



NeWater



TRAINING AND GUIDANCE BOOKLET FOR ADAPTIVE WATER MANAGEMENT

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Foreword

The “New Approaches to Adaptive Water Management Under Uncertainty” (NeWater) project, conducted between 2005 and 2008, was an integrated project co funded by the Global Change and Eco-system sub-priority of the 6th EU Framework Programme. The major goal of the project was to develop a theoretical and practical framework to support the transition of existing water management regimes towards greater adaptivity. Based on this framework specific approaches and tools have been tested and further developed for practical applications in various river basins.

This booklet and the enclosed CD-ROM present the structured approach to the construction and implementation of Train-the-Trainer (TtT) workshops developed under the NeWater project to support the transition towards adaptive water management regimes.

Box 1: Who are the authors of this booklet?

*To achieve the development of concepts and tools that guide a stepwise process of change in water management, the **NeWater** project was structured into six work blocks. In addition, the management structure was organised to allow effective exchange between innovative research on integrated water management concepts and practical applications and testing in selected river basins through a participatory process.*

The authors of this booklet were involved in producing and trialling guidance and tools for the NeWater Project. This work developed tools and training materials for practitioners based on new conceptual insights on experiences collected in a number of test basins and on the requirements of ongoing policy processes, in particular the European Water Framework Directive and the European Water Initiative.

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List of Acronyms and Abbreviations

APM	Agile Project Management
AWM	Adaptive Water Management.
BBN	Bayesian Belief networks
DSS	Decision Support System.
GWP	Global Water Partnership.
HDSR	Hoogheemraadschap De Stichtse Rijnlanden.
ICIW	International Course on Institutions in Water Management.
ICT	Information Communication Technology.
IWRM	Integrated Water Resources Management.
NeWater	New Approaches To Adaptive Water Management Under Uncertainty.
TtT Workshop	Train-the-Trainer Workshop.
WFD	Water Framework Directive
WISE-RTD	Water Information System For Europe – Research And Technology Development.

1. Introduction

This chapter defines the aim of the training material and the way in which this document and supporting materials can be used.

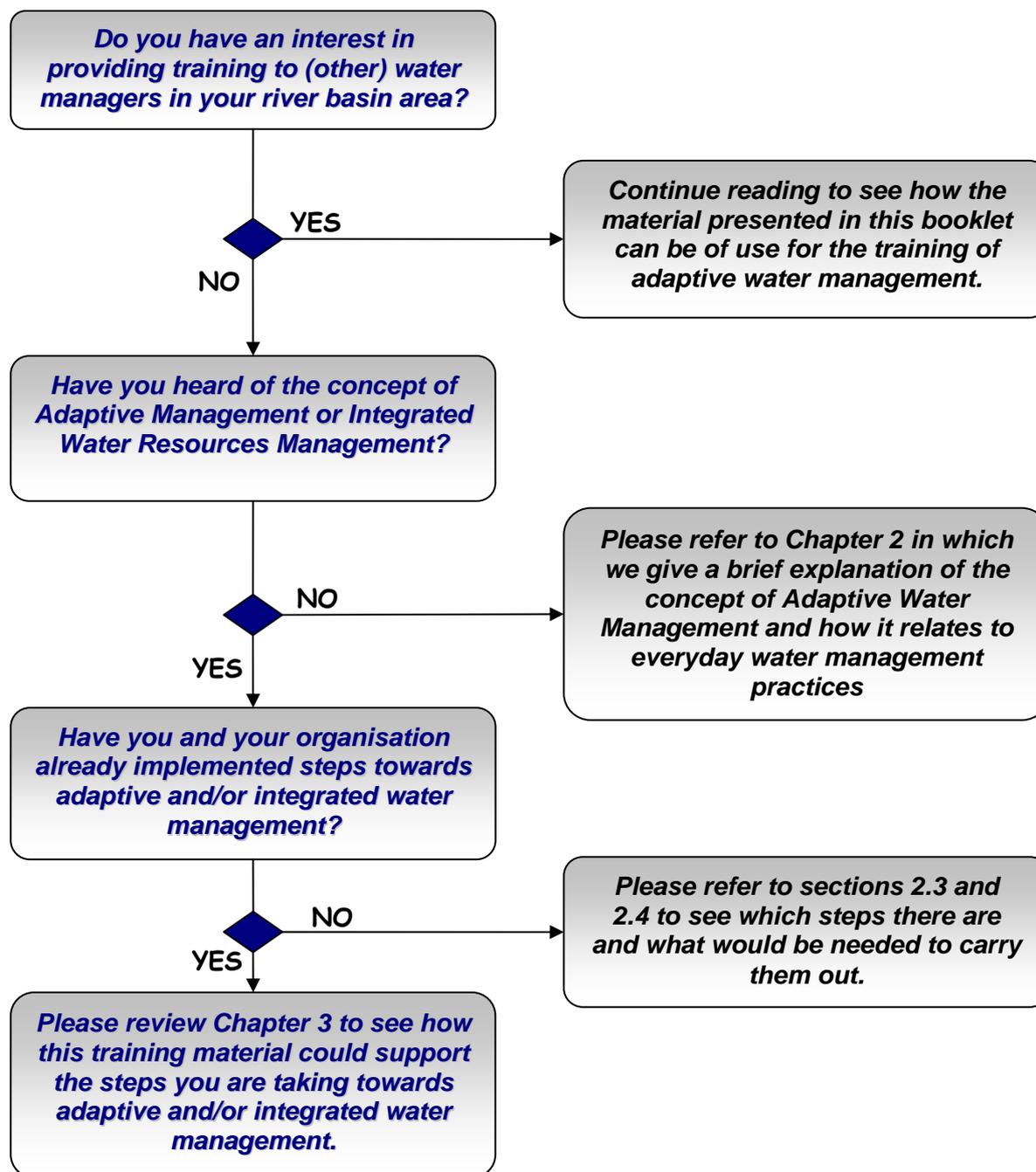
1.1 Aim of the training material

The main objective of the training material and workshop reports presented in this document is to disseminate the knowledge and experience collected and developed in the NeWater Project and other research projects concerned with Adaptive Water Management (AWM). The focus of the training is upon increasing the awareness of the participants, to encourage the adaptive aspects of the principles behind Integrated Water Resources Management (IWRM) as defined by the Global Water Partnership and the use of tools tailored to realise AWM (*If you wish to learn more on the GWP, please consult the further Readings' section p47*).

The training material, which has been developed and applied within the NeWater case study areas (Figure 4, Chapter 4), is intended to support water managers in the implementation of their tasks in various aspects and phases of AWM. It represents the link needed for the use of tools to support the transition to AWM based on the key drivers and vulnerabilities identified in the case study areas involved in this project. When possible, the feedback, comments and evaluation of the workshop training were used to enhance the training materials.

1.2 Who is this booklet for?

The content of this booklet is intended to provide insights and examples for those interested in the training elements of Adaptive Water Management. However, if you are not sure that the training elements of Adaptive Water Management presented in this booklet are of relevance to you or to water managers in your river basin area, the following series of question should help you make up your mind:



The accompanying CD-ROM will provide extra information to those who, after reading the booklet, are interested in more specific information concerning adaptive management tools, the case studies involved in the NeWater project, reports on the outcomes of the workshops and other background material.

1.3 How to use this booklet?

This booklet is divided in five chapters.

Chapter 1 Provides a general background to the training materials applied within the NeWater project and defines the way in which the current document and

supporting material can be used.

- Chapter 2 Explains what the principles of Adaptive Water Management (AWM) are and how they fit with Integrated Water Resources Management (IWRM). It describes the drivers for and advantages to Adaptive Water Management (AWM) and the key components of the “policy cycle”.
- Chapter 3 This chapter explains how the workshops and tools have been developed to be compatible with the AWM cycle using the thematic basis. It provides an overview of the training structure and tools that have been applied.
- Chapter 4 This chapter provides information on the experiences of the Train the Trainer workshops organised at each of the sites involved in the NeWater project. It highlights the various water management issues faced at each site, gives an overview of the specific tools used and briefly describes the experience gained from the utilisation of the NeWater tools.
- Chapter 5 The final chapter documents the changes that were made to the tools and materials as a result of feedback from the workshops, hence highlighting specific issues of concern but also presenting general recommendations for future training programmes.

1.4 Further dissemination of information



The CD-ROM attached to this booklet serves as a repository for the detailed information concerning the Train-the-Trainer (TtT) workshops. It contains information on the tools that were presented, the outline of the workshop and the evaluations that took place, as well as electronic copies of the main documents produced within the NeWater project. It also contains the materials used for the workshop presentations, including PowerPoint presentations and text based documentation. The extra material will be of value to water managers interested in learning more about using the training materials described in this booklet.



A more comprehensive account of the NeWater project including current information on the training materials, tools and case studies is available on the NeWater portal site (www.newater.uos.de) and within the AWM section of the EU WISE-RTD portal (<http://www.wise-rtd.info/>). These web resources are intended to be useful for those seeking guidance when developing initiatives on introducing Adaptive Water Management by providing broader concepts and analysis that may help them to be more informed and to encourage more effective participation by other parties (Box 2).



An introduction to the *Online Curriculum on Adaptive River Basin Management* which has been developed as part of the NeWater project is also available on the CD. This curriculum was developed for teaching at universities at Master's and PhD levels. It builds on teaching material prepared for the NeWater summer schools and curricula developed for Master's programmes at the University of Osnabrück (Germany) and Wageningen University (The Netherlands). The teaching programme

is also published on the internet and individual modules can be downloaded by instructors at: <http://www.newatereducation.nl>.

Box 2: What is WISE-RTD?

The worldwide web offers manifold resources such as guidance, tools and case experiences that support water management. However, the huge number of relevant websites makes it difficult find appropriate results. One solution for this challenge is WISE-RTD.

WISE-RTD (www.wise-rtd.info) is a web portal for knowledge transfer in the field of water management, which is part of the “Water Information System for Europe”. WISE-RTD acts as an entry point providing structured access to resources that are relevant for water management and which come from various sources. The portal offers several ways to find suitable results:

- 1. Free search - An easy and quick way to look for results. Just type in a search term and combine it with keywords related to water management.*
- 2. Available information lists - In case you are looking for a product that you already know. Detailed lists show you what is in the system, structured by information types.*
- 3. Guided searches - The guided searches are tailored to different target groups (e.g. water managers, researchers) and orient on typical steps, tasks and issues in their work.*

Filters allow search refinement with regard to geography and information type. Results are presented together with additional information, e.g. descriptions, helpful links and related resources. All these techniques help the users to find and apply resources that are suitable in their specific context.

Within the scope of NeWater, a new section has been added to WISE-RTD in order to offer resources that help to make water management more adaptive (see Box 3).

2. Managing water resources

The focus of the NeWater training material is on providing water managers with support in dealing with uncertainties in water management. The concept behind dealing with these uncertainties is referred to by researchers as “Adaptive Water Management” (AWM). AWM provides added value to IWRM by explicitly acknowledging uncertain and complex aspects of water basin management.

In this chapter we give a brief introduction to these two concepts and how they relate to each other. This introduction gives some background on the topics handled in the training material. The relationship between these concepts and our training material is illustrated in Chapter 3.

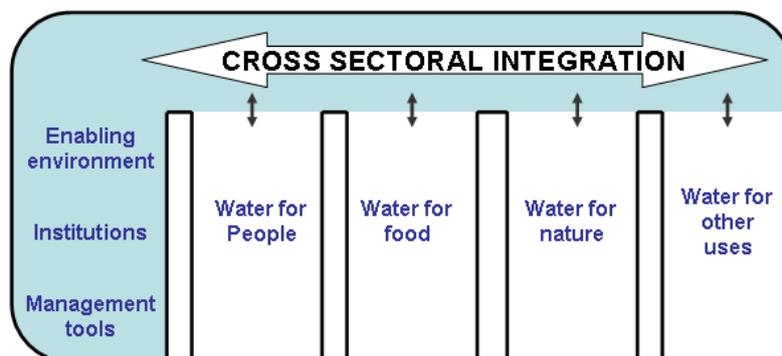
2.1 Integrated Water Resources Management

In the 1990s a growing recognition of the potential contribution of various sectors and systems in a sustainable water management, led to the emergence of Integrated Water Resources Management (IWRM). IWRM has now become an accepted framework for water governance and is defined by the Global Water partnership (GWP) as:

“A process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare, in an equitable manner without compromising the sustainability of vital ecosystems”

(If you wish to learn more on IWRM as defined by the GWP, please consult the ‘further readings’ section p47).

The IWRM framework emphasises the integration of management interests with the values of stakeholders involved in *all* sectors influenced by water usage; so that the impacts of one particular user are taken into account for all other users. This is illustrated by the “IWRM Comb” in Figure 1 below.



*Figure 1. The IWRM Comb: IWRM and its relation to sub-sectors
(For further information on the IWRM please check the ‘Further readings’ section p47)*

It is difficult to prescribe “blueprints” and “steps” for IWRM as each water manager needs site specific implementation guidance. This is especially true when managers are faced with various challenges in collecting data, interpreting data, steering stakeholders and making decisions. These challenges are a result of uncertainties. On the one hand, these uncertainties could be due to unforeseeable changes in the economy or climate. On the other, uncertainties could arise from the way of managing the decision-making process due to increase in cross-sectoral interest and involvement in water management and/or due to uncertainty about the validity of data or model outputs used for drawing up future scenarios.

2.2 The added value of Adaptive Water Management?



Adaptive Water Management (AWM) is an approach that assists water managers in understanding, accommodating and planning for situations of uncertainty and complexity in water management projects; both of which are difficult to address within the framework of IWRM. An example of complexity may be the result of a large number of stakeholders with different and conflicting interests and ideas, while an example of uncertainty could be related to future supply and demand scenarios or changes in precipitation as a result of climatic changes.

The need to accommodate complexity is becoming ever more important because institutions in the water sector that have generally been separated, are increasingly having to work together since users upstream or downstream are becoming more dependent on, or influenced by, the actions of one another.

Adaptive Water Management promotes the improvement and adjustment of management measures, systems and policies in order to accommodate the changes inherent to complex water systems. The process of continual improvement and adjustment should be a result of learning from past policies and practices with the intention of anticipating future developments. However, integrating learning with changes of policy is only possible if the policies implemented can actually be changed. Pahl-Wostl and Sendzimir wrote an article on the relationship between IWRM and AWM. Please consult the ‘Further readings’ section p47 on where to find this article. This requires adaptive capacity building at all levels of policy development and implementation.

AWM promotes the use of negotiated acceptable solutions instead of command and control; seeking a win-win solution for those involved. It applies a decentralised or polycentric governance approach which relies strongly on multi-stakeholder participation engendering shared responsibility and cross-sectoral integration and involvement at all levels of the project. These principles are applied in order to develop a management environment that builds greater adaptive capacity in a water management system, enabling those involved to continue to learn and develop; not simply to rigidly optimise for the known factors of the time.

(If you wish to learn more on the historical development of AWM, please consult the further reading section p47).

2.3 The Adaptive Water Management cycle

In order to find ways to respond to complexity and uncertainty, the “AWM cycle” is commonly used. This cycle follows the decision making process of IWRM in which the problem statements, goals, conceptual model, interventions and monitoring plans are continuously subject to planning, action, monitoring and evaluation. In order to make it an effective social learning cycle, the process includes:

- a. ambiguities, frames and paradigms identified and used to build commitment to reform,
- b. scenario planning, the generation of hypotheses and development of experimental approaches in preparation of strategy and action plans in order to help build commitment to actions,
- c. hypotheses to be tested in practice and to use the lessons learnt to plan the steps to be taken,

The elements a, b and c are essential in the process of coming to adaptive solutions. In Figure 2 they are included at their favoured positions in the AWM cycle. However, in practice, they can certainly also be found at other steps of the cycle.

It is also important to note that potentially at all steps in the water management process water managers can enter the social learning cycle and incorporate the knowledge gained in further fine-tuning of the decision-making process.

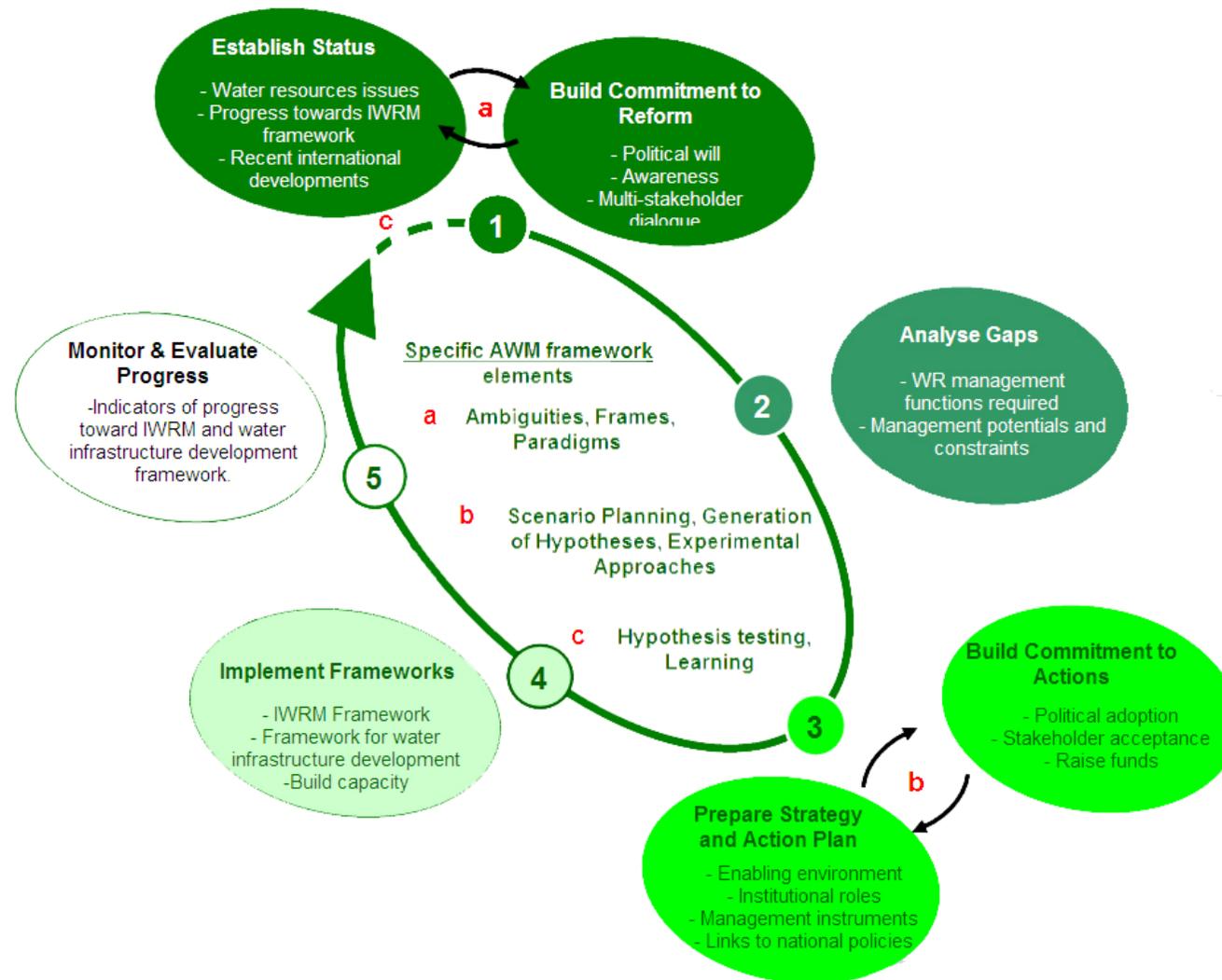


Figure 2. Different steps in the IWRM cycle with considerations of what would be needed to take into account uncertainties and make water management more adaptive (Adapted from the work of C. Pahl-Wostl and P. Sendzimir and the work of T. Jønych-Clausen - see p47)

In the approach promoted in this document, Adaptive Management can help water managers to apply IWRM principles under conditions of complexity and uncertainty and thus increase the adaptive capacity of the (water) system. In doing this, adaptive management tries to promote the ability of management systems to accommodate future changes rather than reacting only to undesirable impacts of change.

Adaptive Water Management is a pro-active management style. The adaptive approach stimulates employment of management strategies that experimentally compare selected policies or practices. Managers learn from the monitoring and evaluation of how policies and practices stand up to the challenges of uncertainty and complexity. These lessons are then used to fine-tune or re-tune policies and practices as the situation changes over time. This means that the development of solutions is often negotiated with other stakeholders, instead of being based on command and control by the manager. Since other stakeholders also want to have their say and may not respond well to command and control solutions, negotiated solutions seek a win-win solution for those involved.

2.4 Cycle Steps and Themes

The AWM cycle consists of a number of steps and can be considered as a continuous process. The steps of the AWM cycle have specific goals and also include specific themes which describe the setting or the environment in which the instruments and measures can be most functional and supportive to adaptive water management. In practice, themes appear in a number of the steps as required by local conditions and issues in the region.

The steps and themes are presented below:

1. Establish Status and Build Commitment to Reform



The starting point of the adaptive water management cycle looks towards identifying the critical water resources issues that need to be tackled. This means that the progress towards a management framework in which the issues can be addressed needs to be charted, while taking into account recent international developments.

To sustain this progress political will is necessary, as is building awareness through a multi-stakeholder dialogue. The dialogue needs to be based on knowledge about the subject matter and awareness rising is one of the tools to establish this knowledge and encourage the participation of the broader population.

Themes to deal with during this step are mainly related to the participation process: development of stakeholder commitment, carrying out stakeholder and institutional analyses and dealing with multiple actors, ambiguous issues and diverging perspectives.

2. Analyse Gaps



The gaps in the adaptive water management cycle can be analysed based on present development, policies, legislations, institutional situations, possibilities and capacities.

Important themes here are Indicator Development, Setting up of Monitoring, Data Collection and Participatory Integrated Assessment. This last theme helps managers gain an overview of the issues and tools that are required when dealing with the parties involved.

3. Prepare Strategy and Action Plan and Build Commitment to Action.



Application of the framework for water resources management requires a strategy and action plan. This means establishing an environment in which institutional roles and management instruments can be applied to set-up relevant measures.

As with the first step of the cycle, commitment by others towards the actions will be necessary. This can be done through working on integrating the plans in a political agenda, gaining stakeholder acceptance and committing finances to achieving that acceptance.

Essential themes here are Participatory Integrated Assessment, and the use of integrated assessment models to develop scenarios with support of stakeholders.

4. Implement Frameworks



Implementing frameworks and plans in the real-world poses challenges. It is likely that changes will have to be made in the present management structures, which most likely requires building capacity and institutional capability to implement the plans.

Relevant themes here are Building Implementation Capacity and the Use of Adaptive and Flexible Implementation Plans to anticipate the uncertainties.

5. Monitor and Evaluate Progress



At the end of the first cycle, monitoring and evaluation of progress will serve as input on how to adjust or fine-tune the course of action. To add value to this information it will be important to choose indicators that describe the progress towards adaptive IWRM and towards the development of water infrastructure.

In this step, as in each of the previous steps, the most relevant themes are “Monitoring the Process” and “Participatory Evaluation”.

3. Training Material

In this chapter we make the link between the concept of Adaptive Water Management and the training material that was developed within the NeWater project. The goal of the training material is to support water managers in targeting different steps in order to disseminate gained knowledge to practitioners in the field. Below we will describe how this was done.

The objective of the training was to introduce the trainees to the concept of AWM; to help them understand how precisely the selected themes and NeWater tools could support specific issues in achieving Adaptive Water Management in the case study areas. The training material was put together in close cooperation with the case study leaders of the NeWater Project. These leaders were representatives in the case study areas and had direct contact with water management practitioners and NeWater researchers in the case study areas.

The tools presented in the training-material are only a small sample of all possible tools that could be used by water managers to implement various steps of the adaptive IWRM cycle.

In this document the information about each workshop is kept general to give the reader an idea of the types of tools that were trained in the workshops. If after reading through this chapter you are interested in more specific details about the tools we refer you to take a look at the CD-ROM.



If you are more interested in how the tools were implemented in the training material, we refer you to continue from this chapter onto the next (Chapter 4). In that chapter we give an overview of the TtT workshop outcomes, giving insight into the training experiences and what participants felt they could do with the supplied information.

On the CD-ROM there are detailed examples of the training material as they were used in each of the TtT-workshops. This includes the:

- invitational flyer to sent to (potential) participants,
- an outline of the course (this gives an overview of the goal of the training, some information about material to read and a sample of how the course was organised),
- the training material (the presentations, background information about the tools, exercises)
- the evaluation of the workshop as given by the participants.

3.1 Tools taught as part of the TtT-workshops

In this context, the term “Tool” refers to instruments or applications that are intended to raise awareness, explore potential management scenarios and encourage engagement and the exchange of information between stakeholders. For example, many of the tools in the training material are computer software based and would often fit into the description of Decision Support System (DSS) or Information and Communication Technology (ICT).

Other tools in the training materials are information sources, games, general methodologies or concepts. The characteristic that unites all the tools used for the NeWater workshops is that they can be used to address one or more steps in the adaptive management process. For the training purposes, however, it was chosen to look specifically at application of the tool in one specific step in the AWM cycle (see Section 2.4).

There are eleven tools that were part of the training material and taught at the TtT-workshops. The following table shows which tools were presented as part of the TtT-workshops in the seven case study areas. It gives an overview of how the tools were arranged according to theme and case study area in which the workshops were held. The focus of each of the workshops was determined based on the needs of the basin.

Table 1. Adaptive IWRM and Themes related to the Tools applied in NeWater Case Studies

Adaptive IWRM cycle steps*	Themes	Tools	Case Study Area
1) Establishing Status and Build Commitment to Reform	Developing stakeholder commitment	<ul style="list-style-type: none"> Group Model Building Cognitive Mapping 	Amudarya
	Identifying stakeholders, their perspectives and their roles in decision making.	<ul style="list-style-type: none"> Enhanced Stakeholder Issue Analysis 	Rhine (Kromme Rijn)
	How to deal with various parties, their ambiguous issues and their different views of the situation.	<ul style="list-style-type: none"> Multi-actor Behavioural Simulation 	Nile
	Identifying stakeholders, their perspectives and their roles in decision making.	<ul style="list-style-type: none"> Enhanced Stakeholder Issue Analysis 	Tisza
(2) Analyse gaps	Assessing and evaluating a problem from different perspectives and collectively with other parties.	<ul style="list-style-type: none"> Bayesian Network 	Guadiana
(3) Prepare Strategy and Action Plan, Build Commitment to Actions	Assessing and evaluating a problem from different perspectives and collectively with other parties.	<ul style="list-style-type: none"> Evolutionary Multi-Objective Optimisation 	Guadiana
	Use of models which help in the assessment and evaluation of problems from different perspectives.	<ul style="list-style-type: none"> Waterwise 	Elbe
	Use of models which help in the assessment and evaluation of problems from different perspectives. Developing and adaptive, flexible implementation plan	<ul style="list-style-type: none"> Waterwise 	Nile
<ul style="list-style-type: none"> (4) Implement Frameworks and Build Commitment to action 	Use of models which help in the assessment and evaluation of problems from different perspectives.	<ul style="list-style-type: none"> International Course on Institutions in Water Management (ICIW) 	Nile
	Developing and adaptive, flexible implementation plan		
	Developing and adaptive, flexible implementation plan	<ul style="list-style-type: none"> Agile Project Management Training International Course on Institutions in Water Management (ICIW) Global Water Partnership (GWP) Handbook 	Orange

*Please note that there was no workshop organised around step 5 of the cycle, the participating parties did not have a tool available at the time that could be taught at a workshop.

Please note that other tools have also been developed or applied within the NeWater case studies, for a wide variety of purposes. If you want to learn more about supplementary tools you can consult the NeWater guidebook (Chapter 2.4) available on the NeWater portal (<http://www.newater.uos.de>) and on the WISE-RTD portal at <http://www.wise-rtd.info/> (see Box 3).

3.2 Short description of the taught tools

1 Group model Building

A group model building process is a structured technique that allows a group of participants to, together, design, build and test a model that represents processes, phenomena, or stakeholder behaviour relevant to a particular management system. Models produced this way can be conceptual / graphical models or formalised computer models. The approach is very useful for social learning and for identifying conflicts and points of agreement between stakeholders. It also can be used to identify management problems and their possible solutions.

2. Cognitive Mapping

The goal of cognitive mapping is to elicit personal perspectives about things and their inter-relationships within a system. The resulting product is a graphic visualisation of the individual's knowledge of the system in the form of nodes and drawn links between them. This method can be used to reveal what the individual thinks are the most important factors in a management system as well as important causalities between them. It can initiate or support a social learning process.

3. Enhanced Stakeholder Issue Analysis

The purpose of the tool is to support water managers in identifying, contacting, involving and communicating with the stakeholders that are relevant in a decision-making process.

The tool gives explanations on how to identify the network of people which may influence the outcome of a decision-making process. By doing this, the goals, interests and aims of the various stakeholders can be identified and used to show which stakeholders could be included in which manners and at which moment in decision-making.

4. Multi-actor Behavioural Simulation

This tool allows setting up an open-ended interaction context for the participants in which they learn about the effects their behaviour has on self and others. Participants learn in an experience-based way about multiparty collaboration, diverging problem definitions, dealing with different interests, negotiation and conflict management. Besides the "Podocarpus National Park" simulation that was used in the Nile TtT workshop a new multi-actor simulation was designed to also learn how to deal with unpredictable changes and how to take decisions based on incomplete information. The new adaptive management simulation "Gorgel" has been designed more specifically for the water management sector and has been based on the real context of the Kromme Rijn case. The new learning tool can be consulted on the CD-rom.

5. Bayesian Belief Networks

Bayesian belief networks are risk assessment models based on influence diagrams (acyclic directed graphs) and probability theory. The combination of a graphical representation of causal chains between events or variables and an inference mechanism enabling information processing from (the probability of) causes to (the probability of) effects (or the other way round) makes the Bayesian networks a convenient tool for various tasks such as early warning, diagnosis, prediction, and simulation in a probabilistic framework. Bayesian belief networks are well suited to adaptive-management applications.

Bayesian belief networks (BBN) can serve many purposes, from illustrating a conceptual understanding of system relations to calculating joint probabilities for decision options and predicting outcomes of management policies, and benefit most adaptive-management teams by promoting a shared understanding of the system being managed and encouraging the rigorous examination of alternative management policies. BBN can also be used to conduct cost-effectiveness and benefit-cost analysis under uncertainty, responding to the economic analysis requirements of the EU Water Framework Directive (WFD). (*To learn more about BBN, please have a look at the documents listed p49*).

6. Evolutionary multi-objective Optimisation (GANetXL)

GANetXL 2007 (*see p47 for further information on this tool*) is an evolutionary based multi-objective optimization tool, which provides optimum trade-off between multiple conflicting management goals (e.g. social, economic, environment, etc.) which should be considered simultaneously. It provides decision makers/stakeholders with a set of non-dominated management options to discuss and evaluate the pros and cons of different policy or management options from different interest group and social, economic and environmental perspectives and finally to come to a decision on preferred policy and strategies.

As well as generating a set of efficient management options, other advantages of using GANetXL are: facilitates adaptive water resources management by generating stepwise decision making process, validates the developed BBN by identifying all the gaps in the developed conceptual models, introduces constraints on intervention nodes if necessary in order to eliminate shortcomings of bottom up reasoning (*To learn more about BBN, please have a look at the documents listed p47*).

7. Waterwise

Waterwise is an interface for existing models on hydrology and spatial planning for optimization of economical land use up streams in relation to desired water quality and flow down-stream. It can be used for spatial planning, assess changes in land and water use and support political discussions and negotiations between stakeholder. Waterwise makes scenarios visible related to regional hydrologic interactions, effects of land use on water quality, on agriculture and on nature and economic developments. (*To learn more about Waterwise, please have a look at the documents listed p49*).

8. International Course on Institutions in Water Management (ICIW)

In ICIW the trainees become aware of the links between functions in water management tasks in an institutional setting and apply this in strategies for implementation of adaptive water management. ICIW makes trainees aware of the links between functions in water management, the institutional setting and tasks to be implemented. Through engaging with the participants in group work and presentation 5 pertinent questions were discussed. This reflection helps stakeholders and parties involved to find appropriate ways and means to work to a feasible solution.

Through engaging with the participants in group work and presentation we address the following questions:

1. Why water institutions in the past could work fairly independently,
2. Why the institutional arrangements of the past are no longer adequate today,
3. What major institutional changes are required for implementing AWM,
4. What are the main difficulties in implementing these changes, and
5. What are concepts and tools available for resolving these problems?

This provides the start for a never ending learning exercise.

The above questions were presented as prototype of "search conferencing". This method aims bringing together 20-35 people to develop strategic plans for a system that they share for common action.

9. Agile Project Management)

The Agile Project Management (APM) approach is based on the principle that management should focus on enabling project teams to create and respond to change rather than relying on a 'command-and-control' approach. Most managers' experiences suggest that control is only an illusion. APM accepts this and presents simple ways to work with this reality. Some of the actions that managers can take to promote APM are:

- Recognizing that people are a longer-term project than the task at hand
- Use Features Breakdown Structures instead of Work Breakdown Structures
- Acknowledge that the Perfect Plan is a Myth
- Replace Predictive Planning with Adaptive Planning
- Stress Execution Over Planning
- Respond to Change with Adaptive, not Corrective Action

APM exhibits many features also found in Adaptive Management approaches. Realising APM involves energizing, empowering and enabling project teams to rapidly and reliably deliver business value by engaging customers and continuously learning and adapting to their changing needs and environments.

10. Global Water Partnership (GWP) Handbook Supplement

This handbook explains the need for AWM as an incremental improvement to the recommendations made for practice under IWRM. By demonstrating the need for adaptive water management this handbook is intended to equip water managers with

knowledge on how uncertainty should be addressed and how managers in the water sector should respond to such uncertainties.

3.3 Taught tools compared to other possible tools

Some of the tools that have been applied in the Train-the-Trainer workshops have been compared to the next suitable alternatives as illustrated in Table 2. While this table does not include all of the applied and/or taught tools in the workshops, we would like to share it with you. We hope you will gain some insight into how these tools relate to other types of tools and which information they will help make more explicit.

Table 2: Comparison of some TtT tools with next suitable alternative

Tool	Next alternative tool (1)	Main advantage over tool in (1) (2)	Most sensitive information (3)
Bayesian belief Network	Simulation models	Combines beliefs and new evidence collected with stakeholders; graphical representation is improved.	Populating conditional probability tables with numbers
Enhanced Stakeholder Issue Analysis	Cognitive mapping and group model building.	More focus on application of collective learning.	Perceptions and attitudes of stakeholders which are embedded in the wider cultural and political environment
Genetic Algorithm	Multiple criteria decision making	Complete pay-off characteristics determined by a single optimization run.	The problem frame and set-up conditions (such as, boundaries, objectives, etc.)
WaterWise	Genetic Algorithms	Efficiency and concentration on content.	The problem frame and set-up conditions (such as, boundaries, objectives, etc.)

3.4 How were the workshops organised?

Train-the-trainer (TtT) workshops were organised as the starting point of a capacity building programme in the river basins for training of water practitioners. The trainees were then able to disseminate their knowledge to other practitioners in their basin. Training material, methods and presentation were designed to fit local conditions, including the language. Therefore, as much as possible, potential trainers and local tools specialists were invited to the TtT to get acquainted with the specifics of the Adaptive Water Management (AWM) cycle and the use and background of the selected tools. During the preparations for the training of practitioners after the TtT-workshop, the local training team was guided by the TtT team to make the material fit

for local training. A detailed example of this approach has been reported for the Guadiana Basin where Bayesian Belief networks (BBN) tools were presented. (*To learn more on the Guadiana basin and/or BBN you can consult the enclosed CD-ROM or chose to read the reports and articles referenced in the 'Further Readings' section p47*).

Together with a representative from the case study area, tools were selected for the TtT workshops. These tools were selected based on the envisioned role they could play to support specific issues related to the application of AWM in the basin. Because of this the tools are not stand alone but most effective when presented under a theme in one of the steps of the AWM cycle (see Section 2.4). In this way each workshop received a site specific curriculum. In some river basins more than one tool/theme was selected given the priorities in the case study area.

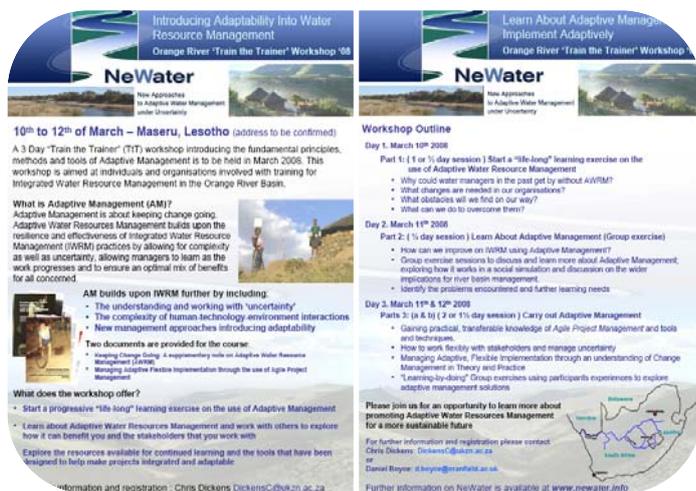


Figure 3. Workshop Flyer- Orange river basin.

The workshops were generally organised at a training centre or university central to the river basin. For each workshop a NeWater training team was set up which consisted of the regional representative (host of the workshop), the AWM trainer and a tool specialist for each tool to be presented.

3.5 How was the training material developed?

The focus of the training material is to support those involved with water management in the implementation of AWM principles. It does this by:

- providing information on the concept of AWM,
- showing the steps that a water manager could follow in the AWM cycle, and
- providing information on the theme and the use of tools that could provide support at these steps and their training modules.

The tools presented were methods, software or educational games and were tailored to the conditions of the case study area in which the training was given. The training material presented in this document provides only a selection of all possible tools that have been developed that could support implementation of the AWM steps. Training I on a single issue may deviate according to each specific workshop as it uses

examples relevant for the case study area. It is adjusted to the experiences of the trainees, their framing of the situation and the training conditions. Consequently the package of actions and tools to accommodate these issues and themes are site specific.

The workshops were conducted over two or three days and covered between one to three tools. The training was as interactive as possible and referred to the local conditions. The tool presentations included hands-on elements in order to familiarise participants with the tool. The training material presented in this document provides examples of how only a selection of tools can be helpful to implement certain steps of the AWM cycle.

More detailed information about the workshops delivered in each case study area can be found in Chapter 4 of this booklet. However, extensive information about each workshop can be found in the CD-ROM and the NeWater internet resource – the ‘NeWater Portal’ (<http://www.newater.uos.de>).

Workshops participants were asked to evaluate the content of the training workshops. This included evaluating the presentation of the AWM cycle and the explanation of (and hands-on experience with) the tools and related themes. Participants were also asked to reflect on the relevance of the tool for use in the case study area. These evaluations and reflections can also be found in the training descriptions given in Chapter 4.

Box 3: How to find supplementary tools using WISE-RTD?

You can find further tools in the WISE-RTD web portal (www.wise-rtd.info, see Box 2). The portal contains a section for resources that help to make water management more adaptive.

There are three ways how you can find guidance, tools and case experiences:

1. Free search
2. Available information lists
3. Guided searches

The guided searches in the Adaptive Water Management (AWM) section were designed carefully to assist you in your search. They allow a systematic approach to find resources for specific contexts.

- The guided search for practitioners (1) is based on the cycle of the Water Framework Directive and on the phases of social learning. Results provide an insight into the various stages of the planning cycle and how they can be improved by AWM. You can also familiarise yourself with social learning, which is an important component of adaptive water management.
- The guided search for scientists (2) takes on a system analytical view. It is structured around the elements of the water system and explains how the elements and their relationships can be regarded from the perspective of AWM. Results are related to the components of the water system.

The AWM section and the rest of WISE-RTD are not static. Everyone who has created new resources for water management can publish them on this platform. Consistency checks serve to guarantee the quality of all new entries. This allows the user to access a growing and up-to-date pool of resources that help to make water management more adaptive.

You can find more information about the AWM section of the WISE-RTD web portal at: <http://www.newater.uos.de/index.php?pid=1053>.

(1) Please go to: http://www.wise-rtd.info/mywise.cgi?id_people=159&b_topics=

(2) Please go to: http://www.wise-rtd.info/mywise.cgi?id_people=196&b_topics=118

4. AWM training in action

This chapter provides information on the Train-the-Trainer workshops organised at each of the sites involved in this project.

4.1 Broad Objectives of the Train-the-Trainer (TtT) workshops

The seven workshops, one for each of the NeWater case study areas (Figure 4), were carried out primarily to introduce AWM to knowledge centres in the river basin and elicit feedback on the training materials, methods and tools developed within the NeWater project.

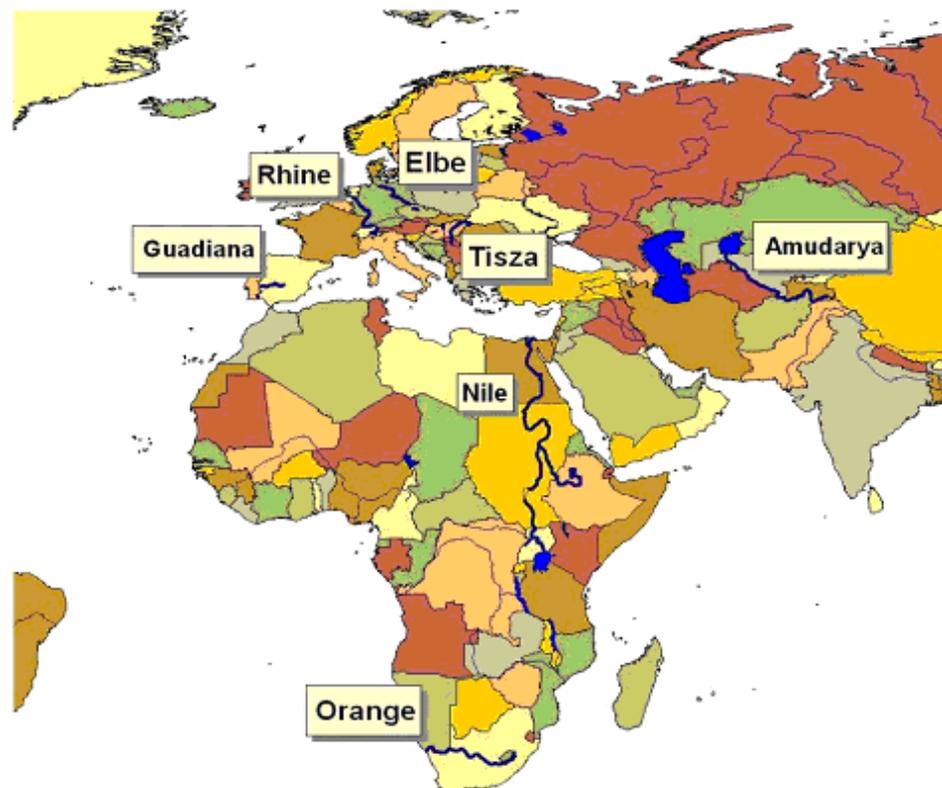


Figure 4. Location map of the case study area

The workshops were guided through a series of group sessions and presentations. These provided a broad introduction to the main points of AWM as well as providing insights into practical aspects of the tools and concepts. This could be experienced through practical application of the tools. These workshops were conducted in short sessions of two or three days, sufficient to obtain feedback from the potential trainers themselves and as the start of a capacity building process to further train and apply the AWM approach in the region.

In the following sections, you will find short descriptions of workshops held at each of the case study areas. These descriptions include information about:

- Water management issues in the case study area to which the workshops were tailored,
- Aims of the specific case study training
- Brief descriptions of the tools that were presented in the training material and workshops
- Experiences which reflect the evaluations of the participants and reflection of the workshops trainers.

The descriptions have been organised according to that step in the AWM cycle (Figure 4) to which the training material was specified as illustrated in Table 3.

Table 3. The order in which workshop descriptions have been organised.

Case Study Area	Key task	AWM Cycle step which training material relates to
Rhine (Kromme Rijn)	Improve decision making	(1) Establishing Status and Build Commitment to Reform
Tisza	Enhance stakeholder issue analysis	
Amudarya	Provide understanding of IWRM and AWM	
Guadiana	Provide knowledge of tools and techniques for problem formulation, data collection and analysis	(2) Analyse gaps (3) Prepare Strategy and Action Plan, Build Commitment to Actions
Elbe	link spatial planning with adaptive water management	(3) Prepare Strategy and Action Plan, Build Commitment to Actions
Orange	Illustrate the need for AWM	(4) Implement Frameworks and Build Commitment to action
Nile	Dealing with multiple actors	(1) Establishing Status and Build Commitment to Reform (3) Prepare Strategy and Action Plan, Build Commitment to Actions (4) Implement Frameworks and Build Commitment to action

4.2 Workshop Participants

The core of participants of the TtT workshops were potential trainers based within the case study area. They were selected by the case study organisers according to specific needs of the project and relevance to the 'theme' or phase of transition to adaptive management identified for the case study.



Limited places and transport were provided for potential trainers from other case study areas where added value through cross fertilisation of themes was thought to be of benefit to the case studies. Also representatives from other institutions e.g. national training institutes were considered.

For each workshop there was a NeWater training team which consisted of the regional representative (host of the workshop), the AWM trainer and a tool specialist for each tool to be presented. Local trainers were invited to teach about additional tools and themes already being utilised to the benefit of the case study.

As an international water management network and promoter of IWRM, regional representatives of the Global Water Partnership attended the TtT workshops as observers. Their task was to evaluate the tools and provide advice for improvements to the workshop. These observations have been incorporated into the evaluation reporting for each of the case study area.



Workshops related to Step 1 (Establishing Status / Building Commitment to Reform)

RHINE river basin

Issues



The Rhine river basin is considered, from an economic point of view, the most important river of Western Europe. Three sub-basins of the Rhine are study areas for the NeWater project; the training was delivered in the Kromme Rijn, Netherlands. In this sub-basin the land use is diverse: a large city, large estates and villages are mixed with pastures and woodland. Land use is characterised by agriculture, a very strong horticultural industry and recreation. Water abstraction is mostly for public water supply. Involving stakeholders in this region has not always been particularly successful; the water managers in the sub-basin could benefit by improving the engagement process, particularly the timing. Balancing the interests of the stakeholders and finding the balance between too much or too little communication with the stakeholders, was of great interest to the water managers.

Aim of the training

The aim of the training was to gain greater understanding of the way in which stakeholder analysis can be used for establishing contacts with other stakeholders and encouraging their inclusion in water management practice reform by building commitment. Moreover, the tool aims to help managers in identifying and establishing the balance between the interests of the various stakeholders who use the land and water in different ways.

Tools

In order to learn more about how stakeholder analysis can be applied by water managers to improve decision-making, the workshop training included the tool: *Enhanced Stakeholder Issue Analysis* (Refer to 3.3).

Experiences

Evaluations of the workshop showed that participants felt that the tool could help in achieving adaptive water management because it helps improve understanding of who they are going to deal with and to learn what drives those stakeholders. In this manner they could come to better plans, goals and possibilities to mutually achieve water management goals.

Participants did feel that the tool needed to be accompanied by more practical experience with the methods in tool description. Future workshops should ensure that more time is spent on this.

TISZA river basin

Issues



The Tisza river basin spans five countries and is situated at the current border of the EU, between Hungary and the Ukraine. Because of this, national and regional water management practices might follow different frameworks for the river.

There is a wide range of threats to the management of the Tisza River. The outstanding natural ecological value of the basin and the dependent population living in the area, need to be protected from the dangers caused by extreme flows, as well as shortage of water which can both occur within a short period of time. There are also multiple hazards resulting from diffuse and point source pollution. The Tisza flows through, and is influenced by, the socio-economic contexts of many European countries; regional and national stakeholders are looking to work together with stakeholders at various levels from local to international scale. However, knowing how to identify which stakeholders need to be approached, at what stage, and in what manner is sometimes difficult.

Aim of the training

The aim of the training is to gain more understanding about how stakeholder analyses can actually be used in establishing contacts with other stakeholders, how to include them in reform in water management practices by building commitment.

Tools

In order to learn more about how stakeholder analysis can be applied to the benefit decision-making by water managers, the workshop training included the tool: *Enhanced Stakeholder Issue Analysis* (Refer to 3.3).

Experiences

The workshop participants felt they could use the tool in the decision-making process and implementation of integrated water resources management approaches in order to find out more about a defined problem. This could be done by examining how to work with and involve different stakeholders in water management.

This workshop included more practical examples of how to apply approaches (than in the Kromme Rijn), which the participants were very happy with. They responded that they would try to use the gained knowledge when developing public information concerning water management issues; in presentations, public seminars and trainings.

AMUDARYA river basin

Issues



The Amudarya river basin is shared by five countries, Tajikistan, Turkmenistan, Uzbekistan, Afghanistan, and the Kyrgyz Republic. Availability of water resources is of great strategic importance for all of these countries, where irrigated agriculture accounts for more than 30% of the regions economy. River runoff is exclusively formed along the first 180km of the river, mainly in Tajikistan and Afghanistan.

Overuse of the surface water resources to support high levels of irrigated agricultural production (mainly cotton) has caused severe degradation of agricultural soils, the semi-natural ecosystems along the length of the river and the Aral Sea. The newly independent states have to deal with the legacy of mismanagement in the past as well as the consequences of the political and economic changes over the past 15 years. In response, all countries have, to varying extents, initiated reforms and a restructuring of agriculture. Recently, reforms in water management have followed in several countries (e.g. Kyrgyz Republic, Uzbekistan) introducing new organisations and institutions to adapt water management to the new physical and political situation. However, this process has developed at a much slower pace than anticipated, having encountered many barriers and setbacks and is often not applied to the extent necessary for effective change. While technical solutions for many problems exist, the human dimension is often neglected and truly integrated approaches are rare.

Aim of the training

In the Amudarya basin, the theme underpinning both 'Group Model Building' and 'Cognitive Mapping' was 'Development of Stakeholder Commitment', under Step 1 of the AWM cycle '*Establishing Status and Build Commitment To Reform*'. The goal of the training was to give water managers a general understanding of integrated water resources management (IWRM) and its extension through Adaptive Water Management with reference to their local situation. The intention was to give the participants an overview of the range of methods for organised stakeholder and general public participation, for the purpose of building commitment to a planning process.

The following points were of particular interest to those working in the Amudarya case study:

1. Integration of additional sources of knowledge in the planning process
2. Development of win-win plans
3. Increasing the involvement of stakeholders in the implementation process.

Tools

In order to achieve the goals of the “Development of Stakeholder Commitment” theme the following tools were presented during the Amudarya workshop: *Cognitive mapping* and *Group model building* (Refer to 3.3).

Experiences

The testing environment was conducted with the assumption that these participatory methods of knowledge elicitation were quite new for people in the Amudarya basin; the established approach being top-down decision making. The basin has been managed in a very centralised way with little bottom-up influence in the last decades. Therefore it was unclear how people would react to them and if they would be willing to use them.

In order that these tools might be presented in an engaging and open manner, the examples chosen related as much as possible to the local situation. It was hoped that this would not only improve the interest in the presented materials, but also increase the likelihood of future training being continued.

All training material was also translated into Russian to make further dissemination easier. Although only a minority of the participants could speak English, the communication went very well thanks to good translation. As a result, it was very easy to involve people in discussions and receive useful feedback. A potential problem might be the trend for the people of this region to speak Uzbek in recent years, rather than Russian. Academic research and science generally have been limited to Russian in former times and the development of scientific terminology in Uzbek is still developing.

During the workshop the participants responded very positively when receiving new information about what were very unfamiliar tools. Although it was suggested that people might not be used to participative actions, the attendees enthusiastically discussed the pros and cons of the tools and their application. Most stated that they would apply them in the future either in projects or research work. Some participants indicated that they would have liked to have had more time available to get better used to the new instruments during exercise work.

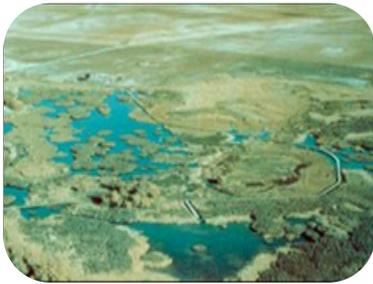
As a very positive indicator, specific dates were named where cognitive mapping and group model building could be used later on in the delta region in the context of a seminar.



Workshop related to a combination of Steps 2 and 3
(*Analyse Gaps, and Building Commitment in Action and/or Preparing Strategy and Action Plans*)

GUADIANA river basin

Issues



The Guadiana case study provides a classic example of a conflict over the overexploitation of water resources in a semiarid region of Europe. Since the 1960s uncontrolled abstraction of groundwater, to provide water for crop irrigation, has lowered the groundwater table by up to 50 m. This has caused the main river channels to run dry and wetlands to become desiccated. On the other hand the abstraction has also supported the agricultural economy and social benefits. The result has been conflict between farmers, local government, regulators and conservationists, a conflict which legal actions, subsidies and engineering solutions so far have failed to combat (More information on this topic can be found in the work published by P. Martínez-Santos in 2008- see p47). The NeWater case study has assessed the agricultural policy, evaluated future climate and economic scenarios for the basin, considered the issue of vulnerability of the local agricultural system and provided a systematic assessment of uncertainties.

Aim of the training

In the Guadiana area, the problems are related to Steps 2 (Analyse gaps) and 3 (Prepare Strategy and Action Plan / Build Commitment to Actions) of the AWM under participatory integrated assessment theme. Given the present policy and legislation, the institutional situation, the capabilities and the overall goals, gaps in the AWM framework can be analysed in the light of the management functions required by the urgent issues.

Training on the “Participatory Integrated Assessment” theme will

- Facilitate an overview of participatory integrated assessment for the purpose of decision making under uncertainty.
- Provide knowledge of tools and techniques for problem formulation, data collection and analysis, scenario development, goals formulation and identification of constraints, integrated assessment, social learning, participatory and interactive processes, and
- Teach how to explore the gaps and prepare strategies and action plans, and to assess the trade-off between (hydraulic, social, economic, political) measures, to address uncertainty in the decision making process and to increase stakeholders involvement in the decision making process.

Tools

There are a variety of tools available that can be used for participatory integrated assessment: cognitive maps, macro-econometric models, computable general equilibrium models (including multi domain models), optimization models, system dynamics models, probabilistic or Bayesian belief networks (including risk assessment models based on influence diagrams) and multi-agent simulation models. Participatory integrated assessment is the participation of stakeholders to elicit the different interest group, social, economic and environmental perspectives concerning policy or management options, hereby offering: 1) Interdisciplinary approaches, 2) Practical handling of uncertainty for water managers and stakeholders 3) Taking a long-term perspective (integration of time spans), 4) Enabling handling of global-local perspective (micro-macro) and 5) Enabling participation of stakeholders.

In order to achieve the goals of the “Participatory Integrated Assessment” theme the following two tools were presented which take into account uncertainty, multiple stakeholders and conflict of interests: Bayesian Network and Evolutionary Multi-objective Optimisation (GANetXL) (Refer to 3.3).

Experiences

The training session for the Guadiana case study was very successful. The participants pointed out that more time would be required to better understand the tools. They see working with tools in advance of the training helpful. Finally they thought some complicated topics were presented very simply and that the tools were very interesting.

Another comment was that more time was needed for understanding practical application through exercises from those people who were not involved in preparation of the belief networks. Those with previous experiences of this type of work mentioned that more advanced features of the tools will be useful in their work.

Participants with less previous knowledge of the NeWater project, acknowledged that familiarising themselves with these tools and NeWater activities was interesting. Regarding target groups, it should be clarified beforehand who the participants are, how many people will participate and which problems they want to be solved. Checking the computers for compatibility with the tools in advance of the workshop is necessary.

More time is needed to work with individuals in person to familiarise them with the tools especially if they have not previously worked with them. The overall conclusion about the tool presentation is that the training workshop is just an introduction. As participants work more with these tools they will better understand them. This has been clearly proven by the level of interest that has been shown for application of the tools to other problems from the Guadiana case study by people who were not even at the workshop.



Workshops related to Step 3 (Build Commitment in Action and/or Prepare Strategy and Action Plan)

ELBE river basin

Issues



The Elbe River in its middle- and downstream parts is a comparatively low human influenced stream with natural river banks and flood plain forests and without any locks and weirs in a length of more than 600 km. The Czech part of the river has 19 weirs to assure inland navigation and irrigation. Since 1990 water quality is improving, though nutrient pollution is still quite significant. Many endangered species (beavers, black and white storks, cranes) survive here and their populations are slowly increasing. The Elbe basin includes the largest floodplain forest area in Central Europe “Flusslandschaft Elbe”, which is protected as a UNESCO biosphere reserve since 1979.

Land use change and climate variability both affect water resources availability and quality. The Elbe basin is experiencing all three major water-related problems: from time to time having too much water (floods), quite often in summer having too little water (droughts), and having water of inadequate quality. In the last three years, extreme hydrological situations were observed in the Elbe basin - a destructive flood in August 2002, and a severe drought only one year afterwards. The Elbe is also a major contributor of nitrogen and phosphorus loads to the North Sea.

Aim of the training

In the Elbe river basin, problems are linked to Step 3 of the AWM cycle: “Prepare Strategy and Action Plan / Build Commitment to Actions” under the theme “Use of Integrated Assessment (models)”. The aim of the training was to ensure that:

- Trainees have an overview of integrated models for the purpose of decision making under uncertainty,
- Trainees learn how to select and use models and techniques in the decision making process. Waterwise was used as an example,
- Trainees have reflected on the possible application of a selection of methods to their case study.
- Trainees have hands-on experience of a selection of methods and application to case studies
- Trainees can use the outcome of Waterwise to link spatial planning with adaptive water management

Tools

In order to learn more about how integrated assessment models can be used to the benefit of decision-making processes by water managers, the workshop training included the tool: *Waterwise* (Refer to 3.3).

Experiences

The participants responded positively to the balance of theory and practice, the quality of the handouts and the venue were rated highly. The set-up of the course was a combination of two objectives: 1. to get the modellers to use the tool in a case study example, and 2. to enable the stakeholders to get an idea of how the tool can be used in the context of adaptive water management.

The set-up was made in such a way that non-modellers would get an impression of *Waterwise*, but that the technical advantages of the model for applying adaptive management would be of interest to those with experience of model development and application.

The participants were a combination of modellers as well as stakeholders; this seemed evident in the response of the participants to different parts of the course. The course organisers remarked that there was an interesting discussion on adaptive water management and the role of a tool like *Waterwise* in AM. However, responses from participants indicated that the explanation of AWM on its own was not of much interest and there was some suggestion that relating AWM themes to the tool could be made clearer.



Workshops related to Step 4 (Implement Frameworks)

ORANGE river basin

Issues



In the Orange there is a pressing need for the river to be managed equitably as a whole system. Highly variable surface water flows and an over-utilised groundwater resource have resulted in seasonal shortages, declining water quality, local resource depletion and a shortfall in supply.

Legislation on integrated water management is in place but still there is a poor development of the distribution network through an inability to fund water infrastructure and carry out routine maintenance due to inadequate capacities and measures like tariff structures. Inter-catchment transfers have brought about river habitat changes and potential impacts on ecological integrity.

Aim of the training

The above mentioned problems can be related to Step 4 'Implement Frameworks' in the policy cycle on AWM. Themes under this step are (a) adaptive, flexible implementation strategies, (b) building implementation capacity.

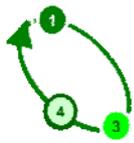
Tools

In order to reach an adaptive and flexible implementation plan, a three-day workshop combining the three following tools) was chosen (Refer to 3.3):

- the Global Water Partnership (GWP) Handbook Supplement;
- the International Course on Institutions in Water Management (ICIW);
- Agile Project Management (APM).

Experiences

The GWP handbook supplement is experienced as comprehensive and written in academic style. The document should either be split up into thematic chapter sessions. Agile Project management (APM) was found useful, but comprehensive and need to be illustrated with more examples (To learn more on APM, please consult the book from S. Augustine, (2005) referenced p47). The training should be more adapted for local conditions The exercises were well received, but more time would have significantly improved the benefits of the exercises. ICIW was appreciated for the use of the practical examples in the case studies discussed, the search conference approach and the attention for system assessment before suggesting changes.



Workshop related to a combination of Steps 1, 3 and 4
(Establish Status and/or Build Commitment to Reform; Prepare Strategy and Action Plan and/or Build commitment to action issues; Implement Frameworks).

NILE river basin

Issues



Population growth coupled with widespread poverty are key drivers in socio-economic development and this increases pressure on the water resources through increased storage and diversion of surface water, in order to serve the increasing energy and agricultural demands. Effects include ecological consequences like reduction in stream flows, and riparian habitats. In the upstream countries forests are cut down and wetlands drained. Soils are eroded, resulting in reduced crop yields and non-sustainable livelihoods. Groundwater recharge is reduced and levels lowered, river flows become flashier and downstream flood and drought impacts are enhanced. Other stresses include high sediment loads, water quality changes, seawater intrusion and waterweed infestation. In Egypt and Sudan the aspirations of the population and economies are intricately linked with water.

Aim of the training

In the vast Nile basin the water management problems are related to a combination of Steps 1, 3 and 4 of the AWM cycle.

Under Step 1: Establish Status / Build Commitment to Reform the theme related to the Nile Case is: Dealing with multiple Actors. The political will is a prerequisite for any progress in the Nile basin and issues like confidence building and consolidating a multi-stakeholder dialogue comes high on the list of priority actions.

Under Step 3: Prepare Strategy and Action Plan / Build Commitment to Actions, the theme related to the Nile Case is: Use of Integrated Assessment models. The strategy and action plan will map the road towards future water resources management and priorities in for development. A portfolio of actions will be set in the perspective of other national and international spatial planning processes.

Under Step 4: Implement Frameworks the theme related to the Nile Case is: Adaptive flexible Implementation Plan on (a) adaptive, flexible implementation strategies, and (b) building implementation capacity. Taking plans into reality poses huge challenges. An enabling environment, the institutional roles and the management instruments have to be introduced to support changes in present structures, capabilities taking into account infrastructure and attitudes.

Tools

During the workshop the following tools were presented (Refer to 3.3):

- Multiple Actors behaviour simulation (In order to promote progress on the theme of 'Dealing with Multiple Actors')
- Waterwise (in order to promote progress on the 'Use of Integrated Assessment models')
- International Course on Institutions in Water Management (ICIW) (in order to promote progress in the theme 'Building Implementation Capacity')

Experiences

The interest of the participants in the Cairo workshop was equally shared over the tools. They appreciated the open and creative atmosphere and the efforts of the trainers to focus on the Nile issues. They would have like more time especially for deeper discussion and exercises to practice more. The Multiple actor behaviour simulation was most successful in quality and relevance. The participants were a bit uneasy. The open-ended and ambiguous task and role setting in the simulation made the simulated multi-actor environment an uneasy one for a number of participants – experiencing how familiar management and decision making routines loose their self-evidence in a multi-actor context can be considered an important learning goal of the simulation. Because of the slow start-up the simulation was not completed. Judging from the extensive debriefing session participants were able to apply what they learned and that interaction and negotiation processes were as important as the content of water management strategies.

The module on institutional change was considered as relevant for the Nile and the discussions were of high quality. Participants appreciated the search conferencing approach as they so discovered themselves the importance of understanding existing institutions at different levels and their complex relations first, before introducing change of water management measures.

Waterwise was shown to the participants as prototype of a Nile simulation and could not be operated by the participants as they hoped. Time was felt short but the participants recognized however the importance of Waterwise for the integrated assessment of water management in the Nile basin and accepted the invitation to formulate further criteria and relevant goal functions for the issues they deal with under Nile Basin conditions.

5. Evaluations of workshops and training material

This chapter gives an overview of the workshop participants' evaluations. Participants were asked to evaluate the workshop's course content, the presentations and the applicability of the received information. They were also asked to give suggestions for improvements and future application of the presented tools.

This chapter describes the aggregated evaluations. The specific evaluations given per workshop can be found on the CD-ROM. One must note that the evaluations reflect aspects of the specific workshops. For application of the training material elsewhere than the case study area that the material was designed for, changes should be made accordingly. The NeWater partners who designed the training material can also be contacted for advice and support for future application.

Training material delivery cannot be seen as a single-event. Instead, it should be planned to hold the workshop as well as to make time for participants to follow-up (and practice on) the lessons learned with practical application in the basin.

5.1 Key outcome of the Train-the-Trainer workshops

The provision of ongoing advice is one of the main conclusions from the evaluations of the workshops. Many participants felt that a single workshop was not sufficient to fully grasp the training material. Participants stressed that they needed more time for the information to sink in. Also, they would need more time to practice with application of the tools. If they had this experience they could also endorse the training material and the tool application better towards others in their case study basins.

5.2 Linking the concepts of IWRM and AWM

Part of the training material and the presentations held during the workshops focused on making the link between the concepts of Integrated Water Resources Management and Adaptive Water Management explicit to the participants.

During the evaluations, the participants indicated that the concepts, as presented, ask for cross-sectoral approaches (Figure 1). Participants, however, question whether this cross-sectoral integration is actually feasible in practice. For example, in unstable economic environments, such as the Orange River Basin, participants considered it difficult to promote the issue of adaptability.

Some groups of participants commented that the links between the tools and the concepts of water management were made clear by the TtT trainers. The evaluations showed that these trainers provided good examples to show the relevance of the concept of AWM and how the presented tools could support achievement of AWM.

However, some participants reported that it was more desirable for them to learn about a specific tool rather than about the concepts. These participants were more drawn to attend the workshop because of the specific tool(s) presented rather than drawn by the prospect of learning about tools to support achievement of adaptive water management.

5.3 Workshop course content

Evaluations of the course content were dependent on the pre-existing knowledge (or lack thereof) of the participants. People with pre-existing experience wanted to learn more about advanced features. Those with less experience acknowledged that more familiarising with the tools and activities knowledge of the participants was desired.

Tailoring the training material to the pre-existing knowledge of the participants, however, was difficult because the developers of the training material often did not know which specific participants would be present at the workshop.

Therefore, in some cases, the workshops were seen as a first introduction to the tool and its application in achieving AWM. Future work was desired in order to help participants to work with those tools and to better understand how to apply them more specifically in the case study area.

Examples

Participants requested more examples that were basin specific. Whilst the training material was tailored to the case study situation as much as possible, material developers did not have a lot of information beforehand to find and develop appropriate examples. Also, some participants would have liked the examples to fit better with their backgrounds and pre-existing experiences with the concepts or the tools. However, the lists of participants were generally not known well in advance to the developers.

For future workshops it is recommended that more time be spent in finalizing the attendance lists relatively early so that developers have the time to specifically tailor their workshop material.

Terminology

Participants felt that the course content often contained difficult (too academic) terminology, although, in general, at some of the workshops the trainers were good at presenting complicated topics in a simple and clear manner.

Also, some workshops required the participants to study large documents. While this was sometimes considered to be very instructive (and positive) and to have a well balanced workload at other times the contents of the document was found to be too repetitive. Recommendations were made to make the training material and presentations less generic and more adapted to the local situation. Here too, there were many requests to include more exercises.

Exercises

At most of the workshops, participants were given exercises with which they were not familiar. Such exercises took some getting-used-to. However, in general, participants considered these exercises beneficial in helping them to think about the issues of complexity and uncertainty. This, in turn, gave rise to a lot of discussions which participants enjoyed.

Some exercises included role-playing and simulations which helped gain understanding of how various stakeholders may interact with each other. Participants considered the lessons they learned from these exercises to be quite valuable.

Tools

In general, respondents were positive towards receiving new information about unfamiliar tools. In some cases the tools were explained to non-modellers and modellers. Through a series of examples, the modellers gained an idea of what could be done with a tool and how it could fit in with the broader context of AWM. This often led to discussions which were reviewed by participants as being important and good for enhancing understanding.

Depending on how detailed or generic the presentations were, there was an overall appreciation of how the AWM concepts were linked with the tools discussed in the workshop and discussed in the NeWater literature and other conceptual texts.

Most of the tools were evaluated by participants to be applicable to present water management approaches. Some of the knowledge that the participants gained during the workshop was considered to be more readily accessible for application in the near future (*i.e.* lessons learned about stakeholder analysis and cognitive mapping). Overall the participants considered that the application of computer models and similar tools would require more training before they would be able to apply them or to understand how precisely to apply them in real situation.

Workshop time

Participants at most workshops felt that the workshops should last longer. This would allow more time to be spent on discussions, field visits, working or practical examples, or on practicing with the presented models. Also, participants felt that explanation of the tools, or the content thereof, would need to be expanded on in future workshops.

The short time available for the workshops had an effect on:

- the time to practice and become familiar with tools,
- the depth with which tools and applications could be explained and explored,
- the ability of participants to digest and reflect on the presented information.

Meeting other professionals was an added advantage to the workshop. Indeed, the participants appreciated that they could exchange knowledge and engage with each other while discussing elements of the training.

Discussions amongst workshop participants and trainers were considered very valuable. Role-playing games and simulation were considered to be good examples and overall good educational tools to learn about collaboration processes. However,

participants would have appreciated more focus on developing specific skills, such as negotiation skills.

5.4 Future application of tools by participants

One of the goals of the TtT workshops was to give information to potential trainers who could pass the information to others in the case study areas. Participants evaluated that “selling” the concept of AWM and the application of the tools, however, would require targeting the right audience. To illustrate, they would need more specific information on the benefits of AWM so that they could explain to others more succinctly how successes could be achieved.

One question that often arose was how to get more examples of successful implementation of AWM in other areas. Such examples were requested because it was felt that explanation of and understanding the advantages of the concepts (and relevant tools) would otherwise require a lot of time and effort, which are often scarce. A good example of AWM that could help bringing the message across more easily is the one applied in Florida on the “Comprehensive Everglades Restoration Plan: Adaptive Management Strategy”. *(For further information on the Florida case, please refer to the document section on the enclosed CD-ROM)*

An important lesson learned by most participants on the application of the tools was that the use and consequences of these tools need to be considered before initiating a project. This knowledge was considered important in order to make a significant impact on the way that water management is approached in the future and whether that includes accommodation of the concepts and principles of AWM.

The participants received information on a number of tools during the workshops. However, they requested to receive more examples about other tools which could be useful and most applicable to specific situations. Such specific information and knowledge was considered by participants to be valuable in order to make tools “theirs.” Giving this information was not part of the given workshops, but could be given in future workshops using the information about tools found on the WISE-RTD website (<http://www.wise-rtd.info/>) and NeWater sites (<http://www.newater.info> or <http://www.newater.uos.de>). This is also further explained in section 3.4 of this booklet.

5.5 Recommendations for future application

The participants gave a number of suggestions for future workshops:

- The most important suggestion was to provide more examples of situations in which AWM has proven already to be beneficial.
- Recommendations were made to take some information out of the PowerPoint presentations used during the workshops and develop them in another form of communicable material.
- The duration of the workshop should be extended to allow more time for discussions, field visits, practical examples, practice with models and trainers to work with individual participants to help them become familiar with the tools. These activities were considered to be beneficial to participants in gaining better understanding of the tools and their practical application.
- Translation issues:
 - Translation into less complicated and clearer text was desired. This meant less use of academic and scientific words and terminology. Especially when participants do not speak perfect English, using simpler language would be highly recommended.
 - In some of the basins it was stated that translating the materials into more common languages (i.e. French) would be appreciated. However, in the Amudarya they did not want the material to be translated because terminology could not be translated easily into Uzbek.
- Targeting the participant groups:
 - To tailor the material more specifically to the participants (*i.e.* those with previous experience with the tool or not) the target group should be clarified well beforehand.
 - In cases where the taught tools require computers, more time should be spent on ensuring compatibility of these tools with computers and networks available in the case study area.
 - the participant's experiences should be taken into consideration to help make the theory more recognisable in relation to practical situations and to get everyone involved with the topic (and discussions). This was sometimes difficult to realise because the participants-list was not always available until the starting date of the workshop.

As part of the NeWater project there was little time left for carrying out a follow-up plan to support the efforts of the workshop participants in their implementation of AWM skills and knowledge. Most participants would have appreciated such support after attending the workshops.

5.6 Train-the-Practitioners as follow-up of TtT workshop

To date, two examples of further application of the Train-the-Trainer workshop material are available: one in the Guadiana River Basin and the other one in the Kromme Rijn sub-basin.

In the Kromme Rijn, the waterboard *De Stichtse Rijnlanden* decided to transform the TtT workshop presentation into a two hour presentation. This new presentation will be given by a person who attended the TtT workshop as part of internal training events held at the waterboard. In addition, the information from the training has been compiled in a handbook “Handboek Watergebiedsplannen” for internal use. This handbook provides insight in the development of a “water area plan” in the area that falls under auspice of the waterboard.

In the Guadiana case study area, a “Train-the-Practitioner” (TtP) workshop was held. This workshop followed-up on the Train-the-trainer (TtT) workshop held in Madrid in 2007, which is described in Chapter 4 (or in the e-booklet on the CD) in the “workshops” section.

There were 19 participants at the workshop, which included a national group of stakeholders mainly from universities and consulting companies who were interested in:

- implementing the Water Framework Directive,
- knowing how the Bayesian belief networks (BBN) can support implementation of the directive.
- Knowing how the BBN had been applied to water management and research issues especially in the Guadiana River Basin

This group differed strongly from the TtT participants who were mainly stakeholders from the Upper Guadiana River Basin and students from two universities in Madrid. Also, a number of the TtT participants had previously been engaged in NeWater research activities in the Guadiana, while this was not the case with the TtP participants.

In the Train-the-Practitioner workshop, participants were introduced to the Bayesian networks that had been constructed in the previous research activities in the Guadiana River Basin. These networks were demonstrated and participants carried out “hands-on” exercises in order to evaluate (collectively) the strengths, weaknesses, opportunities and threats to using the BBN tool elsewhere in Spain for implementation of the Water Framework Directive (WFD).

The TtP workshop was led by three participants from the earlier TtT workshop and who were there trained in participatory integrated assessment and in how to include stakeholders in use of the Bayesian belief networks tool. Further back-up for the TtP was given by Bayesian Network experts from the Centre for the Environment At Oxford University (OUCE - www.ouce.ox.ac.uk) and The Geological Survey of Denmark and Greenland (GEUS - www.geus.dk/geuspage-uk.htm),

During the TtP, participants asked questions and discussions were held which gave further feedback to the developed BBN at catchment and farm scale. In this manner

they learned that the BBN can support implementation of issues raised by the WFD by:

- integrating economy-social-hydrology and ecological factors
- engaging stakeholders in the policy making and in construction of decision support system
- analysing uncertainty related to the development of the Special Plan for the Upper Guadiana to deal with water scarcity issues.

The training material included many information similar to the one used during the TtT workshops, however the guidelines developed under the MERIT Project (Management of the Environment and Resources using Integrated Techniques 2001-2004 / www.merit-eu.net) were also included. These guidelines describe how to construct a BBN in collaboration with stakeholders.

An ex-post evaluation by the TtP organisers led to the discussion and evaluation of further needs for dissemination of the BBN tool to practitioners beyond the NeWater group of organisations. One important suggestion was to update the MERIT guidelines with additional examples from the Upper Guadiana Basin and the Segura Basin (to the east of the Guadiana). Also, it was suggested to translate the MERIT guidelines into Spanish and other languages since this would enable further application of the Bayesian belief networks for adaptive water management elsewhere.

Please see the section on Bayesian Belief Networks in the “Further Reading” section on p. 47 for more information.

Policy summary *(for EU reviewers)*

In support of implementation of the Water Framework Directive, but also e.g. the EU Flood directive, for river basins in and outside Europe (*EUWI concerns overseas areas*), the NeWater project has developed methods for the transition to adaptive water management in river basins. For facilitating this transition process, an innovative training and guidance package has been developed for practitioners in water management in applying these methods for adaptive water management of river basins.

The topics of the training product are linked to all stages of the Integrated Water Resources Management (IWRM) policy cycle with emphasis on how to support implementation of Adaptive Water Management (AWM), including dealing with uncertainty and how to apply participatory methods. Each training package contains concepts including tools that support implementation of Adaptive Water Management for different stages. Course material is demand driven and attuned to local conditions in close cooperation with NeWater case study coordinators. The developed training package has been tested and evaluated¹ in the seven NeWater case studies in 2-3 days Train-the-Trainer workshops.

The training package has been written as a booklet for water managers and trainers and outlines the training material in the context to Integrated and Adaptive Water Resources Management. The booklet is accompanied by a CD that contains a hyperlinked version of the booklet (E-booklet) as well as the complete collection of training material used and evaluation². In addition, it contains a free-access version of the NeWater Online Curriculum developed with the academic community as target group as well as links to web resources, including the NeWater website embedded in the EU-WISE-RTD on water management.

¹ Evaluations by Global Water Partnership (GWP) are included on the CD as D5.2.2

² Train-the-Trainer workshop evaluation for the Rhine is constituting the content of D3.2.5 , for the Tisza D3.5.8.

Further readings and other sources of information

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Waterwise

Waterwise- A Planning Tool for Adaptive Land and Water Management Report of the NeWater project . (Available on the attached CD-ROM in the “document” section)

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Who is this booklet for?

The content of this booklet is intended to provide insights and examples for those interested in the training elements of Adaptive Water Management. The accompanying CD-ROM provides extra information for those who, after reading the booklet, are interested in more specific information concerning adaptive management tools, the case studies involved in the NeWater project, and other background material.



Who are the authors of this booklet?

The authors of this training and guidance booklet, as well as the developers of the tools and training material presented, were involved in the activities of the “New Approaches to Adaptive Water Management Under Uncertainty”, aka NeWater. Water management practitioners from seven international river basins and researchers worked together to develop the material based on new conceptual insights on experiences collected in the basins and on the requirement of ongoing policy processes (in particular the European Water Framework Directive and European Water Initiative).



For more information on the NeWater Project, please visit the NeWater portal at: www.newater.uos.de or www.newater.info



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