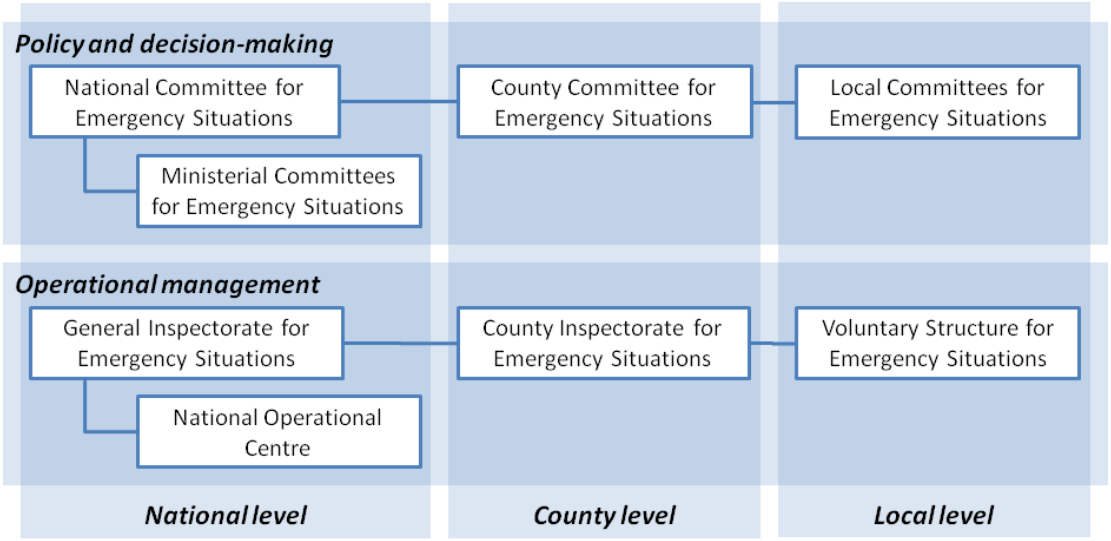


Figure 6 – Organization structure at various levels for the management of emergency situations

Other relevant actors in the field of flood risk management are the European Commission and the International Commission for the Protection of the Danube River (ICPDR). The ICPDR coordinates the activities of the contracting parties (fourteen countries and the EU) of the Danube River Basin. The ICPDR has several expert groups, including an Expert Group on Flood Protection. Flood expert group has been involved in the development of an action programme and oversees its implementation at national level (Website ICPDR).

### 2.1.4 Policy context

Since 2007, Romania is a member state of the European Union (EU). Despite a variety of pre-accession programmes, Romania's environmental infrastructure was and is still lagging considerably behind EU standards. The *Sectoral Operational Programme* (SOP) Environment 2007-2013[3] defines six priority axes related to the protection and improvement of environment and living standards in Romania. Priority axis 5 concerns "implementation of adequate infrastructure of natural risk prevention in most vulnerable areas" (MESD 2007). Given the frequency and intensity of floods and their consequences, floods are regarded as being the most important natural risk in Romania. Within the context of the SOP ENV, the National Administration Romanian Waters (NARW) can apply for EU cohesion funds to support sustainable flood management projects.

Relevant directives at European level are the *Water Framework Directive* (WFD, 2000/60/EC) and the *Flood Directive* (FD, 2007/60/EC). The WFD aims at improving the quality of all waters in the EU in order to achieve a good status by a 2015. For this, river basin management had to be developed

[3] Within the context of Romania's EU accession, Romania and the EU agreed upon a National Development Plan for the period 2007-2013. In order to realize this plan (with the support of EU funds) operational programmes in which priorities are defined for various sectors were drafted. EU funds, which cover about 80% of the investment costs, are available for dealing with the defined priorities.

for every river basin by the end of 2009. The directive also aims to contribute to the mitigation of the effects of floods. The FD has become operational in 2007. It aims at reducing the adverse consequences of floods by providing a framework for the assessment and management of floods. Flood risk management plans need to be prepared by the end of 2015.

Another relevant development at the EU level is the implementation of the *EU Strategy for the Danube Region*. This Strategy was launched by the EU Commission in December 2010. The strategy is based on four pillars including a pillar for 'environmental protection'. One of the priority areas of this pillar is the management of environmental risks (Website European Union 2010). All countries in the Danube region were asked to identify priorities for common action. One of Romania's priorities in the field of environment is: "to increase the forecast and intervention capacities in cases of floods, droughts or accidental spills and to implement an early warning system in cases of accidents with a trans-border impact" (n.a. 2010 p. 26). No separate funds were allocated for the implementation of this EU strategy. However, funds are available through other ongoing EU programmes.

At the Danube river basin level, countries cooperate with each other for the implementation of EU directives and flood risk management. In December 2004, participating countries in the basin signed a joint "*Flood Action Programme for the Danube river basin*". This programme includes the preparation of flood action plans for seventeen sub-river basins (published in December 2009). More recently, Romania initiated an ICPDR-project called the "*Danube Floodrisk: stakeholder oriented assessment of flood risks for the Danube floodplains*". The project is led by DESM of MEF and includes about twenty partners of the whole Danube basin. It was approved in March 2009 and is currently in its implementation phase.

At the national level, flood risk management became high on the political agenda following the floods of 2005. In the period after these floods, the Romanian government initiated and approved a "*National Plan for the Prevention, Protection and Mitigation of Floods*" (Governmental Ordinance No. 1309/ 2005) and a short-term "*National Strategy for Flood Risk Management*" (Governmental Ordinance No. 1854/2005). This national strategy is in line with the ICPDR Flood Action Programme and serves as a framework for specific forthcoming actions and measures. It pays – among others – attention to sustainability (from a social, economic and ecological perspective), an integrated approach and public participation. The strategy includes the development of flood risk plans for every river basin as required by the EU Flood Directive.

In August 2010, the Romanian government also approved a "National Strategy for Flood Risk Management on the Medium and Long term" (Governmental Decision 846/2010). This strategy was developed in cooperation with representatives of various Ministries during a period of two years. It is in line with the EU FD and concerns the medium and long term (2010-2035).

## 2.2 Project design

This section introduces the project 'Pilot Implementation FLIWAS in Banat region, Romania'. It subsequently describes the development of the project plan, its objectives and activities, and the composition of the project team.

### 2.2.1 Development of the project plan

Initially, FLIWAS was planned to be implemented as a pilot project in Slovakia. The request for this project was the direct result of the communication between partners involved in NOAH (led by STOWA) and MOSES (involving partners from Romania, Slovakia and other countries). When the project in Slovakia was aborted, it was decided to transfer the project to Romania (see also subsection 2.1.1). One of the reasons for transferring the project to Romania was the interest of NIHWM to implement FLIWAS in Romania. A HKV expert explained that he was closely involved in

the NOAH project and visited several meetings of the MOSES project. During these meetings, he became acquainted with an expert of NIHWM who expressed from the beginning that FLIWAS would also be interesting for Romania. In July 2008, NIHWM already wrote a formal letter to STOWA in which it requested to install FLIWAS software at a server of NIHWM and to implement it at the Somes-Tisa branch of NARW. The request stated that the installation and the training of operators would be financed through the MOSES project [D2]. According to the HKV expert, there were initially not sufficient funds available to implement such a project in Romania [I5]. When the Slovakian project was aborted, HKV experts started to consider transferring the project to Romania.

Informal discussions about a potential transfer started in April 2009 when two HKV experts attended a 'Dutch-Romanian Delta Dialogue' in Bucharest. One HKV expert had been involved in the project "Development of a strategy for improved protection against flooding and flood risk reduction along the Timis river" (2006-2008). This project had been implemented at the RWB-Banat by HKV on behalf of Rijkswaterstaat. He was already acquainted with the technical director of NIHWM. The other HKV expert had been closely involved in the NOAH project and was acquainted with the NIHWM expert that had been involved in MOSES. According to one of the HKV experts, the technical director of NIHWM was not familiar with FLIWAS but the enthusiasm of the NIHWM expert also created enthusiasm among other relevant actors [I2; I5]. The NIHWM expert had a preference to implement FLIWAS in Somes-Tisa as this was also the focus of the MOSES project. HKV preferred to implement the project in the Banat region as they had implemented a project in this region before [I5]. According to RWB-Banat, their branch was probably chosen for practical reasons (existence of a hydraulic SOBEK model) and because of the good collaboration in the past [I7].

Following their visit to Romania, HKV experts started to rewrite the existing project proposal. In the same period, NARW also submitted a formal request to STOWA to support the implementation of FLIWAS in the Banat region in Romania [D4].

### 2.2.2 Objectives and activities

The initial idea was to support Slovakian organizations with the implementation of FLIWAS and to train these organizations in complex project management. The proposal for Romania was much more focused on supporting the implementation of FLIWAS. The project objective was:

> *To support the National Aministration Romanian Waters and Regional Water Branch Banat with the successful implementation of the Flood Information and Warning System (FLIWAS) in Romania, so that they will be able to use, operate and maintain it independently [based on D3]*

The project has four concrete objectives: (1) prepare implementation and analyze available information; (2) support implementation; (3) train local users and specialists; and (4) administration, maintenance and support [D3]. Related activities include:

0. Project preparation and start-up: preparation of a detailed implementation plan
1. Preparation of implementation: analyze and test the existing organization, information sources and emergency plans.
2. Implementation: support RWB-Banat with the implementation of FLIWAS and train users.
3. Administration and support: support NIHWM with establishing a national structure for administration and support and train supporters and trainers.
4. Communication and knowledge dissemination: disseminate knowledge of FLIWAS to organizations with a role in regional, national and transnational water management.

The Romanian proposal was submitted to Partners for Water in July 2009. It was expected that the project could be implemented in a period of four months between September and December 2009. This time span was relatively short (e.g. the implementation of FLIWAS in Slovakia was planned to take fifteen months). The end date of the project was postponed and project was finalized in the end of April 2010.

### 2.2.3 Project team

The project was implemented by a consortium[4] consisting of: STOWA, HKV and Royal Haskoning. They actively cooperated with the following Romanian governmental organizations: NARW (under coordination of MEF), RWB-Banat (branch of NARW), DESM (directorate of MEF) and NIHWM (subordinated by NARW). Other relevant actors were the Dutch programme Partners for Water (funding agency), the German consultancy company Leiner and Wolff (L&W), stakeholders in Banat region and other branches of NARW. An overview of the actors involved is presented in Figure 7. The remainder of this section shortly presents the role of the consortium and of its Romanian partners.

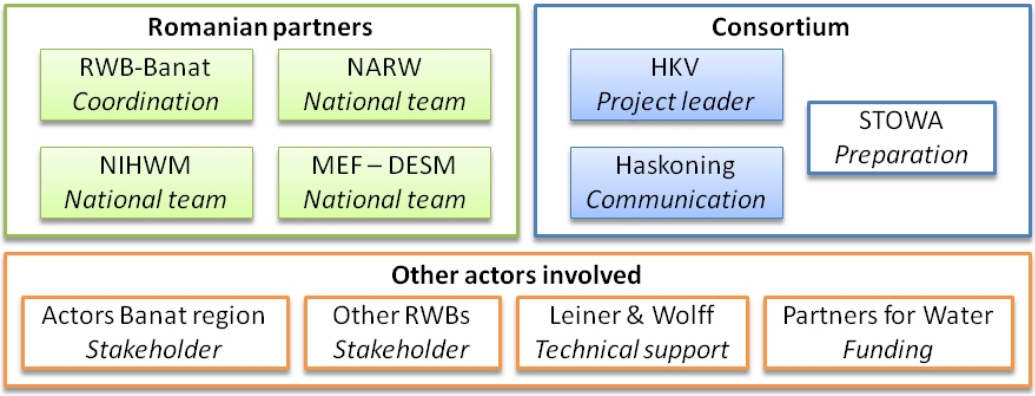


Figure 7 – Overview of the actors involved in the project

CONSORTIUM

The project proposal was submitted by the foundation STOWA in cooperation with the Dutch consultancy companies Royal Haskoning and HKV. STOWA had also been involved as project leader in the transnational cooperation project NOAH. In the Slovakian project proposal, STOWA was especially involved to train the Slovakian partners in project management tasks. When the project was transferred to Romania, the role of STOWA was reduced to project management tasks with a focus on communication with Partners for Water. HKV was responsible for operational project management and the implementation of FLIWAS. HKV provided a project leader and a deputy project leader. The latter functioned as interim project leader during the first mission and took care of project management activities after January 2010. Royal Haskoning was involved to support the implementation of FLIWAS and to take care of communication. It participated with experts of Haskoning Netherlands (H-NL) and Haskoning Romania (H-RO) [D1, D3, I2, I5]. The German company L&W was involved to install the FLIWAS application on the Romanian server [I5].

ROMANIAN PARTNERS

The project involved several representatives of the national level. NARW was involved as decision-maker, i.e. to decide upon the location of the pilot, to decide upon management and support and to support dissemination of project results. It decided that FLIWAS would be implemented at RWB-Banat. The DESM was involved to monitor the implementation of FLIWAS in relation to the National Strategy for Flood Risk Management and to disseminate the project results. NIHWM was involved as coordinating authority for the implementation of FLIWAS in Romania. It is especially expected to provide support and training if FLIWAS is implemented in other branches in the future [D3].

FLIWAS PROJECT TEAM AT RWB-BANAT

FLIWAS was implemented at RWB-Banat, one of the branches of NARW. The department of RWB-Banat that would especially start using FLIWAS is the Department of Dispatch and Flood Protection

[4] We use 'consortium' instead of 'Dutch partners' as the team also included employees of Haskoning Romania

(Dispatch). This department collects hydrological and meteorological data and oversees emergency plans. As various other departments were also expected to play a role, it was decided to form an implementation team that would be coordinated by the Department of Transboundary Relations (International). The Dispatch Department played a key role; its head was appointed as contact person. The following departments also appointed representatives that would support data collection: Hydrology and Geo-hydrology (Hydrology), Maintenance of Hydrotechnical Constructions and Dam Safety (Maintenance), Cadastre of Water and Estates (Cadastre). The Information and Communication Technology Department (ICT) is offering on-site support for technical implementation and during trainings. A representative of the Department of Communication, Public Relations and Press Relations (Communication) provides support on communication [D7]. An overview of the departments involved and their role in the organization is presented in Figure 8.

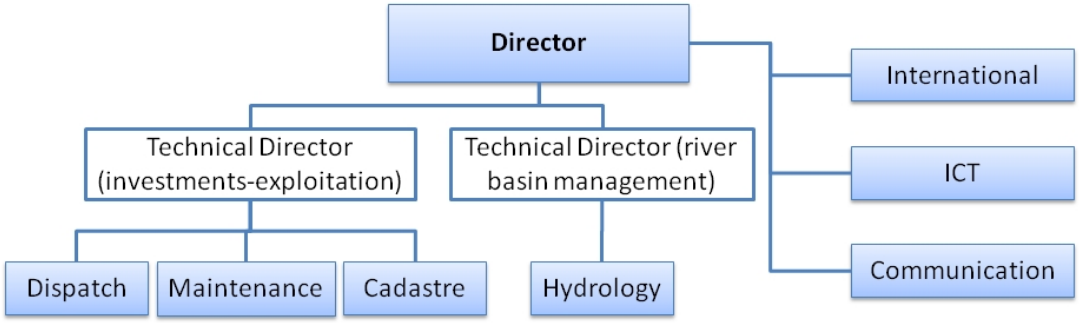


Figure 8 – Overview of RWB-Banat departments involved in the implementation of FLIWAS (based on: NARW 2011)

## 2.3 Project implementation and follow-up

This section presents the implementation of the project and follow-up activities. The first subsection describes the interactive process, with specific attention to the project activities, communication and translation. Most project activities were implemented during one of the five missions by Dutch experts. An overview of these missions is presented in Table 1. An overview of the participants in various meetings is presented in Annex B. Subsection 2.3.2 elaborates the technical implementation process, which included the installation of the server, integration of information and the development of FLIWAS functionalities. The last subsection presents the implemented and potential follow-up of the project.

Table 1 – Overview of the period, activities and consortium participation during the five missions

| No. | Period | Main activities | Consortium participation |
|---|---|---|---|
| 1 | 21-24 Sept. 2009 | Regional kick-off meetings; visit of the area; national kick-off meetings. | HKV, H-NL and H-RO |
| 2 | 26 Oct.-3 Nov. 2009 | Administrator training; regional stakeholder meeting. | HKV and H-RO |
| 3 | 7-12 Dec. 2010 | Support technical implementation; regional and national progress meetings | HKV, H-NL and H-RO |
| 4 | 15-23 March 2010 | User training; regional progress meetings | HKV |
| 5 | 12-23 April 2010 | Regional exercise; national final conference; national follow-op meeting | HKV, H-NL and H-RO |

### 2.3.1 Communication and interaction

INTERACTIVE PROJECT ACTIVITIES

Various meetings, workshops and trainings were organized during five missions, both in Timişoara and in Bucharest. For the first mission, two experts of HKV and one of H-NL flew to Timişoara and after that to Bucharest. The objectives of this mission were: (1) to become acquainted with FLIWAS, project partners and with each others' expectations; (2) to discuss and agree upon the division of roles and responsibilities and project organisation; and (3) to explain the proposed approach and to develop a time plan [D6]. The mission started with a meeting of the consortium with the general director of RWB-Banat. Following this, a meeting was organized for all RWB-Banat experts whom were expected to become involved in the project. About 18 persons were invited for the meeting and about 23 persons (of RWB-Banat) attended the meeting. During the meeting, HKV and H-NL introduced the project. Persons of various departments were appointed as responsible persons for the collection of relevant data. It was further decided that the project would try to inform stakeholders as much as possible. This would be realized by inviting them for a workshop and exercise in Timişoara and for the final conference in Bucharest and by providing information via the press, scientific journals and conferences and internet. On the next day, RWB-Banat organized a visit to the project area [D6; D7].

Following their two-day visit in Banat, the consortium and a representative of RWB-Banat flew to Bucharest to discuss the project with national project partners. The meeting at NIHWM on the first day was attended by 22 persons and included representatives of: DESM (1 person), MEF (1 person), NARW (2 persons), NIHWM (12 persons), RWB-Banat (1 person) and the consortium (5 persons). The meeting started with a welcome and introduction by the head of DESM. One of the issues that came up during the meeting is the hosting of the FLIWAS server. It was decided to organize a meeting on the next day dedicated to IT with experts of the consortium, NIHWM and NARW. It was further decided that all Romanian partners would appoint a person responsible for communication [D6].

In the first week of the second mission, a HKV expert had meetings at various departments of RWB-Banat to further discuss the technical implementation of FLIWAS. The HKV expert also trained potential administrators (i.e. persons who can add, manage and modify data in FLIWAS) during a one-day training. The course was organized at RWB-Banat and included two participants of NIHWM and nine participants of RWB-Banat (represented departments were International, Dispatch, Hydrology, Cadastre and Maintenance). It was decided that Dispatch would be the administrator of FLIWAS and get administrator rights. Other users would only be given user rights. In the course of the first week, the project leader of HKV joined the other HKV expert. During the first mission, the project leader was not available and replaced by the deputy project leader. The second mission was the first time that the project leader visited RWB-Banat. Therefore, a short meeting was organized for the project leader with the general director of RWB-Banat to become acquainted. Another meeting was organized with various departments of RWB-Banat and with NIHWM representatives. The second mission week included a regional stakeholder meeting during which regional stakeholders and press were informed about the project. Various media representatives attended the meeting. The participation of regional stakeholders was limited to one representative of the County Council, one representative of CIES, the vice-prefect representing the Prefecture and a mayor representing a Local Council. Six other mayors and another person of CIES were also invited but did not show up [O2; D10]. RWB-Banat experts expected more mayors to be present or to be replaced by a representative, like a vice-mayor or a counsellor [I7]. During the meeting, the vice-prefect expressed his support for FLIWAS. The representatives of the County Council and of the CIES were both interested in the use of FLIWAS and requested for a user account [O2; D10].

As the data collection and the installation of the server took more time as planned, the project leader proposed (around the end of November) to postpone the third mission for one month and the end of the project with two months (with approval of Partners for Water) [D11]. The first three days of the mission were used to reflect on the communication component and the overall progress of the project. Experts of HKV and RWB-Banat also worked on further technical implementation of FLIWAS. The project leader and an expert of H-NL also presented the progress of the project during a meeting at NIHWM in Bucharest. Besides representatives of the consortium (HKV, H-NL and H-RO), the meeting was attended by thirteen employees of NIHWM. After the progress meeting, the consortium had a separate meeting with IT experts on the installation of the server [O3; D13]. At that moment, experts of NIHWM and L&W already had some contact about the installation of the server. L&W already tried to install FLIWAS but did not succeed in this yet [I10].

The fourth mission was delayed due to illness of the project leader. From January 2010 onwards, he was replaced by the deputy project leader (who had been involved in projects at RWB-Banat before and also replaced the project leader during the first mission). A new time plan was prepared in which the fourth mission and the end date of the project were both postponed for two months. The fourth mission included several progress meetings and a one-day training of users at RWB-Banat [D15]. The training of operational users (i.e. persons who should be able to work with FLIWAS during a high water situation) aimed to train persons in operational use of FLIWAS and in the solving of operational problems (first line support). The training was initially expected to include participants of RWB-Banat, DESM, NARW and NIHWM [D7]. Actual participation was limited to five persons of RWB-Banat and one person of NIHWM. The user training was, like the administrator course, given by a HKV expert [D15]. The user manual of FLIWAS was used to guide the training [I7].

Figure 9 – Impression of the exercise: plenary introduction on the left and group session on the right

The first part of the fifth and final mission was dedicated to the preparation and organization of an exercise at RWB-Banat (for an impression see Figure 9). The objective of the exercise was to give participants a better understanding of the functioning of FLIWAS and how it could support decision-making during floods. The exercise was based on a simulation of the 2005 floods along the Timiş. After a plenary introduction of FLIWAS participants were divided into four groups. Each group was responsible for one of the following tasks: hydrology (introduced measurements), dispatch (received, sent and monitored information), decision-making (took decisions based on provided information) and operations (communicated and proposed actions). Every group consisted of an expert in that task of RWB-Banat, a trained FLIWAS user and three other participants. The exercise included three rounds (each round represented a different moment in time) and two plenary evaluations (one after the first round and another one after the last two rounds). Participants, except for the experts, changed groups after each round which allowed them to fulfil different roles. About twenty persons were invited to participate in the exercise. A few invited external stakeholders confirmed their participation in the exercise but did not turn up (two out of five invited local councils

and one out of two persons of CIES). Six persons assisted with the monitoring and organization of the exercise. The exercise lasted the whole morning and was closed with a joint lunch [D16; O4].

The second part of the fifth mission included the final conference and a follow-up meeting with relevant actors in Bucharest. The objective of the final conference was to present and disseminate the project results. Presentations were given by experts of HKV (on FLIWAS), H-NL (on the pilot project), HKV and RWB-Banat (on the exercise), HKV (on FLIWAS in the Netherlands and maintenance and support) and H-RO (on further implementation of FLIWAS in Romania). An expert of H-RO facilitated the discussions between the presentations. Participants included representatives of the consortium (STOWA also planned to be represented but could not because of flight restrictions), representatives of Romanian partners (including six persons of RWB-Banat), representatives of nine other RWBs (RWB-Mures was the only branch that was not represented) and representatives of the Dutch embassy, the World Wide Fund for Nature, MAI and the Technical University of Bucharest. Most questions and reactions came from other RWBs, NARW, MEF and NIHWM [D16; O5].

Two days after the final conference, a separate meeting was organized at MEF to discuss potential follow-up (also because the head of DESM could not attend the final conference). On the day before this follow-up meeting, several representatives of the consortium had a meeting with the technical director of NIHWM to discuss potential follow-up ideas. They also discussed several other ideas for potential cooperation [O6]. Participants of the official follow-up meeting included the State Secretary for Water of MEF, the head of DESM, the head Dispatch of NARW, the technical director and a researcher of NIHWM, a senior policy advisor of the Dutch embassy and two representatives of the consortium. The meeting started with a short introduction on Dutch-Romanian cooperation and on FLIWAS. The State Secretary only attended the first half of the meeting. After the State Secretary left, further implementation of FLIWAS was discussed in more detail [D16; O7]. The outcomes of both follow-up meetings are presented in more detail in subsection 2.3.3.

COMMUNICATION

Communication during the project and dissemination of its results formed a separate component of the project. To support communication during the project, an expert of H-RO was appointed as project secretary. This expert supported, together with an expert of H-NL, all communication about and during the project [D3]. How the communication component would be implemented was not really specified on beforehand but specified during the project [I1]. Based on the input of various meetings during the first mission, the expert of H-RO suggested to develop a communication plan. The plan was based on two major (external communication) components: (1) invite stakeholders for meetings and workshops; and (2) public relations. The plan distinguished between various target groups including the project team itself, stakeholders in the area (e.g. mayors and public), other RWBs, ICPDR and other specialists and the general public. The plan described for each of these target groups why, how and when they would be involved or informed and by whom. The plan further suggested, for example, to use a standard format for project deliverables (with the logos of partners involved) and to put a text on the websites of various partners, including links to each other's websites and the FLIWAS website [D7; D8].

Stakeholders were invited at various occasions. Regional stakeholders were invited by RWB-Banat for the workshop and the exercise. A wide variety of stakeholders was further invited for the final conference (see also Annex B). An initial list of participants was prepared by H-NL and communicated by email to other project partners [Email, H-NL expert, 26 February 2010]. Invitations for the final conference were send by NIHWM. Other organizational arrangements were made by H-RO [I9]. Public relations included various activities, such as the preparation of press releases, external presentations, promotion materials and papers. Communication with the press was

coordinated by the Public Relations departments of RWB-Banat and NIHWM. Around the kick-off meeting, the regional stakeholder meeting and the final conference there were many articles in local, regional and national press about FLIWAS (for an overview, see Annex C). According to RWB-Banat experts, their communication expert (International Department) exchanged a few emails on communication with H-NL and H-RO and further cooperated with their own press office. They explained that the branch, and its director in particular, has a good relation with the press [I7]. The expert of H-RO prepared promotion materials, such as a brochure and a poster. These materials were send to the project team for comments and printed at NIHWM [I9; own observations]. The brochure was distributed at the final conference [O5]. The consortium was also invited to write an article for Hydrotehnica (magazine of NARW). The article was written in cooperation with RWB-Banat and published in the beginning of 2010 (Aldescu et al. 2010). A HKV expert also prepared a paper and presentation on FLIWAS (including the pilot implementation at RWB-Banat) for a conference in Macedonia (De Gooijer 2010). Besides this, the consortium was invited at several other occasions to present the pilot project (for an overview, see Annex C). All experts that were involved in the communication component were satisfied about the results. The H-NL expert explained that although materials may not have looked highly professional, all communication objectives were reached [I1].


Figure 10 – Impression of the promotion materials: the cover of the project brochure

Internal communication, i.e. between members of the project, was most intensive during various missions (see Table 1). Between missions, communication among Dutch partners was mostly by email or by telephone. In addition, Dutch partners had (probably) two meetings in the Netherlands during the preparation phase. The consortium also had several meetings in Romania, for example, at the end of the first mission, after the exercise and after the final conference [I1; O1; O4; O5]. For the technical implementation of FLIWAS, experts of RWB-Banat and HKV communicated mostly face-to-face during various missions. Between missions, emails were the most important form of communication, especially for the exchange of materials. Experts of RWB-Banat and HKV also communicated a few times via telephone and Skype [I7]. One or two experts of NIHWM also came to Timişoara during most missions, for example, to attend one of the trainings or other project events [I6]. Between missions, there was very limited communication between Romanian partners [I7]. For the communication part, the expert of H-RO had some contact between missions with experts of RWB-Banat and NIHWM [I7; I9].

Actors involved were generally satisfied about their communication but mentioned two cases for which communication was troublesome. The first case concerned the communication between a HKV expert and the Cadastre expert of RWB-Banat. The third mission report reads that "it seems that … [the persons involved] … do not always understand each other" [D13]. Another RWB-Banat expert explained that there were some misunderstandings about shape files. According to him, the persons involved had a problem in understanding each other. Both were speaking English, although the Cadastre expert was only speaking English to a certain extent, so language was not the problem. A RWB-Banat expert tried to mediate between them. He further explained that the person involved of RWB-Banat is a person that has to be approached in a specific way and that you need to be clear about what you expect from her [I7]. Another HKV expert mentioned that there were some communication problems in this case but that all necessary information was eventually obtained and integrated into FLIWAS [I2]. The HKV expert involved mentioned that there was not really a language barrier, it was rather that Romanian partners were more passive as expected [I3].

Communication related to the implementation of the server was also difficult. Experts involved mentioned that actors involved had a big communication problem [I9], that communication was bad [I10; I6] and that it was like they were speaking another language [I5]. Discussions about the purchasing, installation and hosting of the server started with face-to-face meetings during the first mission. According to the project leader, NIHWM ensured that they could take care of that [I5]. According to the IT expert of NIHWM she explained HKV experts during the first mission that the installation of the server would be challenging for her. She was promised to receive assistance in this field [I10]. Another HKV expert later explained that the IT expert was in the meeting in which the location of the server was discussed. During the meeting she assured that it was no problem; only after the meeting she told the project leader (informally) that she lacked specific experience in this field [HKV expert, 15 April 2011]. Further communication on the installation of the server was initially limited to the exchange of emails between HKV experts and an IT-expert of NIHWM. Mid November 2009, the project leader brought the NIHWM expert and the experts of the German IT company L&W in contact with each other. Communication between experts of NIHWM and L&W was mostly by email. They also talked once or twice to each other on the phone [I10]. L&W never visited Romania as it was only contracted to install FLIWAS on distance [I5]. During the progress meeting at NIHWM in December 2009, the project leader of HKV discussed the installation of the server face-to-face with the NIHWM expert. The NIHWM expert explained that L&W initially did not answer her emails, that there were some technical problems, that she was not well-informed and she perceived that she was put under pressure. The project leader explained the process and informed her that there was no longer time pressure (the installation would be started on the Dutch FLIWAS server) [O3].

According to NIHWM, communication with L&W was really difficult as they did not answer emails [I6; I10]. The project leader stated that communication was experienced as being a problem on both sides. What probably played a role is that both sides had another level of expertise [I5]. The NIHWM expert explained that she had experience with the administration and configuration of servers on the network but never installed a server before. She was also not used to work with servers that were based on the operational system Linux [I10]. According to the H-RO expert, communication problems were related to unclear expectations at the project start. She explained that there was always someone to translate (no language barrier) but that partners had a different understanding (rooted in their own background) [I9]. Further analysis of the communication problems confirms that diverging expectations indeed played an important role. Analysis of the email contact between HKV, NIHWM and L&W showed that the actual period between the exchange of contact details between NIHWM and L&W and the first reaction of L&W was only eleven days. Other emails were also answered quite fast. The problem was rather that the first emails of L&W did not answer the questions of the IT expert of NIHWM, which she already had for two months. The IT expert of

NIHWM further explained that HKV promised that she would receive assistance with the installation of the server. As HKV experts did not have the required IT expertise, NIHWM expected that it would be provided by L&W [I10]. HKV explained that L&W was promised to have access to all hardware, which they did not have in the beginning, and would just install FLIWAS on the server [I5]. Various actors involved tried to mediate between both partners. Analysis of the emails showed that most email communication was eventually going via HKV experts [I10]. According to RWB-Banat, HKV experts played an important role in mediating between both organizations. A RWB-Banat expert also contacted the IT expert and suggested to talk on Skype [I8]. According to H-NL, H-RO also contacted the IT expert and played a mediating role [I1]. The H-RO expert explained that she just tried to gain an understanding of what was going on [I9]. In March and April 2011, experts of HKV, L&W and NIHWM were exchanging the last emails about the installation of the server. HKV offered to hire an external IT specialist. The NIHWM expert reacted that she would try to fully re-install the server. A few days later, L&W announced that FLIWAS was functioning on the Romanian server [I10].

#### TRANSLATION

Translation played an important role during the project. The interface of the internet application of FLIWAS (available in English, Dutch and German) and the operational user manual both had to be translated into Romanian. Besides this, an English summary of the Romanian emergency plans had to be prepared. The FLIWAS application and the emergency plans were both translated (before their scheduled deadline) by the International Department of RWB-Banat [D7; D10; I12]. NIHWM offered to translate the user manual [D7]. The project team decided later also to translate the trainers guide, which explains how to use the system, as this may be useful when mayors decide to use the system [D13; O3].

Small-scale meetings between the consortium and Romanian partners were usually organized in English. The training of administrators was also organized in English. One of the mission reports reads that the pace of the course was quite slow for some participants (who could easily understand English) but that this was necessary for other participants (who had difficulties to understand English) [D10]. If possible, presentations during stakeholder meetings about FLIWAS were held in Romanian. Presentations in English were translated by H-RO or by RWB-Banat. Materials for the exercise were translated into Romanian and also organized in Romanian. If necessary translation was provided by H-RO or by RWB-Banat [O4]. The final conference was translated by experts of H-RO and RWB-Banat [O5]. None of the interviewees experienced language barriers during the project [I1-I10].

### 2.3.2 Technical implementation

#### DEVELOPMENT OF A ROMANIAN FLIWAS APPLICATION

FLIWAS is an internet-based application which implies that it requires a server on which software is installed and which is connected to an internet domain. For the installation of the software (on distance), HKV contracted L&W. The server itself would be arranged by one of the Romanian partners. During the first mission (September 2009), there was some discussion about whether NARW or NIHWM should host the server. It soon appeared that both organizations did not have any server available (all were already in use) and did not have an adequate server (lack of internal memory and not running in Linux). NIHWM agreed (with reservations) that it would purchase a dedicated server. The minimum requirements of the server were provided by HKV. It was further agreed that the server would be online in the end of October or the beginning of November. It was also suggested that if NIHWM would fail to make the server operational in time, FLIWAS would first be implemented on a Dutch server and later migrated to a Romanian server [D7]. After the first mission, an HKV expert and the IT expert started to communicate by email. The NIHWM expert had a number of questions related to the requirements and functionalities of the server. HKV clarified the server requirements so that NIHWM could purchase a server (mid October). HKV also specified that

NIHWM should install the latest version of a certain type of Linux, which was installed by NIHWM. In the meantime, the NIHWM expert also studied how to install a Linux-based server [I10]. Figure 11 presents an overview of the Romanian FLIWAS environment. It shows that FLIWAS can be accessed via internet by L&W and regular users. FLIWAS is placed outside the regular network of NIHWM (no additional permissions needed) but behind the router and firewall (relevant ports need to be open) [D13].

During the second mission (October/November 2009), discussions about the server continued. At that moment, NIHWM already obtained a server but it was not yet operational (not installed). The capacity of the server was limited, it could only host FLIWAS for one or two branches [D10, O2]. According to NIHWM, the server was purchased for FLIWAS [I10]. HKV experts explained that NIHWM integrated old and new components. The resulting server had less storage capacity as was specified by HKV. The specifications of the server would normally have sufficient capacity to implement FLIWAS in one more region. If necessary, it would be relatively easy to enlarge the storage capacity of the server [Emails HKV experts, 28 April 2011]. During the mission, it was further decided that NIHWM would initially host FLIWAS and that – if more branches are planning to use FLIWAS in the future – NARW would buy another server with more capacity. The director of RWB-Banat also requested whether it would not be possible to have a server at their branch – so that they are not dependent on Bucharest – but this idea is abandoned. HKV explained that – if RWB-Banat would purchase its own server in the future – it would be an option to install a replicate of FLIWAS at a local server. It is further decided that the Dutch server could be used to start working with FLIWAS (e.g. try-outs, discussion and demonstration) and that the third mission would start once the server at NIHWM was operational [D10, O2].

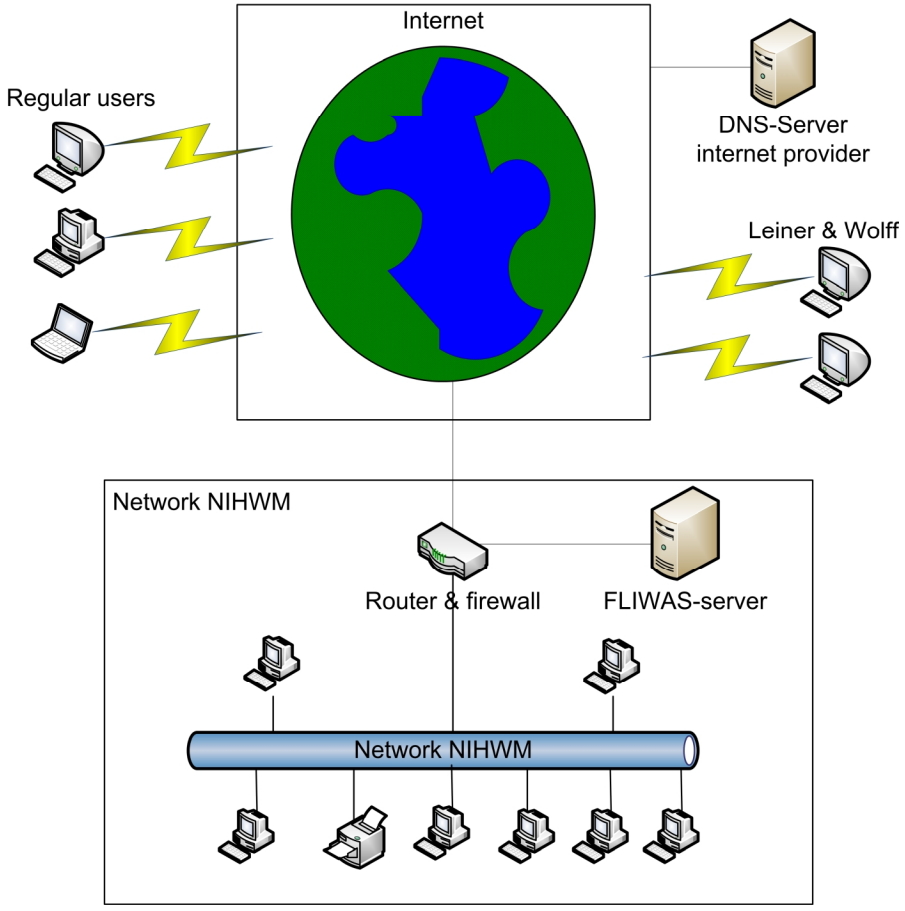


Figure 11 – Schematic overview of Romanian FLIWAS environment [D13]

In the second half of November, the project leader brought NIHWM and L&W in touch with each other. Note that, at that moment, it was still unclear to NIHWM which functionalities the server should have. At the end of November, L&W confirmed that the correct Linux version was installed on the server and that it is planning to install FLIWAS in the beginning of December. NIHWM asked them to give their IP addresses so that it can arrange that its IT service company arranges their access. NIHWM received these addresses in the beginning of December. One day later, L&W was able to access the server but observed that there were problems related to the internet domain. The interface of the installed version of Linux further appeared to interfere with FLIWAS [I10; Emails to/from IT expert NIHWM].

During the third mission, a progress meeting was organized at NIHWM. After this meeting, the project leader of HKV and the IT expert had a separate discussion on the server. One of the discussed bottlenecks was that an external IP address had to be obtained (the server could for security reasons not run on the intranet of NIHWM). As all of them were already in use, a new external IP address had to be obtained. This was solved when the IT service provider of NIHWM provided a temporary external IP address. However, to make it operational the router and network had to be configured which took some time [O3]. The IT expert of NIHWM explained that providing external access to the NIHWM network was quite exceptional as this makes the network vulnerable [I10]. According to NIHWM, L&W should in the beginning of December have been able to access the server and install FLIWAS. L&W experts stated that they were still unable to finalize the installation [O3]. Email contact revealed that L&W had been able to solve several problems in December but that some relevant ports were still closed. Mid December, the installation of the server stagnated and was soon paused because of holidays [I10].

In February 2010, communication about the server between NIHWM, HKV and L&W continued. L&W was still unable to fully install FLIWAS and asked whether a specific port was open or not. At that moment, the IT expert of NIHWM already received assistance from several acquainted IT experts. By the end of March, the IT expert decided to completely re-install the server. In the beginning of April, the internet application FLIWAS is running according to L&W [I10; Emails to/from IT expert NIHWM]. According to the project leader, FLIWAS was properly installed on the Romanian server by the end of the project [I5].

To fully implement the Romanian version of FLIWAS, the Romanian partners also had to reserve their own internet domain (www.fliwas.ro). To the IT expert of NIHWM it had not been clear from the beginning that an internet domain had to be reserved [O3] but NIHWM purchased the internet domain mid November [I10]. When L&W tried to install FLIWAS in the beginning of December it reported that the internet domain did not have any DNS entry [emails, L&W expert, 3 and 4 December 2009]. The IT expert of NIHWM explained that they only knew they had to reserve a domain but that it was unclear what had to be done with it. According to HKV, NIHWM and their IT service provider had to take an action [O3]. The problem with the DNS entry was initially solved but again appeared to be a problem in the beginning of March [email, L&W expert, 3 March 2010]. These problems were solved and the Romanian website of FLIWAS was online before the end of the project [own observations].

### PILOT IMPLEMENTATION OF FLIWAS IN THE BANAT REGION

Besides that the project involved the creation of a Romanian FLIWAS environment, it also aimed to implement FLIWAS for the Banat region. This included the following steps: (1) selection of a project area; (2) integration of background maps and layers; (3) integration of hydrological and meteorological information; and the (4) integration of emergency plans [D9].

During the preparation phase, it was already agreed that FLIWAS would be implemented in the Banat region. According to the NIHWM expert, this area was probably chosen because it already had a hydraulic model [I4]. What further played an important role for HKV was that they had good relational experiences in this area [I5]. During the first mission, HKV proposed that the project would concentrate on the lower Timiş river, the parallel running Bega channel and the discharge channel, *Canal Descarcare,* that runs between the Bega and Timiş [D7]. Eventually, the project concentrated on the lower Timiş river. This river was already mapped and modelled and RWB-Banat experts know the area [I7].

The second step was to import geographical and hydrological information into FLIWAS. During the first mission, it was agreed that Cadastre would start collecting geographic information [D7]. During the second mission, the Cadastre expert provided HKV experts with digital shape files (related to geographic coordinates) including information about the location of the water system (i.e. dikes, dike sections, gauging stations, hydraulic structures, hydro-technical knots and longitudinal profiles), infrastructure (i.e. roads, bridges and railways) and communities (i.e. administrative borders and population). It could further provide maps of the areas that were flooded in 2000 and 2005 and information on weak spots. Some of these data had to be complemented or updated. The coordinates of weak spots were, for example unclear and had to be specified further by the Maintenance department. The Cadastre was asked to collect additional geographical data, i.e. a background map and the coordinates of gauging stations and dike sectors [D10]. At the beginning of the third mission, there was not much progress in the collection of geographical data. New agreements were made about the format of the required background map and about shape files with locations of various objects [D13]. During the fourth mission, the interim project leader obtained all relevant shape files, coordinates and a background map of the Cadastre. All shape files and maps were send to L&W to implement them on the Dutch FLIWAS server (the Romanian server was not yet ready at that moment) [D15].

The collection of hydrological data was also initiated during the first mission. HKV asked Dispatch (in cooperation with Hydrology) to further specify the gauging stations and the formats of hydrological measurements and forecasts [D7]. During the second mission, collected information was discussed during a meeting with various departments. It was decided that FLIWAS would automatically import the automated measurements of RWB-Banat and that forecasts of RWB-Banat and NIHWM would be inserted manually [D10]. During the third mission, HKV experts investigated how the automated measurements could be automatically imported from the existing database into FLIWAS. One of the issues was that the format of the database differed from the formats that were available in FLIWAS [D13]. HKV contacted the developer of the measurement system about export of measured data to FLIWAS. It appeared that it was possible to export data. It was also feasible (as it required relatively little time and money). However, it was according to HKV still beyond the scope of the project [D15]. The project leader later explained that as long as the Dutch server was in use, the automated import of data was not possible [I5]. A NIHWM expert further noted that automated gauging stations still need to be further developed in Romania. They are not yet implemented in the whole country. If they are, there are often problems related to inadequate installation, inadequate positioning or vandalism [I6].

To visualize inundation patterns, FLIWAS could also import flood maps and flood scenarios into the system. Historical floods maps were available at RWB-Banat [D7]. During the third mission, it appeared that the coordinates in some of these flood maps had to be transformed to another coordinate system. This was done by Cadastre [D11]. In the previous project of HKV and others at RWB-Banat, HKV already prepared flood scenarios that could be used [D6]. HKV prepared several new scenarios during this project, which were also used for the exercise [D14]. The Timiş river was modelled using a hydraulic model (the 1-dimensional and 2-dimensional version of Sobek). Scenarios

were simulated with the same hydraulic model (Aldescu et al. 2010). In the future, new flood maps and scenarios, which are currently prepared for the implementation of the EU Flood Directive, could also be integrated in FLIWAS [D6]. HKV explained that the lack of flood maps does not affect the implementation of FLIWAS. They are only relevant for visualization and do not affect the functionality of FLIWAS [O3].

The third step was to integrate the emergency response plans into the core module of FLIWAS. Dispatch (in cooperation with International) prepared an English summary of the plans, including a list of action, responsibilities, monitored objects, critical levels and transition criteria [D6]. During the second mission, HKV organized a workshop (with experts of International, Dispatch, Hydrology and NIHWM) to discuss the emergency plan. One of the issues that turned up during the administrator's course was that the reference levels used at RWB-Banat differ from the reference levels used in FLIWAS [D10]. The Romanian emergency plans appeared to be very similar to the Dutch plans. The main difference is that alerts are based on different types of information [O3]. It was decided to implement only the emergency plans of RWB-Banat in FLIWAS. This means that the plans at the local level and at the county level were not implemented [D13].

OPERATIONALIZATION OF FUNCTIONALITIES

At the beginning of the fourth mission, the emergency plan of RWB-Banat had been implemented in FLIWAS. At that moment, FLIWAS did not yet include all geographic information. The mission was partly used to test whether FLIWAS was correctly implemented (i.e. whether the right warnings and actions were triggered at the right conditions) [D15]. An exercise was organized to show relevant stakeholders that FLIWAS was functional and could support decision-making. As FLIWAS was not yet implemented on the Romanian server the exercise was done on the Dutch server. This implied, for example, that reference levels were not yet shown in graphs of the measured water levels. Another functionality that was not used during the exercise is the possibility to send messages using FLIWAS [D16; O2]. According to the project leader, it was a pity that the communication module of FLIWAS was not fully implemented. This would still be necessary step in order to start using FLIWAS [I5]. Another reason why FLIWAS cannot be fully used yet is that FLIWAS is not operational by other actors of the structure for emergency system management (including the county councils and the local councils) [D16; O2].

In the Netherlands, there is a separate website for the general public providing background information on FLIWAS. In Romania, the website was only accessible for persons with a user name and password [D16; O2]. The technical director of NIHWM mentioned at the end of the project that she was disappointed to hear from others that the interface of the website was still (partly) in Dutch and that the person had to fill out a password. HKV assured her that they would change this as soon as possible [O6]. According to HKV this was done a few days later.

Operational use of FLIWAS also involves support and maintenance. HKV explained that a distinction could be made between: (1) operational support and maintenance (including hosting) at the country level; and (2) functional support and maintenance (including updates) at the international level [O3]. One of the project objectives was to train Romanian partners in the first level of (operational) support and maintenance. The project plan reads that the operational organization of FLIWAS would consist of a coordinator in case of emergencies, administrators that are able to implement information into FLIWAS and operators or users of FLIWAS. They are supported by first line support (able to solve operational problems) and second line support (able to solve complex operational and implementation problems). First line supporters were trained during the user training. Second line supporters received two trainings: the administrator or technical implementation training and the user training. Second line support was expected to be provided by NIHWM experts. The consortium

further planned to give a course for trainers [D7]. Up to our knowledge, this training has not been implemented.

Functional support and maintenance was discussed in more detail at NIHWM during the second mission. Within the context of the NOAH project, the Dutch and German partners developed a structure in which other countries, like Romania, could be integrated. At the end of 2009, the responsibilities for this were shifted (alongside with the Dutch server) from STOWA to Rijkswaterstaat. The basic service level is provided for free and includes software updates, fixing of software bugs and a possibility to submit requests for changes (without the guarantee that requests will be taken into account). The higher service level is gives users also the opportunity to influence the development of FLIWAS and is based on a service fee [O3]. The support and maintenance structure was also explained during the last conference. At that moment, the Memorandum of Understanding for support and maintenance was still developed [O5; D16]. At the follow-up meeting, HKV informed participants what the expected yearly service fee per server would be [O7]. Up to our knowledge, Romania did not apply for functional support and maintenance yet.

### 2.3.3 Follow-up activities

#### FURTHER IMPLEMENTATION OF FLIWAS

During the final conference, several ideas for potential follow-up were raised. RWB-Siret showed, for example, its interest to implement FLIWAS also in their RWB. There were also ideas to link FLIWAS to other projects and initiatives, such as Danube Floodrisk and the European Strategy on the Danube River (see also subsection 2.1.4). The representative of MEF mentioned that it would be interesting to further develop FLIWAS at national level. One of the possibilities would be to implement FLIWAS using the flood maps that are expected to result from the Danube Floodrisk project. The representative of GIES also showed an interest in FLIWAS and questioned whether it could also be used for other types of disasters [O5].

Following the final conference of the project, two meetings were organized to discuss potential follow-up. The first meeting (22nd of April 2010) took place at NIHWM and included representatives of the Dutch team and the technical director of NIHWM. They discussed seven potential ideas for further implementation of FLIWAS in Romania. Not all ideas appeared to be feasible and only two ideas were discussed in more detail. The first idea concerned integration of FLIWAS in the work package of NIHWM in the Danube Floodrisk project. The role of NIHWM in this project is to analyze and digitalize the emergency plans for areas along the Romanian section of the Danube. It suggested that it could use FLIWAS as a database for this. The second idea was to include FLIWAS in a proposal for the implementation of the European Strategy on the Danube River [O6].

Both suggested follow-up projects are discussed in more detail during a meeting at MEF (23rd of April 2010). The first idea, that NIHWM would use FLIWAS for Danube Floodrisk, was abandoned by DESM. The reason was that the NIHWM was involved in a research component of the project which was not related to the implementation of FLIWAS. In addition, it was argued that FLIWAS should support decision-making and therefore should rather be installed at organizations with a role in decision-making, i.e. MEF and counties. The second idea, to implement FLIWAS along the Danube as part of the EU Strategy for the Danube region, was supported by DESM. At that moment, MEF was just working on a proposal for a transboundary project with Bulgaria called 'WATER'. An application *like* FLIWAS[5] would perfectly fit in the project proposal. It was agreed that the Dutch team would prepare a proposal within a few days (including potential activities and costs) as DESM wanted to submit the application within one week. In addition, two other suggestions for follow-up were

[5] Note that it is prohibited by (EU) law for governments to pre-define tools in their project proposals as other companies should also be able to participate in project tenders.

mentioned: (1) to integrate a tool like FLIWAS in a project tender on flood risk management of RWB-Prut; and (2) to prepare a proposal for additional training on FLIWAS within the context of the SOP on Human Resources Development [O7].

The Dutch team prepared a draft proposal for implementation of FLIWAS in Romanian and Bulgarian counties along the Danube river [D17]. DESM received this proposal and integrated it (as much as possible) in their project application for the implementation of the EU Strategy for the Danube Region. DESM received a few questions related to the proposal (none related to FLIWAS) which indicated that the proposal was considered [I2]. According to the latest information, the project proposal was submitted but postponed. The reason was that there were problems related to Bulgaria's participation, the number of Bulgarian partners involved was insufficient [phone call, HKV expert, 20 January 2011].

Once the project was finished, further implementation of FLIWAS was also discussed on several other occasions. On invitation of the head of DESM, FLIWAS was presented by a RWB-Banat expert during a meeting of the ICPDR Expert Group on Flood Protection which was organized in Timişoara on 14 and 15 October 2010. The presenting RWB-Banat expert explained that the participants were potentially interested to implement FLIWAS in the whole river basin. However, the development of flood risk maps (required within the context of the EU Floods Directive) was still having the highest priority. This expert personally doubts whether FLIWAS has yet been sufficiently developed to be applied at such a large scale (i.e. Danube river basin scale) [I7]. FLIWAS was also presented at the first meeting of the Dutch-Romanian bilateral panel for water management (Timişoara, 28 October 2010). One of the results of the meeting was to further discuss the possibilities for cooperation on flood risk management, including further implementation of FLIWAS [NWP Newsletter 40-2010, 5 November 2010; Minutes of meeting attached to email of RNWP, 31 January 2011]. For an overview of external presentations on FLIWAS, see also Annex C.

Various individual branches of NARW showed their interest to implement FLIWAS also at their river basin. RWB-Siret explicitly expressed its interest to implement FLIWAS during the final conference [O5; I4]. DESM suggested that implementation of FLIWAS may also be of interest for RWB-Prut [O7]. According to a NIHWM expert, the RWBs of Ialomita and Arges-Vedea also expressed their interest [I6]. One of the branches at which the implementation of FLIWAS was seriously considered was RWB-Arges Vedea. This basin is located along the Danube and includes the County of Teleorman. Since 2005, this county has been actively cooperating with the Dutch Province of Overijssel in the field of water management, including flood risk management (see also Vinke-de Kruijf 2009b). This cooperation was also supported by experts from H-NL and H-RO. According to an expert of H-RO, the idea for further implementation of FLIWAS at RWB-Arges Vedea was directly related to their experiences with the implementation of FLIWAS in Banat. The project idea was included in a list of potential projects and explored further. Currently, there is little chance that FLIWAS will actually be implemented at Arges Vedea. One reason is that FLIWAS data have not yet been transferred to the Romanian server. Another reason is that MEF still plans to implement FLIWAS along the Danube in a joint project with Bulgaria [I9; conversation, former expert of Haskoning Romania, 6 March 2011].

Another potential follow-up project would be to further implement FLIWAS in the Banat region. The implementation of FLIWAS was now limited to the lower Timiş river and could be extended to other rivers as well (see also subsections 2.1.2 and 2.3.2). According to RWB-Banat experts, this would be very unlikely as there are no funds available for this [I7]. This was confirmed by NIHWM [O6]. One of the latest developments is that HKV and STOWA submitted, also in cooperation with RWB-Banat, a project proposal for European Regional Development Funds (INTERREG IVC). The proposal concentrates on multi-layer safety in which applications, such as FLIWAS, play an important role. If

the proposal is accepted FLIWAS will also be elaborated further in the Banat region [HKV expert, 15 April 2011].

FURTHER USE OF THE INSTALLED APPLICATION

As explained in the previous subsection, the installation of FLIWAS on the Romanian server was troublesome. As a result, HKV decided to start the implementation of FLIWAS (for the Banat region) on the Dutch server. Until now, the Romanian data that were implemented on the Dutch server has not been transferred. Experts of HKV mentioned that they expected the Romanian counterparts to transfer the data. One of them noted that he should maybe send an email about this as they would be removed from the Dutch server by the end of 2010 [I2]. Another one noted that he expected RWB-Banat to transfer the data [I5]. This was confirmed by an expert of NIHWM, who explained that RWB-Banat also had all relevant data [I6] Experts of RWB-Banat explained that they expected that NIHWM experts would migrate the data from the Dutch to the Romanian server as they were responsible for all IT related aspects of the project [I7]. The IT expert of NIHWM mentioned that she was aware that data still had to be migrated from the Dutch to the Romanian server. However, she was never contacted by RWB-Banat about this and would also not know who or what should be done [I10].

One of the key experts of HKV doubted whether RWB-Banat would actually start using FLIWAS. The first step would be to run FLIWAS next to the current flood information and warning procedures. This would require also to make the message functionality of FLIWAS operational (one of the components that was not implemented during the project). It would further require the transfer of FLIWAS to the Romanian server (to have automated instead of manual input of high water forecasts). A subsequent step would be to organize an exercise with more external stakeholders as was done at RWB-Banat before [I5]. An investigation into the use of FLIWAS in Romania (September 2010) revealed that the Romanian FLIWAS version on the Dutch server was last accessed at the 5$^{th}$ of August 2010. The Romanian server was accessed for the last time by a NIHWM expert at the 22$^{nd}$ of July 2010. At that moment, the emergency plans were not transferred to the Romanian server and the system was also not in use [Email, HKV expert, 16 September 2010]. An expert of RWB-Banat confirmed that two experts at RWB-Banat used to visit the Dutch server from time to time [I7]. The possibility to do this stopped when the Dutch server was moved from Stowa to Rijkswaterstaat (November 2010). Romanian beneficiaries were informed that the Dutch FLIWAS server was no longer available by a HKV expert via email. HKV stated that it was in contact with Rijkswaterstaat to safeguard the Romanian data so that it could still be implemented on or copied to the Romanian server [Email, HKV expert, 11 November 2010]. In reaction to this email, the head of DESM asked what was actually going on and whether there was still an interest of Dutch experts to be involved in further implementation of FLIWAS in Romania [Email, DESM, 7 December 2010]. In answer to this email, another HKV expert explained that the Dutch server was not available as it was upgraded and that all FLIWAS related services were moved to another institute [from STOWA to Rijkswaterstaat]. The expert further stated that HKV would try to copy the Romanian data to the Romanian server [Email, HKV expert, 7 December 2010].

After the project was finished, the website of FLIWAS has been online for some time. In the beginning of 2011, an expert of H-RO discovered that the website was not operational anymore. As she was involved in a project that aimed to implement FLIWAS also at RWB-Arges-Vedea, she approached the IT expert of NIHWM if it would be possible to have access to the server. She also approached a HKV expert who stated that although no data had been transferred the installed application should still be operational [I9]. The IT expert of NIHWM explained that the server was turned off due to technical problems during the summer time. As nobody ever used or informed about FLIWAS, she never turned the server on again. She further advised the expert of H-RO to consider that there are plans to implement another server with more capacity at MEF for a project

along the Danube [I10]. During the follow-up meeting, MEF expressed that the capacity of the installed server was insufficient for further implementation of FLIWAS. If FLIWAS would be implemented further along the Danube, a (new) server has to be purchased and placed at MEF which also coordinates flood risks along the Danube [O7]. HKV experts confirmed that the server that was put in place probably has insufficient capacity to implement FLIWAS in whole Romania. However, it would be relatively easy to expand the server capacity [emails HKV experts, 28 April 2011].

# 3 Dynamic interaction between actors involved

This chapter elaborates the dynamic interaction between project participants, i.e. the consortium and Romanian experts and stakeholders. The theoretical background of this chapter is described in more detail in section 1.4. The first three sections subsequently describe their motivations, cognitions and resources. Section 3.4 describes developments in the relational domain. Each section closes with a short synthesis in which characteristics of actors involved are summarized and compared to each other.

## 3.1 Motivations: reasons behind actions

Motivations refer to what drives the actions of various actors involved. We distinguish between the following sources of motivations: personal and organizational objectives and values (related to process and/or content); external pressure (civic duty or financial, social or political reasons); and self-effectiveness assessment (capacity to contribute to or possibility to increase this capacity).

### 3.1.1 Consortium

The organizational objective of STOWA is to provide Dutch water managers with scientific knowledge and practical instruments for the management of wastewater, surface water, groundwater and flood risks. Initially their role in the project was, among others, to train Slovakian organizations in project management. When the project was transferred to Romania this component was left out [D1, D3] (for more information on these changes, see subsection 2.1.1). A HKV expert explained that, as a result of this change, the project did not contain any project component that was really in line with the activities and objectives of STOWA. One of the reasons that STOWA remained officially involved was that the project could only be transferred to another country on the condition that the same partners would remain involved. According to the HKV expert, the project was still relevant for STOWA as it invested considerably in the development of FLIWAS. The application of FLIWAS in an international project proves the relevance of FLIWAS to its participants (i.e. it legitimizes its investment). The HKV expert also mentioned that international activities in itself are not part of the core business of STOWA [I5]. We did not verify this with employees of STOWA.

HKV is an international consultancy company (of Dutch origin) in the field of water management with a focus on issues related to water and safety. HKV also participated on behalf of STOWA in the NOAH project. As a result of their involvement in FLIWAS, HKV experts have detailed knowledge and experience on FLIWAS. The motivation of HKV to participate in the project was to apply this knowledge in Eastern Europe in order to strengthen its market position in this region [D3]. One of the experts involved noted that FLIWAS matches very well with the organizational goal of HKV, which is to deliver high-quality research and consultancy services in the field of water management and safety [I3]. All experts of HKV emphasize the importance of strengthening the position of HKV in Eastern Europe. One expert stated that the project is a pilot study that aims to generate follow-up projects [I3]. Another expert explained that FLIWAS is an umbrella for other studies and applications. Eastern Europe, including Romania, forms an important potential market for HKV. As HKV had been involved in flood risk projects in Romania before, it was relatively easy to implement the project in Romania. It was further an opportunity to strengthen and maintain the network of HKV in Romania [I2]. Another expert also mentioned that other chances to strengthen the market position of HKV in Eastern Europe are limited as the tariffs of HKV experts are usually too high [I5].

Besides that the project fitted very well with the organizational goals of HKV, the experts involved were also personally motivated to participate. One of the HKV experts noted that after being closely involved in the development of FLIWAS, he was eager to test the applicability of FLIWAS in other regions. His ambition was to implement FLIWAS in order to prove that the application is also useful in another context [I5]. Another expert stated that he really believed in the added value and wanted

to 'prove' the usefulness of an integrated information system [I3]. Both experts further noted that they also just like to be involved in international projects [I3, I5]. Another HKV expert especially liked to be involved in a project with RWB-Banat as he established good relations with some of its employees during a previous project [I2]. The project thus fitted very well both with the organizational goals of HKV (especially to the goal of strengthening its position in Eastern Europe) and with the personal goals of HKV experts (apply their expertise abroad). HKV experts also had a positive self-effectiveness assessment, i.e. they believed that they could contribute with very relevant expertise.

Royal Haskoning is an international consultancy company (of Dutch origin) that provides services in fields that concern the interaction between people and their environment. Flood risk management is one of their fields of expertise. The company has been involved in various flood information projects of which the results have been used for the development of FLIWAS. Application of this expertise in Romania is expected to benefit partners in Eastern Europe and to strengthen the market position of Royal Haskoning in the region [D3]. Like the HKV experts involved, the expert of H-NL was personally motivated to be involved in international projects and to apply expertise gained during previous projects [I1]. The project thus well-fitted the objectives of H-NL and it had a positive self-effectiveness assessment.

Since 2005, Royal Haskoning was also having a small office in Bucharest that provided services in the domains of water and environment. The water department was mostly active in the drinking water and wastewater sector. Due to a lack of projects the office was closed down at the beginning of 2011. H-RO participated with one senior expert of Dutch origin and one expert of Romanian origin [own observations]. The expert of Romanian origin explained that the project itself was mostly interesting for Haskoning in general as H-RO does not apply for projects itself but becomes involved through H-NL. As H-RO had too little projects in the period that the pilot project was implemented, any project was of interest to H-RO. The H-RO expert had no specific experience in projects related to flood management. She initially participated mostly as it was part of her job. The project was, however, much more interesting as expected. The development of the communication plan was new and interesting. Besides this, H-RO experts could really contribute something to the project, i.e. their local expertise. The project also showed the importance of communication, which is the field to which H-RO contributed [I9]. We further observed that when the project was still running, H-RO was still looking for opportunities to expand its market position in Romania. River basin management was one of the domains in which they were looking for projects. Experts of H-NL were also active in this field, with the support of H-RO, in the south of Romania [own observations]. The project thus fitted well with the ambitions of H-RO. They also perceived that it could contribute to the project with their local expertise.

### 3.1.2 Romanian experts and stakeholders

The Romanian partners were mostly interested in FLIWAS as a potential tool to fight floods. Last years, Romania was affected by floods throughout the country on a yearly basis. During the kick-off meeting, the head of DESM stressed the importance of a warning and information system for flood management in Romania. She is therefore very much interested in the results of the pilot project [D7]. In an interview, she mentioned that following the devastating 2005 floods the Romanian government started to realize that flood problems were not only caused by poor infrastructure but also by the lack of data collection, information systems, hydraulic models and decision-support systems. The medium and long term strategy for flood risk management (implemented in August 2010) therefore also concentrates on these issues. She further explained that the transfer of expertise from the Netherlands to Romania is very relevant. In her opinion, the Netherlands is one of the forerunners in flood risk management and brings very relevant expertise to Romania [I16]. This was confirmed by the State Secretary of MEF, who stated during the last meeting that he was

pleased with the Dutch-Romanian cooperation as it is widely known that the Netherlands have a rich expertise in water management [O7]. The technical director of NIHWM explained also that there is currently a lack of experts at NIHWM and that she therefore also appreciates the cooperation with the Netherlands [I4]. According to a NIHWM expert, he was probably asked to participate as he had been involved in other projects. The participation of NIHWM was rooted in the fact that it could contribute data and information and has relevant expertise in the field [I6]. Another expert, who was asked to participate, noted that she always enjoys to be involved in projects and to learn new things. During the project, she was disappointed about the communication on the project. As a result, she and her manager even considered to withdraw from the project. Once the project was finished, she was again disappointed as nobody ever informed about the project [I10]. This shows that both experts personally liked to participate and believed that they had some relevant experience but also perceived it just as being part of their job. Because of poor communication, one expert became less motivated to participate in the project but she remained involved until the end.

Experts of RWB-Banat explained that their reason for participation was that there is a need to fight floods and that FLIWAS could be a relevant tool in this context [I7]. The urgency to improve flood risk management in Romania was also emphasized by other stakeholders of Banat region. The vice-prefect of Timiş County explained that it is highly important to have access to all relevant technical information for adequate flood risk management [O2]. The usefulness of FLIWAS was also emphasized by a representative of the county inspectorate, CIES [O4]. What probably also played a role in the participation of RWB-Banat is that the RWB is and wants to be perceived as one of the forerunners in the country. RWB-Banat experts proudly explained that all international projects at RWB-Banat were pilot projects in Romania [I7]. According to the director of RWB-Banat, its RWB is among one of the RWBs that is best prepared for floods [O2]. Romanian experts and stakeholders were thus especially motivated to learn about how to effectively reduce flood risks. RWB-Banat was further proud to be the first RWB in the country to implement FLIWAS. What probably also played a role in this is the political background of the director of RWB-Banat (see also subsection 3.2.2).

### 3.1.3 Synthesis

When comparing the motivations of the consortium and the Romanian partners, we observe that the consortium is motivated to transfer expertise and Romanian partners are motivated to learn. For the consortium, the project is important as it provides them with the opportunity to strengthen their market. Personally, the Dutch experts also like to be involved in international projects and believe that they can contribute something. In other words, they have a positive self-effectiveness assessment. The project also fitted with the organizational objectives and expertise of Romanian actors. The project was important to Romanian actors as it could help to reduce flood risks. Romanian experts also believed that they had some relevant expertise to contribute and were willing to learn from Dutch experts. In addition, some experts also participated for external reasons, i.e. it was part of their job. In one case, we observed that the personal motivation of an expert diminished during the process as a result of poor communication. Most experts involved were, however, very positive about their cooperation. We further reflect on these relational experiences in section 3.4.

## 3.2 Cognitions: what actors believe to be true

Cognition refers to the knowledge an actor holds to be true. Cognitions may concern a broad variety of topics, we limit ourselves to cognitions regarding: the nature, meaning and urgency of the problem at stake; the expected and generated directions for solutions; and the relevance and potential of the project in dealing with the problem situation (also in relation to the problem context).

### 3.2.1 Consortium

The consortium explained in its project plan that Romania was, like other Eastern European Countries, several times affected by high water situations and floods during the last few years. Based on these experiences, Romanian water authorities concluded that its current information system was outdated and started drafting a new vision on information exchange during high water situations. It further reads that a high water information system helps to anticipate on floods and flood threats and can eventually contribute to a considerable reduction of flood risks [D3]. During interviews, experts involved especially highlighted that FLIWAS is a tool for information management [I1]. It provides information in case of flood and flood threats [I3]. However, it does not provide a solution to flood problems and cannot prevent floods [I2]. It is a tool that *supports* relevant stakeholders to get the right information, at the right moment to make the rights decision during potential or actual floods [various presentations by NL experts, e.g. O2; O3].

The project did not only aim to contribute to solving flood risk problems but also aimed at strengthening the international position of the Dutch water sector. The consortium expected that the project could serve as an example and basis for other projects in Romania and other countries in the region [D3]. This was also emphasized by experts involved during interviews. The H-NL expert explained that for the consortium and for Partners for Water, the implementation of FLIWAS forms a basis for follow-up projects. Within this context, the project is not just about the implementation of FLIWAS but also about becoming acquainted with as many persons as possible [I1]. A HKV expert explained that FLIWAS is a basic product to which many other consultancy services and applications could be connected. The implemented version of FLIWAS is rather basic and many more components could be added, such as decision-support systems, risk maps and flood forecasting systems. These kind of services could also be provided by HKV [I2]. Another HKV expert explained that he only wanted FLIWAS to be implemented and that he did not expect that the pilot would result in the operational use of FLIWAS [I5].

Most experts involved were not familiar with the Romanian context when they became involved in the project. One HKV expert mentioned that flood related problems in Romania only became more clear during the project itself [I3]. Another HKV expert explained that, although he was familiar with the existence of flood problems in Romania, the actual problem for which FLIWAS could provide a solution only became clear during the project. He discovered during the project that Romania's emergency management system is quite vulnerable as it highly depends on individuals and individual knowledge. FLIWAS could provide a solution for this as it forces persons involved to arrive at clear agreements and also to establish them. He admitted that obviously knowledgeable persons are still needed to interpret information [I5].

The consortium explained further that an important feature of the project was that it brought people together. The H-NL expert discovered that the Romanian partners with a role in flood management were not familiar with each other. From a communication perspective, the main problem was therefore that persons involved did not know each other. The objective was that persons would become acquainted with each other and develop network relations [I2]. The potential of FLIWAS as a tool that enhances cooperation was also emphasized by one HKV expert. He explained that FLIWAS forces various parties (such as municipalities, CIES and NARW) to discuss their plans and therefore to cooperate. This is extremely useful in Romania as, for example, mayors have very little trust in NARW [I2]. According to another HKV expert, the implementation of FLIWAS also helped to gain a better understanding in the emergency plans. RWB-Banat had a clear emergency plan but it was not always clear which aspects were actually relevant. By jointly analyzing these plans, it became more clear which information actually had to be integrated into FLIWAS [I3].

Bottlenecks and chances related to the project implementation were also mentioned. The H-NL expert mentioned that there were not many difficult decisions during the project but some hurdles had to be taken, for example, related to the installation of the server [I1]. A HKV expert confirmed that the installation of the server was a serious, but also the only, bottleneck [I5]. Another HKV expert mentioned that during discussions about the safety system of Romania obviously bottlenecks, and thus chances, related to the technical implementation were discovered. This led to new insights and to some new ideas [I3]. Another HKV expert mentioned that bottlenecks were mostly of technical nature and related to the application FLIWAS. From an organizational perspective there were no bottlenecks, rather chances to involve people [I2].

Experts had mixed opinions about the future potential of FLIWAS in Romania. The expert of H-NL explained that FLIWAS could potentially be useful but had reservations about its practical use in Romania. The project itself still functions as a showpiece in Romania and beyond [I1]. A HKV expert stated that FLIWAS (the basic application and its components) have been well-designed and are extremely useful. The only aspect that could still be improved concerns IT. He further stated that, as internet access is becoming widespread, even in rural areas, internet tools like FLIWAS are having the future. This does not imply that FLIWAS could replace existing emergency procedures, it is by definition meant to support decision-making [I2]. Although FLIWAS was successfully implemented, the project leader doubted whether it will be used in the near future. To replace existing communication means by FLIWAS requires that persons trust and are committed to FLIWAS. One of the steps that has to be taken first is to organize a large-scale exercise, with all kind of external stakeholders. He further explained that it is important to migrate the data to the Romanian server. The reason is that only than it would be possible to automatically import measured data. As long as data have to be inserted manually, Romanian actors cannot start using FLIWAS next to their normal system [I5]. The H-RO expert explained that FLIWAS has a great potential as it is very easy to use. It especially has potential if it is implemented along the whole Danube river [I9].

If FLIWAS would become operational in Romania, one of its main advantages would be that it would improve communication. The H-RO expert explained that she discovered the potential benefits of FLIWAS only during various meetings and especially during the exercise. According to her, one of the main benefits of FLIWAS is that it allows for a faster response in case of emergencies. FLIWAS could replace the exchange of formal letters between the local and national level by a press on a button. The introduction of emergency plans into FLIWAS further implies that actors involved do not have to look up emergency procedures in 'big books' but that FLIWAS provides them with a list of measures [I9]. A HKV expert confirmed that FLIWAS could replace the use of telephone or fax by a press on a button. The main advantage is that messages could be standardized which means that the system is less dependent on individuals [I5].

### 3.2.2 Romanian experts and stakeholders

FLIWAS was perceived by the Romanian partners, first and foremost, as a tool for improved flood risk management. The director of DESM stressed during the first meeting the importance of a flood warning and information system and was therefore very much interested in the project results [D7]. In response to a question about the relevance of FLIWAS, an expert of RWB-Banat firmly stated "we have to fight floods and FLIWAS is a tool that can support this" [I7]. This opinion was also shared by other stakeholders. The vice prefect of Timiş County mentioned the 2005 floods and the need to have adequate technical information in flood risk management [O2]. According to RWB-Banat, FLIWAS could potentially have a role in managing, analyzing and supervising flood risk management tasks [I7]. According to a NIHWM expert there are probably communication problems in Romania. The added value of FLIWAS is that it provides a common framework for communication. It allows others to see what has been done and brings solutions together. This implies that it improves communication between actors involved. It further also increases the speed of information [I6].

Romanian experts also explained that the project itself was relevant for improving cooperation and communication. Cooperation between employees of RWB-Banat was an important aspect for its director. At the first project meeting, he stressed that he would like to involve as many employees of RWB-Banat as possible [D7]. RWB-Banat experts explained that the International Department normally operates quite autonomous. One of the reasons that this project was successful is that it enhanced the cooperation with colleagues of various departments and with many colleagues and with Dutch experts [I7]. This was confirmed also by the technical director of NIHWM who stated that the project was very useful as many Romanian partners were involved. Another benefit of the project was that people were trained [I4]. The project also functioned as an eye-opener. A RWB-Banat expert explained that the whole idea of a supporting internet-based application was totally new to him. The use of FLIWAS further elucidated the measures and actions that are taken during floods, which would normally be unclear to persons who are not directly involved [I7]. One of the RWB-Banat experts that was responsible for communication explained that the manner in which the exercise was organized was also new to her. The participants were asked to work in groups and to communicate through FLIWAS. This differs from the way in which meetings are normally organized, i.e. around one big table [I7].

Bottlenecks towards the implementation and use of FLIWAS were also experienced. One of the bottlenecks during the project was the installation of the server. According to a NIHWM expert this was mainly a communication problem [I6]. A director of NIHWM perceived it rather as a bottleneck that was caused by a lack of funds [I4]. Another bottleneck that was mentioned concerned the availability of data. A RWB-Banat expert explained that the implementation of FLIWAS was relatively easy for the Timiş river as data were already available [I7]. A NIHWM expert confirmed this. He explained that FLIWAS could be implemented for the Banat region as they already had hydraulic models. The lack of hydraulic models would be a bottleneck in the implementation of FLIWAS in other areas in Romania. He stated that it could be useful if models were existing. He further explained that not all persons at NIHWM had a good understanding of FLIWAS. Some thought that FLIWAS included a modelling module. This is not the case, you need a separate programme for this [I6]. It should be noted that, according to HKV experts, there is no need to have a hydraulic model in order to use FLIWAS [HKV expert, 15 April 2011].

According to RWB-Banat experts, the current implementation of FLIWAS was a little bit less as expected. It was only implemented for the lower Timiş river and should also be implemented for other (interconnected) rivers in the area. Several other actions were also still needed before they could start using FLIWAS. In order to start using also the communication module, they needed to establish a contract with phone operators, and thus money. Another issue is that the automated data from gauging stations are not directly imported in FLIWAS. In the current implementation, data still have to be inserted manually. This implies that FLIWAS only helps to assess the situation. Once it is connected to automated data it could also help to analyse and supervise a situation [I7]. A NIHWM expert mentioned that the automated gauging stations were only implemented recently and are not always functioning properly yet. This would also be a bottleneck in further implementation [I4]. The technical director of NIHWM further expected that the Romanian emergency plans were not ready available in the right format, i.e. rather based on qualitative information and only available in written form. For example, hazard maps that will soon be required by the EU Flood Directive are not yet available in Romania [I4].

Other bottlenecks that were mentioned by RWB-Banat included a lack of trained persons in the field, a lack of tools to implement data observed in the field and the collapse of internet in case of emergencies. FLIWAS can therefore not replace existing procedures but only support them. In addition, the pilot did not include a larger exercise that included persons in the field. The connection

between the application and the field could cause problems, especially when FLIWAS is implemented at a larger scale. This would mean, for example, that not only NARW inserts data but other persons in the field as well. In the Netherlands, FLIWAS is also only implemented at a relatively small scale. It would be very challenging to implement it, for example, for the whole Danube river [I7]. This view is confirmed by an expert of the Dispatch department. During the exercise he experienced that FLIWAS could really help to supervise which actions have been taken in the field. However, FLIWAS could only become operational once persons in the field also have tools (e.g. a handheld computer) to insert field data into FLIWAS [I7]. One of the stakeholders, a representative of CIES, raised this issue also during the exercise. One potential problem is that users do not have access to internet. Another potential problem is that users are not aware when they have to go online. HKV experts explained that the communication module of FLIWAS could solve this problem, which can be used to send messages to mobile phones [O4].

Overall, Romanian partners involved perceived that FLIWAS could be potentially useful in the Romanian context. According to RWB-Banat experts, the project was their most successful international cooperation project. Other projects often only resulted in guidelines or a report. A project in which a hydraulic model was developed also had potential but the model is not really used. This project delivered a much more concrete result [I7]. A director of NIHWM stated that the topic of the project was well chosen, it was not just a mandatory project of MEF but interesting for both the Dutch and the Romanian partners. As regards the usefulness of FLIWAS in general, she stated that Romania is not prepared yet to start using FLIWAS at the national level. In order to extend the use of FLIWAS it would be necessary also to buy another server. It is currently not a good period to make such investments (also because of the economic crisis). For a pilot project, the implementation has probably been sufficient [I4]. The need for another server was also expressed by MEF during the follow-up meeting. The DESM representative argued that the current server was not powerful to include all emergency plans along the Danube. In addition, it was argued that the server should be located at an organization with a role in decision-making, which is MEF [O7].

### 3.2.3 Synthesis

The consortium and other partners all subscribe that floods represent an urgent problem in Romania and that FLIWAS could potentially assist in reducing flood risks. However, all experts involved doubted whether this project would directly contribute to this. Especially Romanian actors still perceived many hurdles towards further implementation and practical use of FLIWAS in Romania, such as a lack of data, trained people and tools. The consortium also stated that additional steps need to be taken to start using FLIWAS at RWB-Banat. During the project itself, actors involved became aware of other benefits of implementing FLIWAS. One of the major benefits was that the process helped to further develop relations between Romanian actors and between Dutch and Romanian actors. The consortium mentioned that the project especially formed an important basis for follow-up project. It also contributed to a better understanding of the Romanian emergency plans and led to new insights.

## 3.3 Resources: capacity to act and sources of power

Resources provide actors with the capacity to act and may – in a relational setting – be used as sources of control (power). Resources become visible through: involvement (human resources), knowledge (information and expertise), funding (financial resources) and power to get things done (institutional resources in the form of roles and responsibilities). In our description, we distinguish between available and contributed resources and between attributed resources. The resources that are attributed to an actor by others is an indication of power.

### 3.3.1 Consortium

AVAILABLE AND CONTRIBUTED RESOURCES

Until the end of 2010, FLIWAS was owned and administered by STOWA (recently FLIWAS was transferred to Rijkswaterstaat). STOWA was planned to play an active role in the implementation of FLIWAS in Slovakia [D1]. When the project was transferred to Romania, an expert of STOWA was formally still the project leader. STOWA also contracted a company for the project administration and a FLIWAS expert of a Dutch Water Board to give a presentation of FLIWAS during the kick-off [D3]. The contracted FLIWAS expert did not attend the first mission but was planned to give a presentation at the final conference. Eventually, he could not attend the conference as it was impossible to travel by air at that moment (because of a volcano eruption in Iceland) [O1; O5]. HKV explained that most of the (limited) project budget of STOWA was transferred to HKV [I5].

In terms of human involvement (hours), HKV was the most important partner in the project [I1]. HKV participated in the projects with three experts on water management. One expert had been closely involved in the development and implementation of FLIWAS (in the Netherlands and Germany). Besides this international project, he had been involved in one other international project on the development of a high water information system in Bulgaria in 2008. He visited Romania, together with a colleague of HKV, for the first time in April 2009. He was also the person that initiated the transfer of the project. He was planned to be the project leader of the project but could eventually only attend the second project mission (due to holidays he could not attend the first mission, due to illness he could not attend the third and fourth mission and due to air travel problems he could also not attend the final conference) [I5]. The role of deputy and interim project leader was fulfilled by another expert of HKV who had also been involved in a previous project at RWB-Banat. He was involved to contribute local knowledge and to support the dissemination of project results [D3]. He was not only familiar with RWB-Banat but also knew persons at NIHWM, MEF and DESM. As he was familiar with all project partners, he was planned to participate during the first mission to introduce persons to each other and during the last mission for networking and marketing [I2]. Due to illness of the initial project leader, he also became the formal leader of the project during the second half of the project. During the last three missions, this expert especially fulfilled a coordinating and mediating role (especially related to the server and to geographic data). Besides this, he also prepared additional flood scenarios that were also used during the exercise [D15; I10]. The third HKV expert was involved to support the implementation of FLIWAS [D3]. He had never been involved in any international project but had been involved in the implementation of FLIWAS in the Netherlands. He contributed to various technical implementation aspects of this project. He was involved in the development of manuals (i.e. a operational user manual and a technical implementation guide), provided trainings, analysed emergency plans and provided on-the-job training of Romanian partners [I3; D7]. As regards the expertise of HKV, one of the experts mentioned that one of the success factors of the project was that HKV experts really mastered the content of FLIWAS and could therefore even do things on distance [I5].

HKV contracted the German company L&W to install FLIWAS on the Romanian server [D3]. L&W is a German-based company for software development, which also developed FLIWAS. They offer services related to the implementation and adjustment of FLIWAS software (Website Leiner & Wolff 2011). L&W dedicated more of its time to the project as expected as it did not have access to the server in the beginning. L&W also assisted HKV with the development of maps. The project leader had the expertise for this but was not available due to illness [I5].

In the initial project plan (for Slovakia), H-NL was planned to be involved with two experts in the field of water management. Both experts were replaced by another expert (who was project manager at

H-NL) when the project was transferred to Romania. H-NL has been involved in two predecessors of FLIWAS, i.e. the development of an Automated Scenario High Water and the revision and extension of the Netherlands High Water Information System. H-NL was also involved in the development of FLIWAS in the NOAH project [D3]. The expert of H-NL had been involved in the Automated Scenario High Water project (around 2001) and had also several years of international project experience. Besides this, she had extensive experience in project communication. She had been involved in various projects on high water in which she often fulfilled a role on the interface between content and process. Her role in the project was to support communication and knowledge dissemination. H-NL and H-RO were both key actors in the implementation of the communication component. The expert of H-NL mentioned that the additional advantage of the communication component was that it also compensated that the technical implementation was not always progressing as planned. This implied that the project never stagnated and that persons involved remained enthusiastic and committed. As regards the implementation of FLIWAS, the role of H-NL and H-RO was rather to supply necessary information and to support the implementation [I1].

The project involved two experts of H-RO. Both experts have been active for several years, especially in the organizational and institutional development of water and wastewater companies. Within the context of these projects, the director of H-RO also developed a good relationships with key persons at MEF [I9; own observations]. The (Dutch) director of H-RO was involved in FLIWAS for its network in Romania and to support dissemination of the project results [D3]. He participated at the kick-off meeting in Bucharest, facilitated and presented at the final conference and attended the follow-up meeting at MEF [D7; O5; O7]. The (Romanian) expert of H-RO, a consultant in the field of communication and human resources, fulfilled the role of local project secretariat [D3]. The expert contributed especially to the development of the communication plan and promotion materials and the organization of the final conference [I9]. H-RO also contributed to potential follow-up by preparing a first draft for potential follow-up of the pilot project [email, H-RO expert, 14 April 2010].

Other Dutch actors that contributed to the implementation of the project include Partners for Water and the Dutch embassy. The Dutch funding agency Partners for Water financed the majority (80%) of the project costs of the consortium [D1]. A project advisor of the Dutch embassy participated in the last conference and also played a role in facilitation of the follow-up meeting at MEF [O5; O7].

ATTRIBUTION BY OTHER ACTORS INVOLVED

Except for HKV, none of the project partners had any direct contact with STOWA about the project. HKV explained that STOWA had been a key actor in the development of FLIWAS. Until the end of 2010, STOWA was also an important organization for the support and maintenance of FLIWAS [I5]. In the project, STOWA was planned to have a management function, a role which they did not fulfil. The tasks of STOWA were never officially transferred to HKV but the hours of STOWA were eventually transferred to HKV. This was a satisfying arrangement for HKV [I2]. That STOWA was not involved also had the advantage that more hours were available for the project content [I5]. The H-NL expert explained that the only aspect in which STOWA was still involved was the financial administration; declarations to Partners for Water were first sent to STOWA [I1].

According to H-NL, HKV fulfilled a key role during the project, i.e. HKV experts proposed to transfer the project, prepared a new proposal and progress reports, and contacted Partners for Water and STOWA. HKV also led the project [I1]. According to H-RO, it was of added value that one HKV expert was familiar with RWB-Banat. This supported the financing and implementation of the project [I9]. RWB-Banat and NIHWM especially emphasized the role of HKV experts with knowledge and know-how on FLIWAS. Especially the project leader was a real expert in the field of FLIWAS and came up with ideas on how to implement FLIWAS. HKV also provided the trainings on FLIWAS [I7; I6]. As regards the installation of the server, the IT expert of NIHWM mentioned that the HKV experts were

nice and friendly but lacked the IT expertise needed to support her with the installation of the server. She expected that this support would be given by L&W. However, this was not really the case. In the opinion of the NIHWM expert L&W reacted late on emails and only communicated that the server was not working without explaining why it was not working. As a result, the IT expert of NIHWM got the impression that L&W experts only knew how to install FLIWAS and had no knowledge on how to install the server itself [I10]. Another NIHWM expert (who was included in the email exchange) explained that NIHWM was sending emails, received a reaction from L&W that the server was not working, made modifications and subsequently did not receive any reaction for several weeks [I10]. According to a HKV expert, L&W did more as was expected from them. He further mentioned that communication may not be their strongest skill and that differences in knowledge play a role [I5]. It should be noted that we did not interview L&W experts. However, our own analysis of the email communication showed that NIHWM and L&W were only brought in contact in the end of November. At that moment, the L&W expert was out of office for about one week. When they reacted they did not answer the questions of the NIHWM expert. However, the email contact was especially in the beginning of December quite intense [I10].

HKV experts confirmed that the role of H-NL and H-RO was to support implementation. In the initial plan, H-NL would only be involved and also contribute to the technical implementation of FLIWAS. When the project was transferred to Romania, it was decided also to involve H-RO. H-RO did a lot of direct communication in Romania, i.e. operational project management, what HKV could not do on distance [I5]. H-NL mentioned that the involvement of the Romanian expert of H-RO confirmed the added value of involving someone who speaks the native language and lives nearby [I1]. A HKV expert mentioned that the involvement of local persons of H-RO, even someone who speaks Romanian, was one of the success factors of the project [I5]. Another HKV expert mentioned that it was of added value to pay explicit attention to communication as this also created commitment among the Romanian partners. According to him, communication is crucial for the project itself as well as for its follow-up [I2].

Romanian partners are generally having the opinion that Dutch expertise is of added value to Romania. The head of DESM explained that floods could potentially cause a lot of damage in the Netherlands. It therefore developed very high standards and invested a lot in technology and research. The transfer of know-how from the Netherlands to Romania is very relevant, especially in case of complex problems [I15]. RWB-Banat experts explained that they only cooperated with Dutch partners on flood risk management and that Dutch experts are probably the best in this domain. Their expertise is especially relevant in relatively flat regions, such as Banat. In the mountainous parts of Romania it is less relevant [I7]. Another RWB-Banat expert confirmed that Dutch experts probably lack specific expertise on flash floods, which is a major problem in Romania. Still, the Dutch approach is very useful as they approach problems in a very organized and structured way and have a lot of knowledge on water management and flood defence [I8].

### 3.3.2 Romanian experts and stakeholders

#### AVAILABLE AND CONTRIBUTED RESOURCES

Since the establishment of its International Department in 2006, RWB-Banat participated in several international projects. This included four Dutch-funded projects (related to heavily modified water bodies, flood risk management, ground water and decision support systems). The one on flood risk management was implemented in cooperation with HKV (see also 2.2.1) and included the development of a hydraulic model (using Sobek) of the lower Timiş river. The existence of this model was probably one of the reasons that Banat region was selected for the pilot. Several experts of RWB-Banat were also trained in the use of Sobek. One of them was still working at Dispatch during this project, the others already left the organization [I7]. The existing flood scenarios that were

prepared in Sobek during the previous project were used in FLIWAS and complemented with new scenarios [D7]. It should be noted that a hydraulic model is no pre-requisite for using FLIWAS [HKV expert, 15 April 2011]. According to RWB-Banat experts, another reason for implementing FLIWAS for the lower Timiş river was that automatic monitoring stations have already been installed. Not all rivers in the area are constantly monitored. RWB-Banat experts were familiar with this part of the river; maps and other data were both existing. This eased the implementation of FLIWAS [I7].

RWB-Banat participated with a considerable number of persons in various meetings and activities (e.g. 23 persons at the kick-off meeting, 15 at the stakeholder meeting and 11 at the exercise). The director of RWB-Banat was also actively involved in the project. He participated, at least partly, in all meetings and had short meetings with the project leader and interim project leader [D7; D10]. In the actual implementation, three experts of the International department played a key role. Two of them had an educational background in geography and were already working at RWB-Banat since 2005. The other expert was educated in languages and worked for less than a year at RWB-Banat and since March 2009 at International. One expert (interim head of International) coordinated the technical implementation of FLIWAS, one was responsible for communication and another assisted in the organization of meetings. All three experts also contributed to the translation of documents and presentations. The expert responsible for the technical implementation was contact person for various departments and integrated all information. He also fulfilled the role of 'catalyst'. He mediated when communication between experts of RWB-Banat and HKV was not developing smoothly. He also contacted the IT expert of NIHWM and suggested to discuss the installation of the server on Skype [I7].

Besides these experts of the International department, RWB-Banat was involved with experts of various other departments (see also subsection 2.2.3 and Figure 8). According to the International Department, RWB-Banat contributed to the technical implementation of the project by selecting the project area and providing data and information on: the river section (dikes, weirs and polders of which most were already inserted in the hydraulic model Sobek); names of persons responsible for dike monitoring; historical and actual data about discharges and water levels (by Hydrology), latitude and longitude of dikes (by Forecast) procedures for operation of structures at polders (by Maintenance); warning levels and flood defence plans at the local level and at the county level (by Dispatch); and dike levels and coordinates (by Cadastre) [I7]. Two experts of RWB-Banat (one of International and one of Dispatch) participated in all trainings and inserted most data into FLIWAS. They were assisted by another expert of Dispatch who had specific knowledge related to, e.g. the locations of gauging stations, the warning levels, and the persons responsible for dike monitoring [I7; I8]. Soon after the project was finished, the Dispatch expert who was trained in FLIWAS went on maternity leave for a period up to two years. As a result, there is currently no expert at Dispatch able to use FLIWAS [I8]. The RWB-Banat experts who participated in the FLIWAS trainings used to look up the application from time to time. When the Dutch server was moved (end of 2010) they had no longer access to the Romanian FLIWAS version [I7].

RWB-Banat experts also contributed to the communication component. The expert involved explained that she prepared press releases in cooperation with the Communication department. They further put materials on the website and cooperated with H-RO in the development of promotion materials (poster). According to the expert involved, the Communication department and the director of RWB-Banat are having good relationships with the press. As a result, the project was mentioned in various newspapers and on radio and TV. RWB-Banat further helped to organize the meetings, i.e. invited stakeholders and arranged catering. During and after the project, RWB-Banat experts also presented FLIWAS on several occasions [I7; see also Annex C].

NIHWM was involved with four experts each of them representing another department. One of them worked at the laboratory where they process data of hydrometric stations. He participated in the MOSES project and initiated the project [I4]. According to his colleague, he also participated in both trainings at RWB-Banat but the mission reports show that he probably only participated at the administrator training [I4; D10; D15]. According to his colleagues he initiated the project but further played a role at the background (i.e. he did not make any concrete contributions towards the project) [I4; I10]. Another expert was educated at the hydrotechnical faculty and worked at the Water Management department of NIHWM. He had some experience with project-based work, which he gained during two studies in which he had been involved. He also participated in a two-week course, which was given in the Netherlands, on the application and implementation of EU projects. He had no specific experience in the use of software for flood risk management. His contribution to the project was to connect actors involved (NIHWM with RWB-Banat and the IT department with the consortium) and to provide (some) information on gauging stations. He further participated in both trainings. According to him, NIHWM could mainly contribute with their knowledge on flood warning and forecasts [I4].

The third expert was an IT specialist who was involved for the installation of the server. She had always been interested in IT and participated in some IT training after her study. At NIHWM, she had been involved in several other international projects that involved the configuration of a server. In those projects, the servers were based on Microsoft and fully installed when they arrived. She only had to administer these servers and to introduce them into the network. She had no experience with the installation of a server nor with Linux-based servers, which was required for this project. Her role in the project was to arrange and install a server and an internet domain (both were paid for by NIHWM). In this, she was supported by several friends and colleagues of NARW. She also administered the server once the project was finished and decided (some time after the project was finished) to turn it off as nobody was using it [I10]. According to her colleague, NIHWM has some IT expertise but for projects like FLIWAS it would normally involve a specialized company. Especially as the IT expert at NIHWM never worked with a Linux server before [I6]. HKV offered at the end of the project to hire an external IT company but at that moment it was no longer needed. If this would have been offered in the beginning of the project, the IT expert of NIHWM would certainly have accepted the offer. According to her, the server was crucial for the project and it would have been better if it had been installed much earlier [I10]. The installation of the server was the main contribution of NIHWM to the project [I10; I4]

The fourth expert of NIHWM (Public Relations department) was involved in the communication component of the project. This expert sent the invitations for the final conference and to the press (with which they had contacts) [I9]. She also arranged that the brochure and posters could be printed at NIHWM [own observations]. In addition to these four experts, the technical director of NIHWM was also involved in the project. She participated during various meetings and explored ideas for follow-up. In total, about thirteen employees of NIHWM (including the scientific director) attended the progress meeting in Bucharest [O3]. Participation of the other Romanian partners was limited. The head of DESM and the head of Dispatch participated in the first meeting and in the follow-up meeting in Bucharest. A few regional stakeholders participated in the stakeholder meeting and the exercise. The last conference was attended by representatives of most RWBs and a few other stakeholders (see Annex B).

ATTRIBUTION BY OTHER ACTORS INVOLVED

Actors involved all stated that NIHWM and RWB-Banat were key actors in the implementation of FLIWAS [I1; I2; I6]. As regards the general expertise of Romanian partners, a HKV expert mentioned that this varies largely and highly depends on the persons involved. The RWB-Banat expert that coordinated the technical implementation, for example, may not have all required substantive

expertise but understands how things work and has communicative skills. Persons with substantive expertise or communicative skills are of high value in projects [I2]. The HKV experts that had not been working in Romania before mentioned that Romanian experts were more awaiting than they expected. In their experience tasks were executed but only if it was explicitly asked for. Experts were further not always having the level of expertise or education as high as in the Netherlands [I3; I5]. According to the H-NL expert this awaiting attitude also applied to people involved in communication. However, in her opinion, Romanian partners also reacted fast and adequate, for example, on emails. Except for an expert of RWB-Banat there were usually no substantive comments on proposals. However, if necessary a NIHWM expert referred to procedures or verified names [I1].

According to RWB-Banat, NIHWM experts were only to a certain extent involved in the implementation of FLIWAS. They participated in trainings and were further responsible for the installation of the server [I7]. According to the project leader, the reason that the server was installed at NIHWM was that a representative of NIHWM stated 'we can do that'. Only later, it appeared that NIHWM experts never installed a server before. Therefore, it was obvious that this initially went wrong. The project leader stated, with hindsight, that if he would have been aware of this beforehand, he would have asked an expert of L&W to visit Romania [I5]. The deputy project leader explained that he did not expect that the installation of the server would cause problems. At the same time, it was to be expected as government organizations usually do not employ highly skilled IT personnel. He therefore considered during the last month of the project to contract an IT company in Bucharest to solve the problems. This was not necessary in the end. In his opinion, the IT expert at NIHWM worked hard, was committed and succeeded eventually [I2]. The expert of H-NL confirmed that there was willingness to cooperate, which helped to overcome the bottlenecks related to the implementation of the server [I1]. The H-RO expert had the impression that the IT expert of NIHWM was just told to install the server; that nobody asked her whether she had experience in this and that nobody explained what was expected from her. This led to the impression that the IT expert was not knowledgeable, which was not the case [I9]. As regards the quality of the installed server, the HKV experts explained that NIHWM combined new and old components which resulted in a server that had less storage capacity as specified by HKV. It could therefore not be used for the full implementation of FLIWAS in Romania [emails HKV experts, 28 April 2011]. MEF also stated that another server would be required in case of follow-up projects [O7].

The problems with the installation of the server raised the question whether NIHWM was the right organization for this. With hindsight, a NIHWM expert stated that it would have been better if the server would have been installed at NARW. He explained that NARW also has access to relevant data and information and NIHWM is subordinated to them. However, he is also not sure whether they have the required IT expertise [I4]. The IT expert stated that if the server would have been installed at another organization it would not necessarily have been better. It would only have been better if it could have been installed quicker. Even now, she involved colleagues of NARW in the installation of the server [I10]. The project leader explained that it was not important for the consortium at which organization the server would be installed as long as the server installation was in line with the right specifications. To what extent organizations differed from each other, in terms of expertise or scope, was and still is difficult to estimate for the consortium. If one of them would be more policy-oriented and the other more technically-oriented, it would have been logical to install the server at the latter [I5].

DESM and NARW did not have an active role in the implementation of FLIWAS. The deputy project leader stated that they were involved to support the project, which they did. The head of DESM and the director of NARW, for example, attended the start-up meeting in Bucharest [I2]. The H-NL expert mentioned that the head of DESM was involved at the background and also attended the last

meeting at MEF. She further stated that hierarchy is much more important in Romania than in the Netherlands. This is an aspect that has to be taken into account during a project [I1]. Within this context, the project leader mentioned that the initiator of NIHWM appeared to have access to the right persons and network. He eventually brought the project team in contact with the head of DESM and the director of NARW, which appeared to be very useful [I5]. The experts that implemented FLIWAS did not attribute any concrete contributions to NARW or DESM [I4; I7].

Besides the project partners, several other stakeholders were involved in the project. According to RWB-Banat, CIES is one of the most important stakeholders during emergencies. They inform Local Councils (mayors) and measures are always taken via them [I7]. A director of NIHWM mentioned that the involvement of mayors was especially important, also in order to improve the relation between mayors and MEF [I4]. A NIHWM expert further mentioned that local councils play a key role in monitoring emergencies [I6].

As regards the future use of FLIWAS by Romanian partners, a HKV expert mentioned that most people should be able to use FLIWAS. The capabilities to implement FLIWAS, and especially to maintain it, may not be available at all Romanian institutes. For support and maintenance it may be necessary to involve a private company [I2]. Another HKV expert mentioned that the substantive expertise to use a system like FLIWAS is available in Romania. However, there is still a need to integrate the system in the daily work of experts so that the system can support also the sharing of knowledge. This process also took time in the Netherlands but will probably take even more time in Romania as experts are not used to share information [I5]. Romanian experts further mentioned several bottlenecks towards the actual use of FLIWAS, such as the lack of trained personnel, models hazard maps, inadequate measurement stations, communication tools and server capacity (see subsection 3.2.2). The project leader explained that the main requirement was still to migrate data to the Romanian server in order to also start the automatic import of measurements [I5].

### 3.3.3 Synthesis

An analysis of the contributed and attributed resources showed that actors involved (see also Figure 7) were relevant for various reasons. Financial resources were mostly provided by the Dutch agency Partners for Water. Small financial contributions were further made by Romanian partners, i.e. to purchase the server and the domain and to print brochures. RWB-Banat was an important source of information, whereas HKV, H-NL, H-RO and NIHWM played an important role in providing know-how. The direct involvement of other partners, i.e. STOWA, DESM and NARW, was limited but their involvement was still perceived as being relevant as they had power to get things done (access to institutional resources). The analysis further shows that Romanian actors attributed high-level expertise to Dutch experts. Dutch experts especially attributed resources to individuals, i.e. knowledgeable experts and managers with the capacity to influence.

## 3.4 Relations: existence and development

This section elaborates on developments in the relational domain. This aspect is discussed separately as positive relational experiences contribute to the willingness to trust and thus to continue the cooperation. Existing relations may further explain why actors are motivated to participate.

### 3.4.1 Existing relations

The organizations that participated in the consortium cooperated with each other before. However, most of the experts involved had (probably) not been involved in a joint project. One of the exceptions was the cooperation between experts of HKV and STOWA in the development of FLIWAS. In addition, the director of H-RO was already familiar with several experts involved, i.e. the expert of H-NL and one or more experts of HKV [own observations; email, expert H-NL, 25 July 2009]. The

Romanian partners, i.e. DESM, NIHWM, NARW and RWB-Banat, were all having professional relationships with each other (see subsection 2.1.3). According to RWB-Banat experts, it never implemented a project in cooperation with NIHWM. They are normally just having a professional relation with them [I9].

As regards the relations between the consortium and Romanian partners, HKV already had connections with all of them. As organization, HKV had been involved in several flood risk management projects in Romania. One HKV expert cooperated with NIHWM and NARW within the context of the projects NOAH and MOSES [I5]. Another HKV expert was involved in a previous project at RWB-Banat. Within the context of this project and other visits to Romania (e.g. for a scientific conference in Timişoara and a Dutch-Romanian meeting in Bucharest) this expert was already familiar with all Romanian partners [I2; own observations]. The technical director of NIHWM mentioned that she already had a very good connection with this HKV expert [I4]. RWB-Banat also developed a very good relation with this expert. The director of RWB-Banat especially thanked his *friend* of HKV during the stakeholder meeting [O2]. According to experts of RWB-Banat, the director is having a very positive impression of this HKV expert [I7]. They also explained that the previous project with HKV has been their most successful international project. What played a role in this was communication, which is supported by the development of a good relation and trust [I11]. Another expert (Cadastre) mentioned also that she developed a very good relation with the HKV expert, that he was like a son to her [O2].

### 3.4.2 Cooperation experience

Experts of HKV, H-RO and H-NL were all very positive about each other's role in the project and their cooperation. They both appreciated each other's input and also enjoyed the project itself [I1 – I3; I5; I9]. The consortium cooperated most intensively with experts of RWB-Banat and NIHWM. This cooperation was not without problems (see subsection 2.3.1 on communication). According to H-NL, there was also contact at the background between the consortium and the head of DESM. The interim project leader called her several times to keep her informed and the director of H-RO was also in contact with her, also for other projects [I1]. According to the expert of H-RO, the success factor of the project was the close cooperation between Dutch and Romanian experts. Romanian partners were eager to learn and enthusiastic. What played an important role in project management and implementation is that the interim project leader knew the people involved at RWB-Banat. According to her, you could see that people already had a good relation and therefore formed a real team. It would have been impossible to develop such relation within a few months time [I9]. The project leader mentioned that he regretted his limited involvement, which also caused that roles were not clear from the beginning [I5]. The expert of H-RO noted that the project leader was not really accepted and people kept asking for the interim project leader (with whom they were familiar) [I9].

According to the project leader, one of the success factors of the project was that Romanian partners were committed to install FLIWAS and to spend time on this. Another success factor was the trust of the consortium towards Romanian partners and vice versa. He especially trusted the willingness of Romanian partners. He was, for example, surprised to observe that both the technical and scientific director of NIHWM were present at the progress meeting. This showed that they were really committed to the project. The overall cooperation was very good, experts were always available if the consortium wanted to have a meeting. Experts were open and supportive and dedicated time to participate [I5]. Various experts, however, also mentioned that experts at RWB-Banat were more awaiting as expected [I1; I3; I5]. A HKV expert explained that this led to a different form of cooperation than expected [I3]. Another expert described that actions were only taken if the consortium asked for it. On the other hand, experts were also available when they were asked for input [I5].

Romanian actors were also satisfied about their cooperation with the consortium. The technical director of NIHWM stated during the final conference that the project had been a positive experience, especially because of the involvement of young people and the good cooperation [O5]. During an interview, she stated that she really enjoyed the cooperation with the Dutch team. She reiterated that Dutch people are direct in their communication. She said again that she enjoyed that people involved were young and open. She further stated that the project was not only successful in terms of its content but also because of the very good cooperation in the team [I4]. This was confirmed by the director of RWB-Banat in his satisfaction letter. The letter reads that a "sustainable relation has been developed between Romanian beneficiaries and Dutch consultants. The good results of the project are a direct consequence of the good cooperation between the joint team." It further reads that "in any project successful results depend a lot on the cooperation frame, the mutual understanding of the project goals and the close relationship between the project team". It is expected that the "close relationship" that was developed during the project forms a basis for follow-up activities of FLIWAS at the national level [D18].

Experts of RWB-Banat stated that the cooperation was excellent. One of them added that one of the main reasons that the project was successful was that they cooperated with familiar people, i.e. experts of HKV and experts of RWB-Banat. They also explained that it is not always easy to get experts of other departments involved. Information is often only available in written form, which means that experts have to put an extra effort in digitalizing data. This implies that they need to do extra work without receiving additional payment. The head of a department has to be convinced in order to get experts that far [I7]. This aspect of the cooperation was also emphasized by the IT expert of NIHWM. She explained that the project had to be implemented next to her regular work. In her case it even meant that she had to study during weekends and in the evening [I10]. One RWB-Banat expert explained that this leads in some cases to the feeling of being 'patronized', i.e. a situation in which Dutch experts are just giving orders [I7]. This feeling probably also played a role in the implementation of the server. The IT expert of NIHWM explained that it was a negative experience because of poor communication. She asked for assistance and posed questions of which many remained unanswered for some time [I10]. Some of the emails were short or only observed the problem [I10; I6]. What also played a role, according to the expert of H-RO, was that her competence was openly questioned. An underlying problem was probably that expectations were unclear at the beginning, i.e. that people had a different understanding [I9].

### 3.4.3 Synthesis

The project was largely based on existing relations. Both Dutch and Romanian actors stated that the cooperation was very good. Dutch actors valued the openness and commitment of Romanian actors. Romanian partners emphasized the importance of close cooperation and the development and existence of relationships. The importance of relationships also explains, at least partly, why cooperation on the installation of the server was perceived as poor. Actors involved felt that there was a lack of communication and that their efforts were not appreciated. The experts of RWB-Banat stated quite the opposite. According to them, they sometimes felt patronized in other projects but this was not the case in this project.

# 4 Project evaluation

This chapter evaluates the effectiveness of the project in relation to the following goals: (1) contributes to the solving of water management problems in the benefiting country; and (2) generates follow-up projects for the Dutch water sector. This chapter starts with an assessment of the process and its immediate outcomes using six process criteria and four immediate outcome criteria. These criteria provide additional insight in the effectiveness of the project as they explain and predict the likelihood that the project will contribute to the realization of the overarching goals. Section 4.1 presents an assessment of the process. Section 4.2 presents an assessment of the immediate project outcomes. The last section reflects on the extent to which the project is expected to contribute to the realization of the programme goals. This chapter builds upon theoretical insights that are presented in section 1.4.

## 4.1 Evaluation of the process

This section assesses the process on the basis of the following criteria: stakeholder involvement, institutional embedding, integration of context-specific knowledge, mutual understanding in communication, pro-active diffusion strategy and adaptive management.

### 4.1.1 Stakeholder involvement

This criteria questions whether stakeholders were actively involved and had the opportunity to influence the process and its outcomes. With stakeholders, we refer to any person, group or organization with an interest in an issue, either because they will be affected or may have an influence on its outcome. The main stakeholders in the development of FLIWAS are its potential users, these are all actors with a role in the management of emergency situations. In the Romanian case, these actors include: various water management authorities (MEF, DESM, NARW, NIHWM and RWBs), authorities for internal affairs (MAI, GIES and CIES) and decentralized public administration (Prefect, County Council and Local Council). Besides this, the general public is obviously also having an interest in the implementation of FLIWAS as they benefit from a reduction of flood risks.

The project involved the following Romanian stakeholders as partners in the project: RWB-Banat, NIHWM, DESM and NARW. Of these stakeholders, especially RWB-Banat and NIHWM played an active role in project implementation. A wide variety of employees of RWB-Banat and NIHWM were also informed during a start-up meeting. DESM and NARW participated had a more consulting role, their participants were mostly managers. The project team also invited various regional stakeholders (CIES, County Councils, Prefectures and mayors) to participate in the stakeholder meeting and the exercise. However, the actual participation of most of these authorities was limited [O2; O4]. The majority of the participants of the final conference represented other RWBs. During the meeting they were informed about the project and had the opportunity to pose questions [O5]. The general public was informed about the project via local, regional and national media (see Annex C).

There were several opportunities for beneficiaries to influence the project. The project started with an overall plan but the communication and implementation plan were only prepared following input of stakeholders during the first mission. Beneficiaries were given an active role in the implementation of both plans [D7; D8; D9]. A RWB-Banat expert explained that implementation of FLIWAS started with a blueprint. However, this blueprint was not set in stone. He explained that some parts were skipped and other corrected. It appeared, for example, to be necessary to adjust the warning phases [I7]. We further observed that for those stakeholders who were interested, there were opportunities to contribute to the project. During the stakeholder meeting, a representative of the county council and CIES were invited to come up with ideas about what kind of information they would like to be included in the system. They came up with questions and a few suggestions [O2]. FLIWAS itself was also perceived as a tool that enhanced participation in flood risk

management. A RWB-Banat expert mentioned that most people normally have no idea about actions that are taken during floods. One of the innovative aspects of FLIWAS is that it allows users to observe measured water levels and corresponding actions [I7].

Project team members were generally satisfied about the level of stakeholder involvement. One HKV expert mentioned that national authorities could have been more actively involved. However, it would have made the implementation also more difficult. In his opinion, stakeholders involvement was sufficient to form a basis for follow-up [I2] Another HKV expert further mentioned that before Romania can really start using FLIWAS an additional exercise is needed with much more external stakeholders. Especially as the actual use of FLIWAS requires that users trust the system and are committed [I5]. The H-NL expert confirmed that the involvement of stakeholders was sufficient for this pilot. For further implementation and use of FLIWAS, regional stakeholders need to be involved more closely, also for their local knowledge [I1]. The RWB-Banat experts share the opinion that it was especially important to involve CIES. However, they were disappointed about the lack of interests of local councils [I7].

Overall, we conclude that the actual number of stakeholders that was actively involved was limited but that they were having opportunities to influence the process and its outcomes. Before FLIWAS can actually be used, there is a need to actively involve more stakeholders in order to gain access to their knowledge and to create support. In this phase, the majority of stakeholders were only involved at the level of information of consultation. One of the strengths of the project was the provision of information to the general public via media.

### 4.1.2 Institutional embedding

The institutional embedding of a project relates to the involvement of civil servants, executives and politicians. This project actively involved civil servants of RWB-Banat and NIHWM. In addition, the project consulted and informed a wide variety of high-level civil servants, such as the head of DESM, the head of Dispatch of NARW, the director of RWB-Banat, directors of NIHWM and the vice-prefect of Timiş. All of them (actively or passively) supported the project. It is very probable that the involvement of these high-level civil servants also contributed to the participation of the State Secretary of MEF at the follow-up meeting. During this meeting, the participating high-level civil servants all expressed their support for further implementation. They, for example, explained to the State Secretary the benefits of implementing FLIWAS. The State Secretary did not commit himself directly to further implementation. However, he was positive about the project and came up with suggestions for follow-up. He said that he was informed that all Romanian partners were very content about the cooperation and implementation of FLIWAS. He also said that 'there is a need to take fast decisions on further implementation' and 'I would like to leave the discussion on further implementation to experts' [O7]. Politicians did not directly identify a role for themselves in the process. However, the director of RWB-Banat is a prominent political figure in Timiş County. He already used to be head of the county branch of one of Romania's main political parties. Recently, he was also selected as their candidate for President of the County Council for the elections of 2012 (Andrei 2011). Although national politicians were not identifying a role for themselves, the overall institutional embedding of the project was well-organized with various high-level civil servants clearly showing their commitment to the project.

### 4.1.3 Integration of context-specific knowledge

Water management projects usually require the integration of general knowledge of experts (e.g. theories, models, concepts or techniques, methods and tools) with context-specific knowledge of local experts and stakeholders. In this project, Dutch experts especially contributed with general knowledge on FLIWAS (e.g. how to insert data and how to use it) and on project communication (e.g. how to develop a communication plan). The consortium also included several experts with specific

knowledge on the Romanian context; two experts of H-RO (one of Romanian origin) had experience with the implementation of water projects in Romania (no specific experience in Banat region) and one HKV expert had specific experience with flood risk management in Banat region. As we explained in section 3.3.1, this experience was perceived to have been of added value during the project. Some of the data and models that were gathered during the project was also used, for example, as a basis for the exercise. However, most data needed for the implementation of FLIWAS still had to be provided by experts of RWB-Banat (see also subsection 3.3.2). RWB-Banat experts explained that the availability of data and maps and their knowledge about the lower Timiş river was one of the main reasons that this river section was chosen for the pilot [I7]. Regional stakeholders contributed relatively little knowledge. According to an expert of H-NL, additional involvement of regional stakeholders would be required to further integrate their knowledge into FLIWAS [I1].

As regards the communication component, the H-NL expert provided the basic ideas for the development of a communication plan. This was complemented with context-specific knowledge of NIHWM, RWB-Banat and H-RO. Experts of these organizations played especially an important role in creating media attention and developing promotion materials. They also played a key role in the selection and invitation of stakeholders for various activities. Context-specific knowledge was not only relevant for implementation and communication but also in generating ideas for follow-up. This knowledge was especially contributed by NIHWM and MEF during the follow-up meetings. The project team was a well-balanced mix of experts that could provide sufficient general, country-specific and region-specific knowledge for this pilot. On the other hand, we also observe that especially Romanian experts still have their doubts about the practical use of FLIWAS in the field. Further involvement of people from the field could have been beneficial to gain additional insights in this.

### 4.1.4 Mutual understanding in communication

Cooperation requires that actors involved develop a mutual understanding in communication. In international projects, this often already starts with overcoming barriers related to differences in native language. In this project, translation was often needed to enable communication. During meetings, this was provided by RWB-Banat experts (International department) and by H-RO. RWB-Banat also translated documentation and the application into Romanian and emergency plans into English. According to actors involved, language barriers did not really affect the project, also because there were sufficient persons who could translate [I7; I9; I10].

Another potential barrier is formed by different levels of knowledge. In the project, this especially concerned knowledge on the local situation and on the FLIWAS application. Except for one HKV expert, the knowledge of Dutch experts about the Romanian situation was limited and developed during the project [I1; I2; I3; I5]. The idea of an internet-based application for flood information was totally new to the Romanian actors involved [I3; I7; I9]. The H-RO expert (of Romanian origin) explained that her understanding of FLIWAS especially increased during the exercise. In her opinion, the tool is not difficult to understand, even if you have no expertise in this field, but it takes time [I9]. My own experience is that the tool remained abstract in the beginning (even though the presentations were quite clear and contained many pictures). Only during the exercise, when there was a possibility to really work with the tool, FLIWAS became more tangible. During the implementation of FLIWAS and the exercise, FLIWAS itself was also used as a means of communication. A HKV expert explained that he gained more insight in the problems and emergency plans during the implementation phase [I3]. A RWB-Banat expert mentioned that she was surprised to see that people were asked to work in groups and to communicate through FLIWAS [I7]. Another RWB-Banat expert mentioned that you could see which actions were taken by other groups, which was very useful [I8]. Overall, actors involved shared the cognition that FLIWAS is a tool that could potentially help to reduce flood risks and improve cooperation and communication in Romania (see

also section 3.2 on cognitions). This message was also communicated in media and during presentations. At the same time, we observe that even at the end of the project experts involved still had different ideas, for example, about the role of hydraulic models in FLIWAS and other potential bottlenecks (see subsection 3.2.2).

As explained in subsection 2.3.1, a lack of mutual understanding in communication directly affected the progress of the project on at least two occasions. These occasions were the collection of geographic data and the installation of the server. In both cases, Dutch experts expected that Romanian experts understood what had to be done but Romanian experts did not act upon these expectations. In the case of the server installation, we observed that there were also expectations the other way around. The IT expert involved had expected also to receive more support from the consortium [I10]. In both cases, experts involved explained that there were difficulties in understanding each other, even though parties involved were both speaking English. We observe that the problems with geographic data were solved when the HKV expert who was familiar with the RWB-Banat expert intervened. To solve the problems with the installation of the server took much more time. One of the reasons was probably that all communication between NIHWM and L&W was on distance (mostly by email). HKV experts tried to facilitate the communication by illustrating what was needed during a face-to-face meeting (see Figure 11) and by email. The problems were eventually only solved after a HKV expert offered to hire, if necessary, an external company. In reaction on this, the NIHWM expert decided to completely re-install the server, which was successful.

The above shows that actors involved arrived at a basic mutual understanding about the potential of FLIWAS. However, we also observe that actors still had different opinions about the potential problems related to the implementation of FLIWAS. We further observed that a lack of mutual understanding in communication negatively affected the implementation of FLIWAS. The outcomes of the project show that the project team has been able to overcome these differences. How knowledge played a role in the realization of these outcomes will be discussed in more detail in Chapter 5.

### 4.1.5 Pro-active diffusion strategy

One of the explicit goals of the project was that the results of this pilot would form the basis for water managers in Romania and in other East European countries to further implement FLIWAS. The consortium even hoped that FLIWAS would become the new standard for information and warning systems in flood risk management. The final conference was planned to be the most important activity for the dissemination of the project results. The target audience included representatives of other RWBs, the ICPDR and the World Bank. The contact person of ICPDR was already contacted before the project and expressed its interest [D3]. Besides the final conference, the project plan did not define specific dissemination activities. All other activities were only defined and elaborated in a communication plan following the first mission [D8]. The progress and outcomes of the project were disseminated, for example, during various progress meetings at RWB-Banat and NIHWM. The director of RWB-Banat was informed at several moment during the project. The head of DESM was also said to be informed at several moments. The project was further mentioned in various media and presented at several occasions during and after it was finished. One of these occasions was the final conference, which was attended by representatives of nearly all RWBs. The ICPDR and the World Bank did not attend the final conference. However, the project was presented to the ICPDR expert group on floods (see also Annex C).

Our analysis of the diffusion strategy and activities show that although the project plan did not fully elaborate a diffusion strategy, project results were still disseminated at various occasions and among various groups. What probably played an important role in the dissemination of results is that the

project contained a separate communication component (that was dealt with by a separate group of experts). According to the H-NL expert, the project was more focused on communication than other projects in which she had been involved. She further explained that it was an advantage that the communication component was not filled out. This gave the experts of H-NL and H-RO the opportunity to shape the plan following the first mission and to also use the input of NIHWM. Experts of NIHWM and RWB-Banat were both actively involved in the implementation of this component [I1]. Whether this dissemination also contributed directly to the realization of follow-up activities is discussed in more detail in section 4.3.2.

### 4.1.6 Adaptive management

This criteria evaluates the extent to which the project plan had to be adjusted to emerging internal and external dynamics in order to remain effective. Subsection 2.3.1 shows that the project time plan was adjusted two times. The first adjustment (postponement of the third mission) related to delays in the installation of the server. Problems with the installation of the server led to the decision to install the Romanian FLIWAS data initially on the Dutch server. This eventually also affected the outcomes of the project as Romanian data were never transferred from the Dutch to the Romanian server. The second adjustment (postponement of the fourth mission) related to illness and subsequent replacement of the project leader. The project leader was replaced by a HKV expert who had project experience in Romania and had also replaced him as deputy project leader during the first mission. Unlike the actual project leader, the interim and deputy project leader had little specific experience with FLIWAS. Another HKV expert had experience with FLIWAS and could deal with most technical implementation aspects. One of the aspects that he could not deal, the development of maps, was instead taken care of by L&W [I5]. In terms of project management, the replacement of the project leader may have enhanced the cooperation process. As the project leader did not attend the first mission, he already did not make a very good start [I5]. The H-RO expert observed that Romanian partners were often asking for the deputy project leader [I9]. The project also led to the development of new insights and information. The project could not be implemented exactly as planned but some adjustments had to be made [I3; I7]. These were all minor adjustments as it appeared that the response plans, infrastructure and warning system of RWB-Banat were all similar to the Dutch situation [O3]. The idea to develop a communication plan was also only developed after the first mission so that input could be integrated easily [I1].

The above shows that the need for substantive adjustments to the project were very limited. Process-related adjustments were mostly caused by internal developments. External developments hardly affected the project, probably also as it was implemented in a relatively short period of time: the first mission was in September 2009 and the last mission in April 2010. In this period, there were no elections or major changes in the institutional context. Up to our knowledge, only one external event – a volcano eruption on Iceland – directly affected the project. The eruption resulted in air travel disruptions which caused that two Dutch presenters could not attend the final conference. This led to some adjustments in the programme, i.e. presentations were given by other members of the consortium. We conclude that most project adjustments were the direct result of internal dynamics. Problems with the installation of the server did not just directly affect the process but also its outcomes: data were never installed on the Romanian server. The project plan did not take this into account and it would have asked for an additional effort of actors involved. Without coordination attempts such efforts are unlikely to be occur.

## 4.2 Evaluation of immediate outcomes

This section evaluates the project outcomes that became visible during and directly after project completion. It pays attention to four immediate outcomes: the formulation of a motivating goal, the creation of negotiated knowledge, the mobilization of necessary resources and positive relational

experiences. We assume that these outcomes form a basis for follow-up actions, which are needed for the realization of programme goals.

### 4.2.1 Motivating goal

One of the factors that forms a basis for continuation is the extent to which actors with construction or realization power developed a motivating goal. Our analysis of the motivations of actors involved (section 3.1) shows that an important source of motivation of the Dutch actors involved was to strengthen their market position in order to generate follow-up projects. Analysis of their cognitions (section 3.2) further reveals that they perceived the project and its outcomes as a first step in realizing these goals. They believe that FLIWAS could potentially be a useful application in Romania and beyond but that follow-up projects were needed for this. The Romanian actors involved were initially especially motivated to participate in order to learn about the potential of FLIWAS. Based on the project results, they believed that FLIWAS could potentially reduce flood risks. At the same time, they mention many hurdles towards further implementation and use. Most of these hurdles are expected to be solved in time (e.g. automated measurement stations and models are currently developed) or expected to be solvable (e.g. by training people or the purchasing of adequate tools). In addition, the willingness to really start using FLIWAS at RWB-Banat seems to be limited. What probably contributed to this is that a key person at Dispatch went on pregnancy leave. In the meantime, the IT expert of NIHWM decided following problems to leave the FLIWAS server turned off as nobody was using it [I10].

The follow-up activities (see subsection 2.3.3) show that actors involved were indeed willing to extend the implementation of FLIWAS. MEF wanted to include FLIWAS in one of their project proposals. HKV also showed its willingness by quickly responding to the request to elaborate a proposal. A former expert of H-RO suggested to implement FLIWAS at Arges-Vedea. STOWA and HKV prepared a proposal in which further development of FLIWAS at RWB-Banat was included. RWB-Banat presented FLIWAS at several occasions. During the final conference, several other RWBs and the general inspectorate (GIES) also expressed their interest in FLIWAS. All these actors are potentially important in further implementation of FLIWAS; HKV (for their expertise), MEF (for their decision-making position), trained experts of RWB-Banat and NIHWM (for their expertise) and other RWBs and CIES (for their role in flood risk management). Overall, the project contributed to the development of a motivating goal towards further implementation of FLIWAS among various actors with relevant decision-making capacity or expertise. However, actors seem to be less willing to really start using FLIWAS on the basis of the current implementation.

### 4.2.2 Negotiated knowledge

Further continuation of the pilot also depends on whether actors involved developed a relevant, agreed upon and scientifically valid knowledge base. The implementation of FLIWAS did not require the development of new knowledge. However, experts involved had to arrive at an agreement about which knowledge had to be integrated into FLIWAS and about the future potential of FLIWAS. The project description (section 2.3.2) shows that experts involved successfully integrated the basic components of a flood information and warning system: emergency plans, the warning levels and geographic data. The installation was also tested during an exercise in which FLIWAS was used. A further analysis of the cognitions of actors involved (see section 2.3) shows both Dutch and Romanian actors discovered that the implementation process itself contributed to improved communication, cooperation and understanding. Experts involved also agree that in order to start using FLIWAS an additional step would be required, this is to connect FLIWAS to an automated measurement system [I5; I6; I7]. For this, the implemented data first need to be migrated to the Romanian server [I5].

The above shows that experts involved agreed upon the basic steps and knowledge needed to implement FLIWAS in Romania. Further analysis shows that there are also topics on which Dutch and Romanian actors behold diverging perceptions. Although Dutch experts doubted whether Romanian actors would indeed start using FLIWAS, they emphasized that RWB-Banat could already start using FLIWAS next to existing procedures. In order to start using FLIWAS as a communication tool, an additional large-scale exercise would be required [I1; I2; I5]. Romanian experts emphasized that there are still many hurdles towards implementation, such as the lack of hydraulic models, hazard maps and communication tools [I4; I6; I7]. HKV experts did not perceive these aspects as pre-requirements for the actual use of FLIWAS. Actors involved also have diverging perceptions about the use of internet-based applications. Several Romanian experts emphasized potential problems with internet access. HKV experts stated that a lack of internet in the field could be solved by using the communication module. One of them further explained that internet-based tools are having the future, also in rural areas. Although Dutch and Romanian experts disagree on the practical bottlenecks towards the actual use of FLIWAS in the Romanian context, all of them seem to agree that FLIWAS is potentially a very useful tool in flood risk management. In this sense, the project created a sufficient substantive basis for follow-up actions.

### 4.2.3 Mobilization of necessary resources

Continuation of a project crucially depends on whether resources needed for follow-up are accessible and available. Some of these resources were created within the project. Several Romanian experts were trained in the use of FLIWAS and a Romanian version of FLIWAS has been developed. The implementation showed that the Romanian emergency plans can easily be integrated into FLIWAS. This all forms a knowledge base which is useful for follow-up projects. What has not been realized is to implement the data of RWB-Banat on the Romanian server. As explained in subsection 2.3.3, HKV initially expected that Romanian counterparts would transfer the data. Some experts expected that RWB-Banat would migrate the data. RWB-Banat expected that NIHWM would migrate the data. In November 2010, nothing had been done and the Dutch server was moved. Upon an email from DESM, HKV offered to migrate the data. Up to our knowledge this additional effort has not been made yet. A lack of resources probably played a role: project resources of HKV were already finished and Romanian actors lack the knowledge to migrate the data. The server itself is currently not operational.

As regards other pre-requirements to actually start using FLIWAS, we observe that FLIWAS has been tested and the possibility to automatically import data has been verified. However, as nobody actually started using FLIWAS in Romania, it is questionable whether automated measurement stations provide adequate information and whether the availability of internet forms a problem. Most consortium members believe that Romanian stakeholders should be able to use FLIWAS. In their opinion it especially needs additional exercise and experience. Follow-up is now especially focusing on the raising of external funding for further implementation of FLIWAS at RWB-Banat and along the Danube. These external funds are needed as the national government does not have the financial resources needed to extend the implementation of FLIWAS. However, whether FLIWAS could help in the reduction of flood risks in Romania was not proven yet in this pilot. This would require an additional analysis of some of the mentioned bottlenecks.

### 4.2.4 Positive relational experiences

Relational experiences are directly related to the willingness to trust and may therefore either enhance or hamper future cooperation. The analysis of the existing relations and the cooperation experience (see subsection 3.4) shows that this project strengthened existing relations and also contributed to the development of new relations. Most relational experiences were positive, except for the cooperation of NIHWM with L&W. The consortium especially valued the commitment of Romanian partners and are willing to continue their cooperation with them and with each other. We

further observed that especially Romanian actors perceive their positive cooperation experience as an important basis for future cooperation.

## 4.3 Realization of programme goals

This section reflects on the likelihood that ultimate project goals will be realized. The ultimate goals are based on the reasons of the Dutch government for supporting international water projects. Related criteria are the extent to which a project contributes to problem-solving and to the generation of follow-up projects.

### 4.3.1 Contribution to problem solving

The manner in which the project aimed to contribute to the solving of international water problems was by implementing FLIWAS. The project plan reads that implementation of FLIWAS in Romania and possibly also in other countries in the region significantly improves to flood protection. On the long term the project could also contribute to the development of an integrated European FLIWAS [D3]. The basis for further extension of FLIWAS is formed by the successful implementation of FLIWAS in a pilot region. This raises the question: did the implementation of FLIWAS at RWB-Banat contribute to problem solving – i.e. the reduction of flood risks – in the area? Our analysis shows that the majority of the implementation steps (translation, installation of FLIWAS, collection and integration of data, training and exercise) were realized. These steps contributed, according to the actors involved, also to an improved understanding, communication and cooperation. However, before RWB-Banat can actually start using FLIWAS data have to be migrated to the Romanian server (which is currently turned off). This would also allow for the automated import of measurements, which is no pre-requisite but necessary to benefit from FLIWAS. Support and maintenance were also not yet arranged. In addition, another exercise at a larger scale is probably needed before RWB-Banat can start using FLIWAS.

The above shows that additional steps are needed to finalize the implementation of FLIWAS at RWB-Banat. Until now, Dutch and Romanian experts did not make an additional effort to realize these steps. This probably does not only relate to a lack of resources – a finalized project budget and a lack of know-how – but also rooted in the belief that additional steps are required (cognitive domain). This belief probably also negatively affected the willingness to make an additional effort. Hence, it is unlikely that this project itself will directly contribute to flood risk reduction in Banat region. Factors in the process that provide an explanation for these immediate outcomes are problems in developing a mutual understanding in communication (especially regarding the installation of the server) and a lack of (adaptive) management. The latter refers to the fact that subsequent efforts were needed to migrate the data once it was decided to insert the data initially on the Dutch server.

### 4.3.2 Generation of follow-up projects.

The project plan shows that the project especially intended to generate follow-up projects in Romania and beyond [D3]. This was confirmed by the consortium as being an important source of motivation (see subsection 3.1.1). Both Dutch and Romanian actors perceive FLIWAS as a useful tool for reducing flood risks in Romania. However, they have diverging opinions about the direct applicability of FLIWAS in Romania. Especially Romanian actors perceive that there were still many hurdles towards further implementation. A director of NIHWM expressed, for example, that it was useful to have FLIWAS installed but that people are not yet prepared and that hazard maps are not yet available [I4]. She was still very much interested in the generation of follow-up activities and also emphasized the benefits of FLIWAS during the follow-up meeting [O7]. She further stated that, for the development of technologies like FLIWAS, Romania really needs external assistance [I4].

The willingness to reduce flood risks and the cognition that Fliwas was a useful tool that could only be implemented with Dutch expertise led to several ideas for potential follow-up ideas. Further

implementation appeared to highly depend on the availability of external funds. It was decided to integrate the implementation of a tool like FLIWAS in a transboundary proposal for the Danube. The proposal was submitted which is, up to our knowledge, still waiting for approval. Another idea was to implement FLIWAS also in other RWBs. This idea was elaborated for Arges-Vedea branch within the context of its cooperation with Dutch Water Boards. According to the H-RO expert, the idea was abandoned as the Romanian server was no longer operational and FLIWAS was already expected to be implemented further along the Lower Danube [I9]. Another follow-up project, which included further implementation at RWB-Banat, was recently initiated by Dutch actors (see also subsection 2.3.3).

When linking the follow-up ideas to the immediate outcomes, we observe the focus is currently on the mobilization of external funds to further implement FLIWAS. We observe that the pilot contributed to the shared cognition that FLIWAS could be a useful tool for the reduction of flood risks in Romania. The follow-up meeting and interviews showed that Romanian actors are very willing to continue their cooperation with Dutch experts (for the implementation of FLIWAS but also for flood risk management in general). Two probable explanations are: (1) the perception that the successful implementation of a tool like FLIWAS crucially depends on Dutch expertise; and (2) positive relational experiences, which contributed to the development of trust as a basis for further cooperation. Other resources were only partly seen as a basis for a follow-up project. Romanian actors perceived, for example, that the installed Romanian server was of little added value for a follow-up. Several actors explained that further implementation of FLIWAS along the Danube would require a new server [I4; O7].

FLIWAS has been a quite successful pilot in the sense that its results were directly used as a basis for the formulation of follow-up projects. Some of these projects were initiated by the consortium (with the support of Romanian actors) and one also by DESM-MEF. What probably played a role in this is that there has been a lot of attention for the dissemination of the project results (pro-active diffusion strategy) and that various civil servants (including ones from a higher level) were engaged (institutional embedding). The actual role of pilot projects in policy development can be conceptualized with three different models. The analytical model is based on the assumption of informed decision-making. The political model perceives policy making as an incremental process with various rounds and windows of opportunity. The holistic model views policy development as a process that takes place within an uncertain social and natural context in which various systems interact with each other (Vreugdenhil et al. 2010). The development of this pilot and its potential follow-up are best understood with the political model, which is based on the 'stream model' developed by Kingdon (1984). He states that a decision about the solution of a problem emerges from the coupling of three separate streams: problems, solutions and politics. Problems and solutions are articulated by policy entrepreneurs, i.e. actors that search for solutions or support a solution. If policy entrepreneurs and decision-makers are in touch with each other, this creates an opportunity (policy window) for realizing certain policies. Partial couplings, i.e. between problems and solutions (problem window) or between solutions and politics (political window), often form a basis for a problem solution but are insufficient by themselves (Koppenjan and Klijn 2004). When applying this theory to the case study we observe that the need for a flood information and warning system already raised on the political agenda of Romania. This is also created the opportunity to implement FLIWAS in Romania when the Slovakian pilot stagnated. FLIWAS represented a possible solution that was brought forward by Dutch experts. As a result of the project, actors that were looking for solutions (i.e. Romanian water managers) also became proponents of FLIWAS as a solution. During the last meeting on follow-up, a connection was also created between these policy entrepreneurs and decision-makers. This resulted in the inclusion of a tool like FLIWAS in a project proposal of MEF.

# 5 Discussion: knowledge transfer in international projects

As explained in the introduction of this report, the Dutch government supports water projects around the world for a combination of altruistic and economic reasons. These objectives are realized through the transfer of knowledge. This chapter explores knowledge and the transfer of knowledge in such international project settings. It starts with an introduction of theoretical concepts, which are synthesized in a conceptual model of knowledge transfer. The second section elaborates how knowledge was transferred in the case study. The last section reflects on these case study findings.

## 5.1 Introduction of theoretical concepts

This section starts with an introduction of the meaning of knowledge transfer in a Dutch-Romanian setting. Subsection 5.1.2 discusses various understandings of knowledge and how it is best understood in a knowledge transfer setting. Subsection 5.1.3 and subsection 5.1.4 further elaborate two key factors in the knowledge transfer process, which are actor-interaction and knowledge itself. The key findings of this section are summarized in subsection 5.1.5.

### 5.1.1 Knowledge transfer in Dutch-Romanian water projects

Within the context of this research, Dutch-Romanian flood risk management projects are seen as project-based interventions that involve the transfer of environmental concepts, methods or technologies from one country to another. The reason for employing the term 'intervention' is to emphasize the goal-oriented nature of these projects. They are designed for the purpose of 'solving water problems in the benefiting country' and 'generating follow-up projects for the Dutch water sector' (Vinke-de Kruijf et al. submitted). The transfer of Dutch knowledge – in the case study especially related to the transfer of the FLIWAS concept and technology – is expected to contribute to the realization of these objectives. The Dutch National Water Plan reads that "we [the Dutch public and private players in the water sector] have traditionally used our knowledge and expertise to work together with other countries to support them in the water challenges they face. At the same time, we can benefit by learning from those countries' experiences" (Min. V&W 2009 p. 243). To gain more insight in relevant knowledge processes in these Dutch-funded international water projects, we reviewed literature on the management and (international) transfer of knowledge and technology. In a transfer setting, technology is very similar to knowledge and literature on both topics is therefore overlapping (see e.g. Bresman et al. 1999; Trott et al. 1995). The reason is that it is rather the knowledge associated with an international technology transfer that is difficult to transfer than the technology itself (e.g. the equipment). It is argued that "most technologies are very difficult to transfer because they include a large portion of tacit knowledge" (Lin and Berg 2001 p. 288) and that successful adoption of a new technology largely depends on "the integration of a new technology with the existing knowledge base of the organization" (Trott et al. 1995 p. 31). In a transfer context, technology is therefore often understood as 'differentiated knowledge about specific applications' or 'specialized know-how' (Reddy and Zhao 1990). The same argument applies to the transfer of concepts and methods. This implies that the transfer of Dutch concepts, methods and technologies is especially about the transfer of knowledge.

For this research, knowledge transfer is defined as *an interactive process through which knowledge sources and receivers share and acquire knowledge for the purpose of applying it*. This definition is based on the recognition that a knowledge transfer basically involves: (1) a source that shares its knowledge, i.e. provides information to others; and (2) a receiver that acquires this knowledge, i.e. accumulates or assimilates information by integrating it with existing knowledge (Bresman et al. 1999; Wang and Noe 2010). The latter shows that there is no strict distinction between knowledge transfer versus knowledge creation or combination. The modification and further development of knowledge is rather an integral part of the knowledge transfer (Bresman et al. 1999). It further shows that an effective knowledge transfer also results in the application of knowledge for intended

(case-specific) purposes. In the case of Dutch funded international water projects, this means that knowledge is also used as a basis for problem-solving and follow-up projects. Literature shows that effective sharing and acquisition of knowledge does not necessarily lead to knowledge application. There may be many reasons for not using knowledge, such as, a lack of trust or respect in its source, resistance to change, risk aversion, lack of time or lack of opportunity (Davenport and Prusak 1998). Note that the seeking and recognizing of new knowledge is sometimes seen as the initial phase of knowledge transfer (Cabrera et al. 2006; Cohen and Levinthal 1990; Szulanski 2000; Trott et al. 1995). Becoming aware of external knowledge also plays a role in our research but is not included in our analysis of knowledge transfer.

### 5.1.2 Towards an interpretation of knowledge

Knowledge has been studied extensively within the contexts of organizations, transfers and projects (for literature reviews, see e.g. Alavi and Leidner 2001; Blackler 1995; Reddy and Zhao 1990; Wang and Noe 2010). This literature shows, among others, that scholars currently move away from seeing knowledge as a 'timeless body of truth' that is internalized by experts and embedded in language, culture and routines. An alternative approach is to perceive knowledge as an active process of 'knowing'. It is argued that research should focus on the context-specific and dynamic systems through which people achieve their knowing and on the processes through which they generate new knowledge (Blackler 1995). This action-oriented perspective on knowledge also forms the basis for our research on knowledge transfer.

Our literature review further shows that there is an ongoing debate about the relation between data, information and knowledge. Some argue that there is no need to distinguish between knowledge and information and define knowledge as "information processed by individuals including ideas, facts, expertise, and judgments relevant for individual, team and organizational performance" (Wang and Noe 2010 p. 117). Others suggest that there is a hierarchy between these concepts. They argue that data are raw material and define data as "a set of discrete, objective facts about events" (Davenport and Prusak 1998 p. 2). Data can become information when assigning a meaning to them, for example, by adding contextual information. Information is seen as a message from a sender that aims to inform a receiver. Knowledge is argued to be broader, deeper and richer as information (ibid). It is defined as "a fluid mix of framed experience, values, contextual information, and expert insights that provides a framework for evaluating and incorporating new experiences and information" (Davenport and Prusak 1998 p. 5). Others argue that the hierarchical relation between data, information and knowledge is actually inverse, i.e. that knowledge is a pre-requisite for the collection and identification of information and that information forms the basis for data (Tuomi 1999). We share the opinion that the relation between data, information and knowledge is more complex and that they are closely related and interwoven concepts. Data and information may form the basis for new knowledge but also require knowledge to be understood. Knowledge can be converted into data or information by articulating it. Whether articulated knowledge is data or information depends on the extent to which the source and receiver share a similar knowledge base. This implies that what may be data to one person may be information (i.e. data with a meaning) to another person (Stenmark 2002). As the distinction between knowledge, information and data is contextual, there is not much practical utility to distinguish between these concepts when analyzing knowledge transfers (Wang and Noe 2010).

Central in recent literature is the assumption that knowledge is personal. It is processed and created by individuals and does not exist outside an individual (see e.g. Alavi and Leidner 2001; Nonaka 1994; Wang and Noe 2010). This raises the question to what extent individuals can actually share and acquire each others' knowledge. It is widely acknowledged that people can only express a limited amount of what they know, for example, in words and numbers. Most knowledge resides in individuals and is 'tacit', i.e. hard to formulize and communicate. It is argued that tacit knowledge

provides the necessary background to interpret information. This implies that all knowledge is either tacit or rooted in tacit knowledge (Polanyi 1966). This background includes a knowledge tradition (socio-cultural inheritance), profession and organizational belonging (Stenmark 2002). It is also referred to as the 'life-world' in which people live and that they take for granted (Leeuwis and Van den Ban 2004). Tacit knowledge is often contrasted with explicit knowledge, i.e. knowledge that can be transferred between individuals as it can be articulated in a formal, systemic language (Nonaka 1994). This distinction is confusing as it suggests that once knowledge has been articulated it can be disseminated easily within and between organizations. This is not necessarily the case as a receiver may have a different background as therefore does understand the language or lacks the technical capabilities. Tacit and explicit knowledge should therefore not be seen as two different types of knowledge but rather as two separate aspects of knowledge (Stenmark 2002). Explicit (or discursive knowledge) is therefore better defined as "knowledge that we are aware of, have reflected upon, and can easily capture in language (i.e. can be converted into information)" (Leeuwis and Van den Ban 2004 p. 97).

The above suggests that the knowledge is only transferable if it can be articulated, i.e. converted into information. This is not the case. Literature shows that knowledge sharing is not only about the provision of information but also about the provision of know-how (Wang and Noe 2010). In line with this, literature on knowledge transfer defines knowledge as a combination of information (know-what) and expertise (know-how) (Bresman et al. 1999; Kogut and Zander 1992). Expertise refers here to knowledge on a particular subject, including the experiences and the skills to use this knowledge (Wesselink et al. 2009). Literature also refers to this knowledge as procedural knowledge, practical knowledge or the technical elements of knowledge. Expertise refers to knowledge that persons apply. As persons develop and accumulate this knowledge over a period of time it needs to be learnt or acquired (Davenport and Prusak 1998; Kogut and Zander 1992; Nonaka 1994). The articulation and transfer of knowledge requires considerable efforts such as prolonged observation or in-depth discussions. This is not feasible with all knowledge, some knowledge will always remain hidden (Leeuwis and Van den Ban 2004). On the basis of relevant literature, we define knowledge as a *personal and dynamic mix of processed information and accumulated expertise.*

One of the starting-points of our research is that international water projects can be understood as processes of social interaction of which the course and outcomes basically result from the dynamic interaction between the motivations, cognitions and resources of actors involved (Bressers 2004). Within this context knowledge is perceived as a resource that provides actors with the capacity to act. We are aware that knowledge also has a cognitive element, i.e. that it provides a frame consisting of beliefs, views and paradigms through which people interpret information (Alavi and Leidner 2001; Nonaka 1994) and that this cognitive dimension may affect the transfer of knowledge. Since actors often behold diverging perceptions, they also tend to interpret and judge information differently (Hommes et al. 2009). The cognitive dimension of knowledge has been central in previous research on, for example, boundary spanning (Bressers and Lulofs 2010), how actors perceive and use provided information in interactive processes (Van Tilburg 2007) and how interaction contributes to the development of context-specific 'negotiated knowledge' (Hommes et al. 2009). Knowledge is not only closely related to cognitions but also to motivations and other resources. The relevance and strategic value of knowledge depends both on the interpretation of the problem (cognition) and on the intended action (motivation). The availability and accessibility of knowledge also influences cognitions (gathering and processing information requires knowledge) and motivations (actions are only possible if knowledge is available) (Bressers 2009). We are aware of the dynamic interaction between knowledge and other actor characteristics. However, the focus of this part of our research will be on knowledge and interaction in the knowledge transfer process.

### 5.1.3 Actor-interaction in the knowledge transfer process

Projects that address problems in the public domain involve actors of different social entities. These entities include: (1) public and stakeholders with a general or specific interest; (2) responsible authorities who are in charge of decision-making; and (3) experts that conduct or support the process. Actors can represent one or more entities and this can also change during a project (Krywkow 2009). Research shows that relevant knowledge can be provided both by local people (with local experience and local interests) and by specialists (with a broader perspective and understanding of the problem situation) (Collins and Evans 2002). In our research, we refer to these knowledge sources as stakeholders (persons invited for their interest and expertise) and experts (persons who are paid to contribute with their expertise) (Vinke-de Kruijf et al. forthcoming). The actual role of stakeholder knowledge also depends on the design of a project. Some projects are expert-driven and focus on knowledge creation and learning among experts. The focus of other projects is on stakeholder knowledge and learning, which means that expert knowledge is rather supportive (Vreugdenhil et al. 2010).

Knowledge transfers are driven, among others, by communication and interaction (Alavi and Leidner 2001). A distinction can be made between the following communication means: face-to-face interaction, telephone, written personal, written formal and numerical formal. Direct interaction is the richest medium as it allows for feedback and includes body language. The other communication forms are having a decreasing capacity to transfer knowledge in a project context (Koskinen et al. 2003). Whether direct interaction contributes to knowledge transfer also depends on the interaction setting. Some settings are especially designed for one-way communication (information provision). Other settings allow for the exchange of information (consultation) or active cooperation (exchange of perspectives) (Krywkow 2009). If personalization mechanisms are used, knowledge will remain tied to persons that are in direct contact with each other. To make knowledge also accessible to others, it may be useful to codify knowledge, i.e. to store it in databases and documents. Personalization and codification mechanisms can be applied in rather informal and decentralized manners. In such cases, knowledge sharing relies on individual mechanisms. Organizations may also consider institutional mechanisms by establishing routines and structures that enhance knowledge transfer (e.g. using information technology or organizing regular meetings) (Boh 2007).

Projects are fragmented environments that involve persons from different organizational and disciplinarily backgrounds. This makes it more difficult to develop routines but also to exchange knowledge (Bresnen et al. 2003). These difficulties will increase with geographic and cultural distance (Bresman et al. 1999). In international projects, knowledge transfer is thus complicated as they involve actors with diverging socio-cultural inheritances, professions and organizational belongings. Because of their diverging backgrounds, these actors may have difficulties to understand each other. Before they can even start to exchange knowledge, they may first need to expand or adjust their knowledge (Stenmark 2002). In line with this, it is argued that to truly exchange knowledge, actors need to have a certain level of overlap in their tacit knowledge base, this is also referred as a 'shared knowledge space' (Alavi and Leidner 2001). What especially contributes to the acquisition of knowledge is hands-on experience (action) in combination with reflection on this experience (Nonaka 1994). True experts are often able to reflect upon their own actions. However, reflection usually benefits from interaction with others as this requires the articulation of (tacit) knowledge (Schon 1983; Stenmark 2002).

Research shows that especially interpersonal relations and social networks, rather than technologies or procedures, are of crucial importance in knowledge management (Bresnen et al. 2003). An analysis of international acquisitions shows that knowledge transfer tends to change over time. Actors gradually started to exchange more knowledge, knowledge transfer became a more

reciprocal process and the type of transferred knowledge also changed from articulate to more tacit forms of knowledge. A probable explanation is that actors become more willing to share knowledge once they can identify with their colleagues (Bresman et al. 1999). In line with this, it is argued that companies can enhance the creation of new knowledge by establishing self-organizing teams. Such teams facilitate not only the development of shared (tacit) knowledge but also the building of mutual trust. The development of mutual trust is essential for the development of new concepts (Nonaka 1994). As regards the adoption of new knowledge, literature especially highlights the importance of 'champions'. These are key actors that can promote ideas and push to exploitation (Trott et al. 1995).

### 5.1.4 The role of knowledge in the knowledge transfer process

Depending on their background, actors can provide knowledge that differs both in content and orientation (Hommes et al. 2009). In international projects, it is useful to distinguish not only between experts and stakeholders but also between knowledge sources that are relative 'outsiders' (people from outside the area) and 'insiders' (people from the area) (Leeuwis and Van den Ban 2004). Research shows that external experts are especially important for the provision of general knowledge of theories (including concepts, models and approaches). Experts and stakeholders that originate from the country or the specific area are especially important for the provision of context-specific knowledge about specific conditions and practices (Gummesson 2000; Vinke-de Kruijf 2009b). Relevant knowledge further includes: (1) substantive knowledge, which includes specific knowledge about problems and potential solutions; (2) procedural knowledge, dealing with the organization and management of the process (e.g. the facilitation of meetings); and (3) political knowledge, dealing with the policy network (e.g. with relevant social groups and power relations) (Leeuwis and Van den Ban 2004; Wesselink et al. 2009).

Besides that actors behold different types of knowledge, their level of knowledge (or expertise) in a certain domain also varies. Literature distinguishes between (1) actors without any knowledge of a domain; (2) actors with interactional knowledge, i.e. with sufficient knowledge of a domain to interact interestingly with people who are expert in that domain; and (3) actors with contributory knowledge, i.e. able to contribute to the development of new knowledge in that domain. Actors with interactional knowledge are valuable as they may be able to translate between persons that are expert in different domains. And even if people have no knowledge in a certain domain, they can still fulfil an important role in the knowledge process. These people may, for example, be able to judge knowledge based on what they know about the level of social consensus that has been reached on that topic (Collins and Evans 2002). Water projects require knowledge of various professional domains. Some of these domains are already disciplines on their own (e.g. engineering or ecology). Another relevant domain concerns the management of participatory processes. It is argued that this domain is not fully developed yet and still needs to become an area of expertise on its own (Krywkow 2009). Such knowledge is also relevant to create a proper connection between the participatory process and the formal decision-making process (Vinke-de Kruijf et al. 2010).

The above shows that relevant knowledge goes beyond substantive knowledge that is rooted in education or experience. Actors may also have 'social knowledge', this is knowledge that is embedded in relationships. Social knowledge refers to the idea that the knowledge base of a group of people (i.e. an organization or a project team) is usually greater than their individual knowledge. Relationships connect individual knowledge to a larger body of knowledge and also makes knowledge accessible to others (Trott et al. 1995). Persons that are aware of the expertise, capabilities and availability of others are also called knowledge brokers. These persons are able to broker knowledge linkages between persons seeking for expertise and persons having certain expertise (Boh 2007). Literature further shows that the successful application of knowledge highly depends on personal attributes or characteristics, such as, intuition, creativity, vitality and social

ability. These are not rooted in education or experience but still important as they may support or impede the application of specific or general knowledge (Gummesson 2000; Koskinen et al. 2003).

### 5.1.5 Synthesis

Dutch-Romanian flood risk projects are international projects that concern the transfer of knowledge embedded in certain concepts, methods and technologies. Knowledge transfer is in this context defined as an interactive process that involves the sharing, acquisition and application of knowledge. This process involves a source and receiver who transfer knowledge through their interaction (see also Figure 12). In an international project setting, actors tend to have backgrounds that diverge in terms of socio-cultural inheritance, profession and organizational belonging. This background includes tacit understandings and assumptions that are difficult to communicate. If a knowledge source and receiver have diverging backgrounds, they may have difficulties to understand each other (Stenmark 2002). Because of their diverging backgrounds, actors can also contribute knowledge that differs in form and orientation (Hommes et al. 2009). When analyzing relevant types of knowledge, a distinction can be made between general versus context-specific knowledge (Gummesson 2000) and between substantive, procedural and political knowledge (Leeuwis and Van den Ban 2004; Wesselink et al. 2009). The level of knowledge in a certain knowledge domain can vary from no knowledge, interactional knowledge to contributory knowledge (Collins and Evans 2002). In our opinion, these levels of knowledge apply not only to specific domains but also to specific settings. We assume that actors with interactional knowledge on multiple domains or settings can help to translate between actors with diverging backgrounds. Social knowledge, i.e. resulting from relationships between knowledge sources and receivers, can also ease the knowledge transfer process. Transfers involve a large portion of tacit knowledge, which is best shared and acquired through direct interaction, active collaboration and personalization mechanisms. This implies that knowledge transfer also depends on adopted communication means (Koskinen et al. 2003), the interaction setting (Krywkow 2009) and the mechanisms used (Boh 2007). Knowledge transfers are effective when they result in the application of knowledge for case-specific purposes. In this research, transfer are effective if knowledge is used as a basis for problem-solving and follow-up projects (Vinke-de Kruijf et al. submitted).

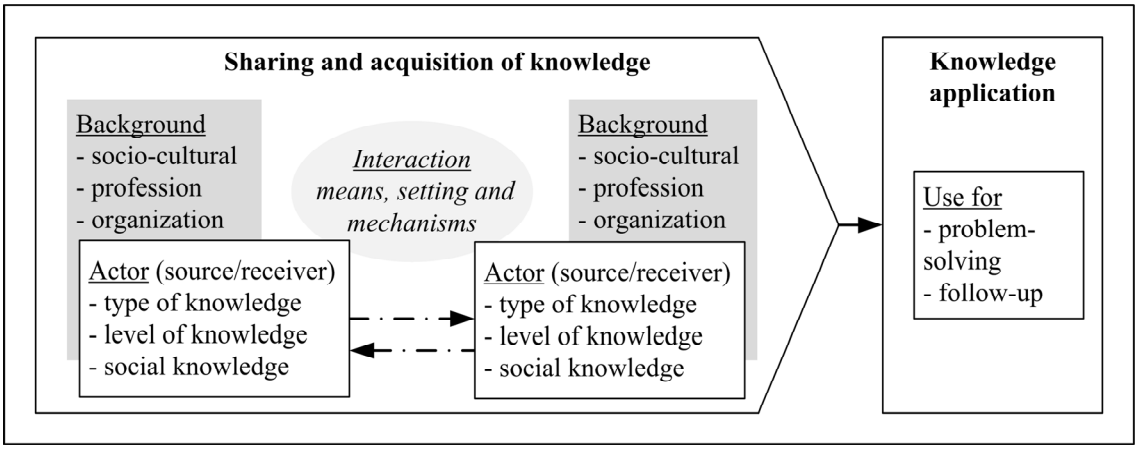


Figure 12 – Conceptual framework for the analysis of knowledge transfer in an international project setting

## 5.2 Knowledge transfer processes in the case study

In this section, the presented theoretical concepts are applied to the pilot implementation of FLIWAS. The first subsection presents the actors involved in terms of their background and the knowledge they contributed to the project (for detailed descriptions and references, see subsection 2.2.3 and section 3.3). The second subsection analyzes the interaction between various actors for

the implementation of various project components (for detailed descriptions and references, see section 2.3).

### 5.2.1 Background and knowledge of actors involved

The case study basically involved: (1) a consortium that represented the Dutch water sector and consisted of experts who were supported by a Dutch funding agency; (2) Romanian authorities with responsibilities in flood risk management who participated with experts and managers/decision-makers; and (3) the general public and stakeholders, which included local, regional, national and international actors (mostly authorities) with a role in the management of flood risks (see also Figure 7). The project was expert-driven in the sense that it especially concentrated on knowledge creation and learning among experts (Vreugdenhil et al. 2010). The remainder of this subsection therefore concentrates on the background and contributions by experts involved. The role of other Romanian actors is briefly discussed at the end of this subsection.

#### CONSORTIUM EXPERTS

The consortium consisted of STOWA, HKV and Haskoning. STOWA was formally responsible for project management but did not directly contribute to the pilot implementation in Romania. HKV was involved with three experts (of Dutch origin) who especially contributed to operational project management and technical implementation. The initial project leader had limited international experience and hardly any knowledge on the Romanian setting. As he managed the development of FLIWAS, he was having contributory knowledge and social knowledge related to FLIWAS. The deputy and interim project leader was an expert in river management but (until the project) not familiar with FLIWAS. He had been involved in various international projects, including a Dutch-Romanian project on flood risk management in the pilot area. Because of this, he already had relationships with experts and specific knowledge on flood risk management in the pilot area. He had general knowledge on the implementation of international projects, an interactional knowledge level of FLIWAS and of the Romanian setting, and social knowledge about relevant actors. The third HKV expert contributed to the development of FLIWAS but had no international project experience. He was therefore having no knowledge of the Romanian setting but having interactional/contributory knowledge of FLIWAS. HKV contracted L&W experts (of German origin) for the installation of the server. These experts had been involved in the development of FLIWAS and cooperated with HKV experts before.

Haskoning was involved with three experts and especially contributed to project communication and dissemination. The expert of Haskoning Netherlands was having an education in water management and had been involved in one of the predecessors of FLIWAS. She had been working internationally, although not in Romania, and had experience in communicating the results of technical-oriented projects. She was thus used to translate between experts with diverging backgrounds. The same applies to the Dutch expert of Haskoning Romania, who had extensive experience as project manager in international water projects. He was also having interactional knowledge of the Romanian setting as he had been working for several years in Romania. The Romanian expert, who was also the project secretary, was having inside knowledge of the Romanian setting and also interactional knowledge of the Dutch setting as she was experienced in Dutch-Romanian cooperation. She could therefore translate between experts that were having different backgrounds and speaking different languages. Both experts of Haskoning Romania were not having specific experience in the pilot area or with flood risk management projects in Romania.

#### ROMANIAN EXPERTS

The consortium experts cooperated with four Romanian partner organizations. All partner organizations were having professional relationships but most of the actors involved did not cooperate with each other before. This means that the social knowledge that was embedded in their

relations was limited. Two of these partner organizations were directly involved in the implementation of FLIWAS. RWB-Banat participated with experts (of Romanian origin) who were working in various departments and related professional domains (see also Figure 8). They contributed context-specific knowledge on various topics, such as, the water system, the emergency plans and communication. The International Department was involved with three experts who coordinated the pilot internally, translated documents and meetings and organized interaction moments. All experts of this department were used to work in an international projects. As these projects often cut across departments they were also used to work with experts of other departments (i.e. having social knowledge). The actual integration of data into FLIWAS was especially done with the support of an expert of International (who also coordinated technical implementation) and an expert of Dispatch. Both were expert in flood risk management and could therefore easily develop an interactional knowledge level of FLIWAS.

NIHWM was involved with several experts. One expert was not involved as specialist but raised the attention for the project and thus contributed social knowledge. The project further involved NIHWM experts with contributory knowledge on flood risk management (providing information and participating in trainings), communication (contributing to dissemination) and information technology (IT) (taking care of the installation of the server). All experts of NIHWM had limited experience in international projects and were especially having knowledge in their specific domains.

#### OTHER ACTORS INVOLVED

The context-specific substantive knowledge that was required for the pilot was mostly provided by the experts involved. There were some exceptions. During the final conference, other regional water authorities contributed some substantive context-specific information (e.g. on the systems that they were using). From all partner organizations, actors with management and decision-making capacities were regularly informed and consulted about the design, the progress and the dissemination of the pilot. They contributed 'inside' political and procedural knowledge during project preparations, the first mission and the last mission. Their participation was also important as they could contribute social knowledge on which expert in their organization could contribute what knowledge.

### 5.2.2 Interaction process

To structure the analysis of the interaction between actors, a distinction is made between the following project components: (1) development of a FLIWAS environment; (2) pilot implementation of FLIWAS at RWB-Banat; and (3) dissemination of the project results.

#### DEVELOPMENT OF A FLIWAS ENVIRONMENT

The development of the FLIWAS environment included translation activities, the installation of the server and the setup of maintenance and support. The implementation of these aspects was mostly decided upon during or following the first mission when consortium experts communicated face-to-face with experts and managers of Romanian partner organizations. The interaction setting varied from rather personal (e.g. the meeting with the director of RWB-Banat) to more formal (e.g. both kick-off meetings involved more than twenty persons). The implementation of translation activities was relatively straightforward. When responsibilities were divided, documented information was exchanged by email [D7]. For the setup of maintenance and support, knowledge was transferred during trainings (active collaboration) and during meetings (information and consultation). The trainings were organized in small-scale workshop settings. This setting enhanced the acquisition and sharing of knowledge as experts were working in teams, gaining hands-on-experience with the use and management of FLIWAS and reflecting upon this experience.

The transfer of knowledge for the installation of the server was challenging. During the first mission, there was some direct interaction between the NIHWM expert and the HKV expert. Once the

decision was taken that NIHWM would arrange a server, HKV provided the specifications (written form). The NIHWM expert addressed several specific questions (e.g. about the required configuration and operation system) by email. HKV experts could not answer all these questions, which was frustrating for the NIHWM expert. Mid November, the project leader brought the IT expert of NIHWM and the German L&W experts in contact with each other by email. The German experts answered several questions of the NIHWM expert by email and subsequently tried to install FLIWAS on the server. When this attempt was not successful, experts involved had additional contact by email and by phone. It soon appeared that experts on both sides were having difficulties to understand each other. In December 2009, the project leader had a face-to-face meeting with the IT expert of NIHWM during which he tried to understand and clarify the problems, among others, by visualizing the FLIWAS environment. During this meeting (and later also by email and by phone), other experts also tried to translate between the IT expert, the project leader and the German experts. Despite these efforts, the problems with the installation of FLIWAS persisted until the end of the project. Around March 2010, the interim project leader contacted the NIHWM expert again by email and by phone. When he proposed to hire an external IT company, the NIHWM expert decided to redo the configuration all over again. Shortly afterwards, the German experts informed HKV and NIHWM (by email) that they had been able to install FLIWAS at the Romanian server.

PILOT IMPLEMENTATION OF FLIWAS

The pilot was implemented by experts of the consortium and RWB-Banat. Each mission, these experts communicated face-to-face with each other. At RWB-Banat, a team was established for the technical implementation of FLIWAS, which was coordinated by an expert of the International Department. The International Department also translated, if necessary, documentation and conversations. The interaction between HKV experts and RWB-Banat experts can be characterized as active collaboration that was supported by direct communication means. Codification mechanisms were also used as information had to be codified before it could be integrated into FLIWAS. This codification process sometimes required additional efforts (e.g. the coordinate system of maps had to be transformed and that the reference levels used in Romanian emergency plans differed from the levels used in FLIWAS). The only codification issue that was not solved in this pilot was the mismatch between the data format required for FLIWAS and the data format provided by the automated measurement system. Contact between HKV and the software developers revealed that this issue was solvable. However, it was decided that this was beyond the scope of the pilot

Experts involved were usually not having difficulties to understand each other. The main exception concerns the collection of geographic information. Despite their face-to-face communication, the Dutch expert and the Romanian expert were having difficulties to arrive at a shared understanding. The problem was solved when the interim project leader of HKV (who already had a good relation with the cadastre expert) asked for the data during the fourth mission. We further observe that experts also did not arrive at a shared understanding regarding the transfer of data and other follow-up actions. During meetings, the need to transfer data and to implement additional components was highlighted but never discussed in detail. As regards the transfer of data, Dutch experts were expecting Romanian experts to take care of this, while Romanian experts expected that Dutch experts or other Romanian experts would take initiative in this. Stakeholders were invited to contribute to the pilot implementation but their actual participation was limited. Experts involved mentioned that before RWB-Banat could start using FLIWAS, it needs to organize a larger exercise and to train additional actors.

DISSEMINATION OF PROJECT RESULTS

The project had a separate communication component which concentrated on the dissemination of the project results. The implementation of this component was also laid down in a communication plan, which was developed by Haskoning experts following face-to-face communication with experts

of RWB-Banat and NIHWM during the first mission. Experts involved met each other during a few missions and were further communicating by email or by phone. Communication often went through the Romanian project secretary of Haskoning. Various communication means were adopted. Employees and managers of partner organizations were regularly updated in meetings. There was also separate contact with key actors of national authorities (by email or by phone). Regional stakeholders were invited on two occasions to interact about the project in a workshop setting. The general public and stakeholders were informed about the project via promotion materials (e.g. posters and a booklet), press releases and website announcements. Experts involved also prepared articles about the project and presented the project at various occasions for a regional, national and international public. At the end of the project, several meetings were organized to inform and consult other stakeholders and managers/decision-makers about the project.

## 5.3 Reflection on knowledge transfer in the case study

This section reflects upon various aspects of the international knowledge transfer process (see Figure 12) in relation to the case study. The first subsection discusses the process from the perspective of the actors involved, including their background and their knowledge. The second subsection discusses the overall knowledge transfer process including the interaction process and outcomes.

### 5.3.1 The role of actor backgrounds and knowledge

The case study demonstrates that international knowledge transfers involve actors with diverging backgrounds. It confirms that the less overlap actors have in terms of socio-cultural inheritance, professional discipline and organizational belonging, the more difficulties they have to understand each other (Stenmark 2002). Examples that confirm this are the installation of the server and the collection of geographic information. Both instances included experts with completely diverging backgrounds that never cooperated before. The external experts also lacked any experience in the Romanian setting. Even though experts were speaking the same language they were having difficulties to understand each other. Hence, they were not able to arrive at a shared understanding of what information could be provided or was required. This highlights that a lack of shared knowledge space may seriously hamper the sharing and acquisition of knowledge and thus knowledge transfer. However, experts with diverging backgrounds do not necessarily have communication problems. In fact, most of the experts were not having any communication problems despite their diverging backgrounds. A further analysis shows that diverging backgrounds did not really affect knowledge transfer when actors collaborated before or had relevant context-specific experience. In such cases, actors with diverging backgrounds already developed partly overlapping underlying knowledge bases or already had some shared knowledge space (Alavi and Leidner 2001).

The knowledge orientation of the case study was rather expert-driven (Vreugdenhil et al. 2010). The project team tried to involve regional stakeholders but the interest and/or capacity of these stakeholders to contribute knowledge appeared to be limited. This did not impose a problem as experts of Romanian partner organizations could provide most context-specific knowledge. Actors with managing and decision-making capacities also contributed knowledge. Their political and procedural knowledge was relevant for the design, communication and dissemination. Experts in the consortium contributed general knowledge needed for the implementation of various project components. Some of the consortium experts had been involved in the implementation of Romanian projects before and could therefore also contribute some context-specific political and procedural knowledge. The case study confirms that besides substantive knowledge, also procedural and political knowledge are relevant in (international) flood risk management projects (Wesselink et al. 2009). It further confirms that relevant knowledge may come in the form of general and specific knowledge (Gummesson 2000). In most international interventions, 'inside' knowledge needs to be provided by stakeholders from the area (Leeuwis and Van den Ban 2004). In the case study, the

consortium also included 'outsiders' that were having context-specific knowledge which was rooted in their previous experiences.

The case study involved actors with different levels of knowledge. The problems with the installation of the server show that diverging knowledge levels impose a problem if actors are not aware of the mismatch between the required versus the available level of knowledge in a specific field (see also subsection 3.3.2). Diverging knowledge levels do not necessarily impose a problem. The FLIWAS concept, for example, was completely new to the Romanian experts involved, while the project also involved experts that had been closely involved in its development. It obviously took some time before the first group of actors started to understand FLIWAS. This was especially the case for actors that were also not having a background in flood risk management. One of the experts suggested, and literature confirms, that the advanced knowledge level facilitated the knowledge transfer. However, experts with advanced knowledge also tend to provide instruction at a level of abstraction that is difficult to absorb for beginners (Hinds et al. 2001). In such situations, experts with interactional knowledge might be able to translate between experts (Collins and Evans 2002). In the case study, various actors were having interactional knowledge on FLIWAS and also on the Dutch setting and the Romanian setting. We observed that these experts tried to mediate when other experts were having difficulties to understand each other. Whether this also contributed to the creation of a shared knowledge space is difficult to assess. Despite several mediation attempts, the problems with the installation of the server persisted until the end of the project. It is also questionable whether the interactional knowledge of the interim project leader contributed to the collection of geographic information. It is probably that interpersonal aspects especially contributed to this (i.e. the interim project leader was also having a good relationship with the Romanian expert). Further research is needed to confirm whether interactional knowledge, rather than interpersonal aspects, contribute to knowledge transfer.

The case study included several experts with social knowledge that was rooted in their relationships. The project leader knew, for example, who was having knowledge on FLIWAS due to his close involvement in the development of FLIWAS. And the interim project leader and experts of Haskoning Romania were aware which organizations were having what knowledge on flood risk management in Romania due to their previous project experiences. The coordinating experts of RWB-Banat knew who could provide which knowledge or information in their own organization due to their regular involvement in interdepartmental projects. The project was also initiated by a NIHWM expert who was not specialized in flood risk management but had the social knowledge needed to initiate the project. It is likely that the social knowledge rooted in relationships eased the knowledge transfer as it made knowledge better available to others (Trott et al. 1995). It meant that there were persons able to create a linkage between persons seeking for knowledge and persons having that knowledge. The brokering of knowledge was especially relevant for the pilot implementation of FLIWAS.

### 5.3.2 The interaction process and outcomes

International projects are especially about the transfer of tacit knowledge (Koskinen et al. 2003; Lin and Berg 2001; Reddy and Zhao 1990; Trott et al. 1995) which is best transferred when actors communicate face-to-face and actively collaborate with each other over a longer period of time in smaller groups. Such collaboration enables actors, among others, to develop shared understandings, gain shared experience, exchange perspectives, provide contextual information, give immediate feedback and to verify meanings (e.g. Boh 2007; Koskinen et al. 2003; Krywkow 2009; Leeuwis and Van den Ban 2004; Nonaka 1994). The actors involved in the case study confirm this. Actors without knowledge on FLIWAS reported that their understanding of the concept developed gradually and that meetings, trainings and the exercise contributed to this. Actors involved highlighted that the integration of data into FLIWAS, which was basically about the codification of existing information, also provided a better understanding of existing flood risk management procedures. This shows that

codification mechanisms are not only useful as a means to improve the accessibility of data (Boh 2007). When done in collaboration with others, codification is also useful for the development of a shared understanding of data and information.

The case study confirms the importance of face-to-face communication. Most activities were implemented during or following one of the missions. One of the exceptions was the installation of the server, which was also one of the most troublesome activities. The underlying problem was that experts were not having a shared knowledge space. Communication was eventually often going through HKV experts. They were having some overlap with both sides: they cooperated with the German experts before, were actively involved in this project and had face-to-face contact with the Romanian expert. This means that they could provide some contextual information that was needed to understand the explicit knowledge that was shared (Alavi and Leidner 2001). Direct face-to-face interaction between experts would have been more effective to share also underlying tacit assumptions and understandings (Koskinen et al. 2003; Stenmark 2002). The difficulties with the collection of geographic information also highlight that face-to-face communication is no panacea. It does not necessarily result in a mutual understanding in communication between actors with diverging backgrounds.

Whether all knowledge that was relevant for the transfer of FLIWAS was effectively shared and acquired is difficult to say. We observe that most hurdles were effectively dealt with. Dutch experts argue that Romanian experts accumulated all knowledge needed to start using FLIWAS and that only additional training on the management and maintenance of FLIWAS is probably needed [I2; I5]. However, in practice Romanian experts did not start using FLIWAS. Mentioned reasons include that one of the trained persons of RWB-Banat went on leave and that the Romanian server never became operational. Underlying reasons probably include that Romanian experts lack the capacity and/or willingness to start using the system independently. Transferred knowledge was thus never used for the reduction of flood risks. However, the results of the pilot were used as a basis for the formulation of follow-up projects. This means that the actual use of the pilot was to explore and to influence decision-processes rather than to mitigate problems (Vreugdenhil et al. 2010).

Literature shows that 'champions' are of particular importance for the successful adoption of knowledge. These are key players that are able to promote and push the adoption of new ideas (Trott et al. 1995). That managers and decision-makers actively supported the pilot probably enhanced its implementation. Whether they also support the actual use of the pilot is questionable. Discussions during the last meetings reveal that they perceived the pilot rather as a basis for follow-up and were focusing on the mobilization of resources for this. This confirms that the application of knowledge does not only depend on the successful sharing and acquisition of knowledge (Davenport and Prusak 1998) but also on actors' motivations, cognition and other resources (Bressers 2007). An analysis of the interaction between actors from a knowledge transfer perspective was useful to highlight some of the main issues in the knowledge transfer process. However, our analysis of knowledge and interaction also show that these factors cannot explain the course and outcomes of such projects. This probably requires a more elaborative analysis of the dynamic interaction between the resources, cognitions and motivations of actors involved (Bressers 2007).

# 6 Conclusions and recommendations

This chapter presents our main conclusions and recommendations. Section 6.1 presents our main findings regarding the four central research topics and related questions (see section 1.1). Section 6.2 presents recommendations for the improved effectiveness of this and other Dutch-funded international water projects.

## 6.1 Conclusions

This section starts with our main conclusions regarding the interaction between the project (process and outcomes) and its context. Subsection 6.1.2 presents our findings related to the characteristics of actors involved. Subsection 6.1.3 concludes upon the effectiveness of the project. The last subsection presents the main findings about the knowledge transfer process.

### 6.1.1 Project and context

This case study confirms the importance of analyzing international projects within their proper context. FLIWAS, an internet-based flood information and warning system, was initially developed in an interregional European project. From the beginning, the developers were having the intention to also apply the tool in other countries. This and various other factors eventually contributed to its pilot implementation in Romania. Actor-interaction was important as the expression of interest from Romania resulted from the interaction between a Dutch expert and Romanian expert. What also played a role was that funds became available after the stagnation of the Slovakian pilot. This historical context also explains the involvement of STOWA. STOWA did not directly contribute to the implementation. Their participation was rooted in the transfer of the pilot from Slovakia to Romania. Previous experiences were another important factor in the design of the pilot. Dutch experts had been working in Romania before and were interested to continue working in the country. Romanian experts initially proposed another pilot region. The reason that Banat region was chosen was also related to the fact that one of the Dutch consultants had been working on flood risk management in the region before.

External developments did not directly affect the implementation of this case study. They were rather used as 'windows of opportunity' for the dissemination of FLIWAS. Project team members presented FLIWAS at various occasions and also tried to include FLIWAS in emerging project proposals. One of the reasons that external dynamics was having little influence was probably also related to the short duration of the pilot. The period between the project preparations and its end date was less than one year. In addition, the implementation plan and the communication plan were only specified following the first mission. The insights of Romanian experts were therefore integrated already in the project plans. Hence, there was less need to adjust the content of the plans to new insights. The main adjustments were related to the time plan. The end date of the project had to be postponed two times. As a result, the project was finalized in April 2010, which was four months later than planned. The first postponement related to difficulties with the installation of a Romanian FLIWAS server. The second postponement related to the illness and replacement of the project leader. The problems with the installation of the server were eventually having a considerable impact on the pilot results. As it took more time than expected to make the server operational, it was decided to start implementation on the Dutch server and to migrate Romania data later. Although the Romanian server was installed just before the end of the project, Romanian data were never implemented on the Romanian server. As a result, Romanian actors are currently not having access to data of the pilot region.

### 6.1.2 Characteristics of actors involved

To better understand the process and its outcomes, the motivations, cognitions and resources of actors involved were also analyzed as well as the relations between actors. This analysis revealed that Dutch actors wanted to transfer their expertise to another setting, among others, to strengthen the international position of their organization. Romanian experts and stakeholders wanted to learn (i.e. gain expertise) about potential means to reduce flood risks. The motivations of all actors were rooted in personal and organizational objectives. Self-effectiveness assessment of the consortium (positive) and the Romanian actors (negative) were also important sources of motivation. Cognitions of actors were partly overlapping and partly diverging. All actors involved perceived as FLIWAS a tool that could contribute to flood risk reduction. Another benefit of the project was that it contributed to improved cooperation and communication. Both Dutch and Romanian experts were having reservations about the actual use of FLIWAS. Dutch experts expected that its actual use was a matter of time and additional effort, while Romanian experts also doubted the applicability of FLIWAS in general. The consortium provided financial resources (Partners for Water), human resources (HKV and Haskoning) and knowledge (general and some context-specific knowledge). Romanian partners contributed by providing the necessary institutional support for the project and employees made their time available (RWB-Banat and NIHWM). The analysis especially highlights that there was sometimes a mismatch between available versus attributed resources, i.e. knowledge of Romanian experts versus attributed knowledge by Dutch experts. What further characterizes this case study is that some experts were already having good relationships with each other. Actors involved all highlighted their good collaboration, even though there were also some communication problems. The dynamic interaction between actor characteristics was not analyzed in detail. However, it is very likely that existing relations and positive experiences were especially important for the creation of a joint motivation, the development of a shared understanding and the mobilization of resources.

### 6.1.3 Effectiveness of the project

The effectiveness of Dutch-Romanian project can be assessed in terms of the contribution to problem-solving and the generation of follow-up projects. The case study was only partly effective. Its results were used as a basis for the formulation of projects in which FLIWAS may be implemented further. However, actors involved did not start using FLIWAS. Analysis of the direct outcomes show that both Romanian and Dutch actors are motivated to further implement FLIWAS. The outcomes of the project and the relationships that were developed or strengthened form an important basis for such follow-up. However, there is little support among Romanian actors to start using the results of the pilot and Romanian experts appear to be unable or unwilling to solve some of the actions that need to be implemented. A further analysis of the process shows that two factors especially enhanced follow-up, these were institutional embedding and diffusion. The project involved water management authorities at various levels. This included regular information provision and consultation of actors with managing and decision-making capacities and active collaboration with experts. The diffusion strategy was not pre-defined but developed in close collaboration between Dutch and Romanian actors. The strategy was also adaptive in the sense that communication activities were added when new dissemination opportunities arose. What probably contributed to the implementation of the diffusion strategy, and also to the communication between project partners, was that several experts were paying undivided attention to communication. The involvement of other actors with a role in flood risk management was limited. This implies that before actors can start using FLIWAS there is, among others, a need to organize a larger-scale exercise and to integrate also the knowledge of these actors. What negatively affected the outcomes of the pilot was that experts involved in the installation of the server had difficulties to understand each other. The resulting problems were dealt with in an adaptive manner (i.e. installation on the Dutch instead of the Romanian server). However, this change to the implementation plan was never compensated for, i.e. data was never implemented on the Romanian server.

### 6.1.4 Knowledge transfer process

One of the specific objectives of this case study was to provide a better understanding of Dutch-Romanian projects from a knowledge perspective. For this, knowledge transfer was conceptualized as an interactive process that involves actors with different backgrounds and knowledge. In the case study, knowledge was especially transferred between experts. Stakeholders were also invited to contribute their knowledge but most context-specific knowledge was provided by experts of Romanian partner organizations. The substantive knowledge of these experts was integrated with general knowledge of external experts. The case study confirms that besides substantive knowledge, the successful implementation of projects also requires political and procedural knowledge. These process-oriented knowledge forms were contributed by consortium experts and also by managers and/or decision-makers of Romanian water authorities.

Knowledge was especially transferred when experts were meeting face-to-face. In the pilot region, experts were collaborating in a small team and had the opportunity to gain hands-on-experience and to reflect on these experiences. Most experts were, despite their diverging background, not having problems to interact with each other. One of the main exceptions concerned the installation of the server. For this component, key experts were only interacting on distance and had difficulties to understand each other. It later appeared that they were having different understandings about available and required knowledge. Literature suggests that face-to-face communication is the best means to arrive at a mutual understanding in communication. However, the case study also shows that direct interaction does not necessarily contribute to the development of shared understandings when experts have diverging backgrounds. The case study shows that it is more important that experts have some 'shared knowledge space'. Within this context, 'interactional knowledge' probably enhanced knowledge transfer in the case study. Due to previous experiences, various experts were having interactional knowledge of each others knowledge domain or knowledge background. Maybe even more important were interpersonal aspects. In the case study, social knowledge and the existence and development of good relationships eased the knowledge transfer. The case study further confirms that the application of knowledge also depends on personal characteristics, such as, a persons' ability to develop good relationships. As the evaluation of the case study shows, the overall knowledge transfer was only partly effective. The case study thus confirms that the sharing and acquisition of knowledge does not necessarily lead to its application. We further conclude that an analysis of knowledge and interaction provides useful insights in some of the factors that hamper international knowledge transfers. However, the course and outcomes of such processes can only be explained by also analyzing the motivations, cognitions and other resources of actors involved.

## 6.2 Recommendations

This section presents a few project-specific and general recommendations regarding the effective transfer of Dutch knowledge on flood risk management to other countries.

### 6.2.1 Project-specific recommendations

When reflecting upon the results of the pilot, we observe that the pilot was successful in the sense that it has been used as a basis for the formulation of follow-up projects. However, the project did not achieve its central objective, which was that Romanian actors could use, operate and maintain FLIWAS independently. One of the main issues is that integrated data was never transferred and that Romanian actors never started using the Romanian FLIWAS environment. Because of this, Romanian experts also foresee many problems with the actual use of FLIWAS in Romania. We further observe that the last meetings concentrated on the formulation of follow-up projects, while hardly any attention was paid to the completion of this pilot. On the basis of these observations, we formulated a few recommendations for the follow-up of this project and the implementation of similar projects.

Our main recommendation to the consortium is to continue supporting the transfer of FLIWAS until it is fully implemented. As Romanian actors lack concrete knowledge on FLIWAS, the consortium has to support them from start to finish in technical implementation activities. In this whole process, it is of crucial importance that key experts develop a shared understanding of what actions are required and who is having the resources to successfully implement these actions. This means that actors interaction should also focus on developing a shared vision on required versus available knowledge. Such understanding is best developed when key experts discuss all details of the technical implementation process face-to-face. In the case study, such discussions are still needed to arrive at a shared understanding about, among others, the transfer data from the Dutch to the Romanian server, the import of automated measurements and further development of operation and maintenance. Our main recommendation to Romanian experts is to start using FLIWAS next to their existing system in order to gain hands-on-experience with the system. It is further recommended to also involve other actors with a role in the management of emergency situations. If they can contribute to the implementation and development of FLIWAS they are also more likely to support its use. It is recommended that all acquired knowledge is also used as a basis for the implementation of other follow-up projects.

### 6.2.2 Recommendations to the Dutch water sector

This case study concerned the transfer of the rather high-tech solution from the Netherlands to Romania. An in-depth analysis of this case study revealed several factors that potentially enhanced or complicated this transfer. On the basis of this analysis, we recommend that experts involved in similar projects to take the following considerations into account:

- To enhance the dissemination of a technical project, explicit attention should be given to communication. For example, by including a communication component that is implemented by dedicated experts.
- To enhance project implementation, key experts should develop shared understandings on what can and needs to be done by whom and how. Experts should especially have the same understanding of required versus available knowledge. The joint development of project plans can contribute to this.
- To enhance the institutional embedding and the integration of political and procedural knowledge, actors with managing and decision-making capacities should be regularly informed and consulted.
- To enhance knowledge transfers, a project team should include actors with advanced levels of knowledge as well as actors with interactional knowledge of various knowledge domains or backgrounds.
- To ease collaboration, experts that have the ability to develop (or already have) good relationships should be given a central position in the project, for example, as project manager.
- To enhance the sharing and acquisition of knowledge, the project should offer opportunities for active collaboration in teams and for hands-on-experiences (in combination with reflection). This also implies that face-to-face should be one of the main communication means.
- To enhance effective application, projects should be managed in an adaptive manner without losing sight of the implementation of the projects' ultimate objectives.

For additional recommendations, we refer to previous case study reports (Vinke-de Kruijf 2009b, 2011).

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# Annex A – List of interviews and project documents

## Project documents

| Doc. No. | Document name | Date |
|---|---|---|
| D1 | Partners for Water proposal and work plan for Slovakia (in Dutch) | 6 Feb. '07 |
| D2 | Project request of NIHWM | 2 July '08 |
| D3 | Partners for Water proposal and work plan for Romania (in Dutch) | 23 July '09 |
| D4 | Project request NARW | 27 July '09 |
| D5 | Letter of NIHWM to HKV about 1st mission | 17 Sept. '09 |
| D6 | Programme of 1st mission | 18 Sept. '09 |
| D7 | Report 1st mission | 5 Oct. '09 |
| D8 | Communication plan | 7 Oct. '09 |
| D9 | Implementation plan | 14 Oct. '09 |
| D10 | Report 2nd mission | 10 Nov. '09 |
| D11 | Planning 3rd mission and timetable | 27 Nov. '09 |
| D12 | Progress report Partners for Water until November 2009 (in NL) | 8 Dec. '09 |
| D13 | Report 3rd mission | 18 Jan. '10 |
| D14 | Progress report Partners for Water until January 2010 (in NL) | 11 Feb. '10 |
| D15 | Report 4th mission | 2 April '10 |
| D16 | Report 5th mission | 21 April '10 |
| D17 | Proposal implementation along Danube | 26 April '10 |
| D18 | Letter of satisfaction RWB-Banat | 8 July '10 |

## Overview of interviews

Once the project was finished, the author conducted interviews with 12 members of the project team. The purpose of these interviews was to understand how the members perceived the project. All interviews were semi-structured and in depth, with a length varying from 90 to 150 minutes. The last interview [I10] also included an analysis of emails that were exchanged between various actors involved. The interviews with Dutch respondents were in Dutch and with Romanian respondents in English. Draft versions of all interview reports were send to interviewees for review. Note that we did not interview employees of STOWA or L&W as they were not directly involved in the interactive process.

| Int. No. | Organization | Role | Place and date |
|---|---|---|---|
| I1 | Haskoning | Communication expert | Phone, 6 June '10 |
| I2 | HKV | Deputy and interim project leader | Phone, 13 July '10 |
| I3 | HKV | FLIWAS expert | Email, 12 August '10 |
| I4 | NIHWM | Management support | Bucharest, 12 Aug. '10 |
| I5 | HKV | Project leader/FLIWAS expert | Phone, 27 Aug. '10 |
| I6 | NIHWM | Expert | Bucharest, 10 Sept. '10 |
| I7 | RWB-Banat | International Department (3p) | Timisoara, 15 Nov. '10 |
| I8 | RWB-Banat | Dispatch Department | Timisoara, 15 Nov. '10 |
| I9 | Haskoning-RO | Communication expert and project secretariat | Bucharest, 11 February '11 |
| I10 | NIHWM | IT expert | Bucharest, 9 March '11 |

In addition to the above-mentioned interviews, we also had interviews with employees of RWB-Banat about previous projects and flood risk management. During the project, we also had a rather informal conversation with the project leader about the project history. We further interviewed the Director of MEF-DESM about flood risk management.

| Int. No. | Organization | Role | Place and date |
|---|---|---|---|
| I11 | RWB-Banat | International Department (3p) | Timisoara, 27 Oct '08 |
| I12 | HKV | Project leader | Timisoara, 2 Nov '09 |
| I13 | RWB-Banat | Dispatch Dept. | Timisoara, 3 Nov. '09 |
| I14 | RWB-Banat | Investment Dept. | Timisoara, 3 Nov. '09 |
| I15 | RWB-Banat | Hydrology Dept. | Timisoara, 3 Nov. '09 |
| I16 | MEF-DESM | Director | Bucharest, 19 Aug. '10 |

### Direct observations

An overview of the project activities that were observed by the author are listed below.

| Obs. No. | Activity | Date | Location | Time |
|---|---|---|---|---|
| O1 | Lunch project team and meeting NL team | 23 Sept. '09 | Bucharest | 13:00u-18:30u |
| O2 | Stakeholder meeting | 3 Nov. '09 | Timisoara | 9:00u – 12:00u |
| O3 | Progress meeting | 10 Dec. '09 | Bucharest | 9:00u – 12:30u |
| O4 | Exercise | 15 April '10 | Timisoara | 9:00u – 14:00u |
| O5 | Final conference | 20 April '10 | Bucharest | 9:00u – 15:00u |
| O6 | Meeting at NIHWM | 22 April '10 | Bucharest | 10:00u – 12:00u |
| O7 | Meeting at MEF | 23 April '10 | Bucharest | 9:00u – 11:00u |

# Annex B – Participation in project activities

Tabel B.1 – Participation of project team members in project activities

| Activity | Location | Date | HKV | H-NL | H-RO | RWB-Banat | NIHWM | MEF-DESM | NARW |
|---|---|---|---|---|---|---|---|---|---|
| Kick-off meeting | Timişoara | 21 Sep | 2 | 1 | 1 | 23 | | | |
| Kick-off meeting | Bucharest | 23 Sep | 2 | 1 | 2 | 1 | 12 | 2 | |
| Administrator training | Timişoara | 27 Oct | 1 | | | 9 | 2 | | |
| Stakeholder meeting | Timişoara | 3 Nov | 1 | | 1 | 15 | | | |
| Progress meeting | Timişoara | 8 Dec | 2 | 1 | 1 | 4 | | | |
| Progress meeting | Bucharest | 10 Dec | 1 | 1 | 1 | | 13 | | |
| Progress meeting | Timişoara | 15 Dec | 2 | | | 5 | | | |
| User Training | Timişoara | 18 March | 2 | | | 5 | 1 | | |
| Exercise | Timişoara | 15 April | 2 | 1 | 1 | 11 | 2 | 1 | |
| Conference | Bucharest | 21 April | 2 | 1 | 2 | 6 | 7 | 2 | 3 |
| Final meeting | Bucharest | 23 April | 1 | 1 | 1 | | 2 | 1 | 1 |

Tabel B.2 – Participation of regional stakeholders in project activities

| Activity | Location | Date | Timiş County Council | Timiş Prefecture | IES-Timiş | Local Councils |
|---|---|---|---|---|---|---|
| Stakeholder meeting | Timişoara | 3 Nov | 1 | 1 | 1 | 1 |
| Exercise | Timişoara | 15 April | 1 | | 1 | 3 |

Tabel B.3 – Stakeholder representation at the final conference (Bucharest, 21 April)

| Organization | No. of representatives: |
|---|---|
| RWB-Jiu | 2 |
| RWB Mures | |
| RWB Siret | 2 |
| RWB Somes - Tisa | 3 |
| RWB Crisuri | 1 |
| RWB Buzau - Ialomita | 2 |
| RWB Arges - Vedea | 1 |
| RWB Olt | 2 |
| RWB Dobrogea - Litoral | 2 |
| RWB Prut | 2 |
| MEF-DG Water | 1 |
| MAI | 1 |
| WWF-DCP | 1 |
| Dutch Embassy | 1 |
| University (UTCB) | 2 |

# Annex C – Communication

## External presentations

The project team presented the project at several occasions, including:

- Presentation by Ad Sannen (Haskoning Romania) at the conference "Estimarea si predictia fenomenelor hidrologice extreme" (estimation and prediction of extreme hydrological events) organized by NIHWM and NARW on 21-22 October 2009 in Bucharest.
- Presentation by Alexa Radulescu (NIHWM) at the Environmental Fair organized in Arad (around November 2009).
- Two presentations by Mihaela Madar (RWB-Banat) at the River Basin Committee of RWB-Banat (around November 2009 and February 2010).
- Presentation by Kees de Gooijer (HKV) at the BALWOIS 2010 conference organized on 25-29 May 2010 in Ohrid, Republic of Macedonia
- Presentation by Catalin Aldescu (RWB-Banat) at a meeting of the Dutch-Romanian bilateral panel (related to the Memorandum of Understanding between the Dutch Association of Regional Water Boards and NARW) organized on 28 and 29 October 2010 in Timişoara.
- Presentation by Catalin Aldescu (RWB-Banat) at a meeting of the ICPDR Expert Group on Flood Protection organized on 14 and 15 October 2010 in Timişoara.

## National and regional press

Several local and national news providers wrote about the implementation of FLIWAS. This included the daily local newspaper "Renasterea Banateana" (the largest regional newspaper in Banat region), the newspaper "Ziua de Vest" (regional edition of the national newspaper ZIUA), the electronic edition of the daily local newspaper "Timis Express" and the regional online news portal "Vestul". The project was also broadcasted as part of the news on the regional radios "Radio Timisoara" and "Radio Resita" and on "Pro TV Timisoara" (regional broadcast of the national TV station Pro TV). The national conference was announced by national news agency "NewsIn" and by the weekly national newspaper "Ziua Veche".

Table C.1 – Press represented at the stakeholder meeting (Timişoara, 3 November 2009)

| Newspapers: | Radio/TV: |
|---|---|
| - Renasterea Banateana<br>- Agenda<br>- NewsIn<br>- Ziua de Vest | - Pro TV Timişoara<br>- Radio Timişoara<br>- Radio Kiss FM |

The final conference (Bucharest, 21 April 2010) was also attended by press.

FLIWAS was mentioned in the following media:

- Ziua de Vest (22 September 2009), Sistem informatic de avertizare în caz de inundații, în Timiş (Flood information and warning system in Timis).
- Timis Express (22 September 2009), Sistem informatic implementat în premieră la Direcția Apelor Banat Information system for the first time implemented at RWB-Banat).
- Vestul (22 September 2009), Sistem electronic pentru gospodărirea inundațiilor (Electronic system for flood management).
- Renasterea Banateana (23 September 2009), În Timiş, lupta cu inundațiile se mută pe internet (In Timis County internet helps fighting floods).
- Ziua de Vest (2 November 2009), Sistem informatic de avertizare în caz de inundații, în Timiş (Flood information and warning system in Timis), Event announcement.

- Ziua de Vest (3 November 2009), Inundațiilor vor fi prevenite cu emailul şi sms-ul, în Timiş (Floods will be prevented with email and sms in Timis).
- Renasterea Banateana (3 November 2009), Specialiştii de la Ape vor să surprindă viitura pe internet (water management experts will fight floods with internet).
- Radio Timisoara (3 November 2009, 16.30h), FLIWAS-proiect pilot implementat la Directia Apelor Banat (FLIWAS project pilot implememtation at RWB-Banat), news item.
- Pro TV Timisoara (3 November 2009, 22.30h), Inundatiile evitate informatic (floods avoided through information), news item.
- Radio Resita (4 November 2009), Măsuri inundații (flood measures).
- Ziua Veche (20 April 2010), Update: Olandezii ne invata cum sa ferim apa (The Dutch teach how to protect ourselves against water).
- Ziua de Vest (21 April 2010), Ieri în Timişoara, azi în toată țara! (Yesterday in Timisoara, today in the whole country!).
- Timis Express (21 April 2010), Sistem online de avertizare a inundațiilor, implementat în Timiş (online system for flood prevention implemented in Timis).
- Radio Resita (21 April 2010, 9.00h), Pregătiți de inundații (Flood preparedness).
- NewsIn (20 April 2010), Implementarea Sistemului de Informare şi Avertizare în caz de inundații – conferință (Implememtation of a Flood Information and Warning System, conference).
- Ziua de Vest (28 October 2010), Parteneriat timişoreano – olandez, în valoare de 1.500.000 de euro (A Dutch-Timisoara partnership of EUR 1.5 million).