



**NeWater**

# **NEWATER SYNTHESIS PRODUCTS**

Version of 30<sup>th</sup> May 2008

**NeWater project -  
New Approaches to Adaptive Water Management under Uncertainty**

**[www.newater.info](http://www.newater.info)**

A process for the synthesis process has been discussed and decided by the PICP. The synthesis process has to be understood as a joint effort by all NeWater partners. While the formal part of the review of NeWater concentrated on contracted products like deliverables, synthesis products should go beyond deliverable and somehow wrap up NeWater research insights and products. These synthesis products shall be visible as major NeWater output and be usable for related target groups when NeWater stops. The dissemination and promotion efforts for synthesis products will be more intensively than for other NeWater products. By this concentration on a small selection we hope to get attention for the core messages/results/products of NeWater.

About 25 suggestions for synthesis products have been discussed in an intensive discussion process. Finally the NeWater general assembly agreed consentaneously on a list of twelve synthesis products:

1. Management and Transition Framework
2. Uncertainty Guidance
3. Policy Process
4. Climate and water adaptation book
5. Water resources scenarios for CS regions
6. Cross comparisons of adaptation strategies across regions
7. Process for analysing dynamic vulnerability and adaptive capacity
8. Special issue on participation
9. Guidebook (merged WB 4 and WB 3 activities)
10. NeWater portal
11. Training material
12. Online curriculum

In order to assure consistent termination, the NeWater General Assembly held in Feb 2007 in Egypt agreed upon the following list of target groups:

EU EC EuP	EU level water policymakers i.e. DG which are generating WFD directives like flood, Environment,... European Commission European Parliament
WBA NPC WB	Water Basin Authorities – Water Basin Commission (including transboundary issues) like Rhine Commission, Nile basin Initiative (NBI) National planning bodies (eg ORASECOM), Water boards at sub-national level: Delfland, ...HDSR,..
WUA PWA	local authorities; water user associations; local water association, water community Professional Water-related sectoral organizations eg rangeland management, drinking water companies, energy sector
NGO IWO IB Public	NGO's; non governmental international cross-sectoral organizations: WWF, International Water related organisations IWA, WWF, GWP, FAO, GWA International Banking WB IFAD General audience (e.g. press)
Ac	Academic community – teachers, students

**Table 1:** Potential target groups of NeWater synthesis products (Listing of water related organizations)

## 1. Management and Transition Framework: Concept and Application

**Contact organisation: USF (Claudia Pahl-Wostl, Britta Kastens)**

### Exact target group:

Methodology of MTF: AC (global change and water governance and management research community, transition research)

Meaningful insights of MTF: EU, EC, EuP, WBA, NPC, WB

This synthesis activity will not aim at delivering products for immediate use for the practitioners' community in water management. This group will be addressed by summarizing relevant insights from MTF development and application as part of the NeWater Guidebook on Adaptive and Integrated Water Management (synthesis activity 9).

### Extended description of Product:

The products has two parts:

1. Concepts and methodology - Management and transition framework (MTF) to analyse characteristics and dynamics of governance regimes, processes of social learning and transition towards adaptive management
2. Insights from comparative analyses on adaptive capacity and transitions to AIWRM
  - Determinants of integrated and adaptive capacity of multi-level governance regimes
  - Potential trade-off of increasing adaptive capacity and other regime characteristics (e.g. efficiency, legitimacy, accountability)
  - Ability to adapt to climate change
  - Effectiveness to deal with climate extremes and new approaches to manage risks (floods and droughts – all cases)
  - Barriers and drivers of transitions to AIWRM
  - Role of informal networks and learning cycles to support AIM and transitions to AIWRM
  - Role of stakeholder participation in supporting the transition to AIWRM
  - Role of the MTF to support integration

The MTF is unique its ability to characterize multi-level water management and governance regimes and their dynamics. Its development was necessary since no conceptual framework exists. Its application allows to capture the complexity of water governance regimes and to draw general conclusions from a range of case studies. The results from comparative analyses will provide insights that have not been obtained before. Such analyses support what can be called a “diagnostic” approach which develops tools to analyse problems embedded in context and supports the development of context specific solution instead of advocating simplistic panaceas. Part of the results will have exploratory character. Four years are simply too short to develop and fully implement such a framework. It can be expected that a number of follow-up activities will be initiated after the end of NeWater.

The MTF in its current form and complexity is mainly of interest to the scientific community. Results from applications and comparative analyses are of major interest to the global change and water governance research community (e.g. IHDP community, resilience alliance, Global Water System Project community, IWA). Contacts have been established to develop a global data base on water management regimes.

Key assumptions and simplified concepts (e.g. role of uncertainties and learning, importance of governance structures and learning cycles for adaptive capacity of water management regimes) and in particular results from applications are of interest to both policy makers and water managers.

Next steps:

- Nomination of one delegate per work package to ensure that NeWater knowledge is included
- Further development of the relational data base - indicators for different regime characteristics, adaptive capacity
- Application workshops (and online meetings) with other NeWater partners.
- Implementation of analyses for learning cycles and more specific aspects for processes of learning.
- Theme specific case study integration with AmuDarya as prototype on the theme sharing of water for different uses.



- Workshop on the “diagnostic method” before summer
- After summer break – workshop to exchange on results and plan special issue details
- Development of guidance for simplified analyses of multi-level interactions and past developments of policy processes

## **Dissemination plan:**

Several conference contributions related to the MTF have already been accepted:

Resilience 2008: Resilience, Adaptation and Transformation in Turbulent Times, Stockholm, April 2008.

International science conference of IHDP: Social challenges of global environmental change, New Delhi, October 2007.

One Special Issue will be published in a leading international journal such a global environmental change. In addition one or two more synthetic papers will be published in interdisciplinary water journals such as “Water Resources Management”.

## **2. Uncertainty Guidance (Guiding in misty waters - Uncertainty guidance for adaptive water management)**

**Contact organisation: USF (Marcela Brugnach), GEUS (Peter van der Keur), FEEM (Jaroslav Mysiak)**

### **Exact target group:**

EU, WBA, NPC, WB

### **Extended description of Product:**

The uncertainty guidance will provide about sources and types of uncertainties, and tools to deal with them. It will assist policy makers and practitioners in assessing uncertainty and taking it into account in management decisions. Well suited examples from the NW cases studies will make it easier to convey the main messages and outcomes to NW policy partners. The guidance will cover different stages of adaptive management and transition towards it. The guidance will consist of three different thematic blocks: First, explanation of main sources and role of uncertainty. Second, strategies to deal with uncertainty, both quantifiable and non quantifiable. Third, the role of uncertainty at the science-policy interface. The guidance will include contributions from many NW partners. It will be based on existing guidance documents such as US EPA Model Guidance on the Development, Evaluation, and Application of Regulatory Environmental Models, NAS report on Models in Environmental Regulatory Decision Making and NUSAP.

#### **1. SUMMARY FOR POLICY MAKERS (Policy Brief)**

#### **2. INTRODUCTION**

2.1 Why uncertainty guidance?

2.2 Uncertainty in water management

Concept, classification, strategies and contexts, inspired by D.1.1.3 (van der Keur et al., Marcela et al., Henriksen (presencing), metaphors, etc.; Examples of uncertainty in IWRM regimes. Newater case studies, similar to D113 but not only for Rhine.

#### **3. EXISTING GUIDANCE**

Review of existing guidelines dealing with uncertainty at different stages of the water management process. Typically, different guidelines documents have focussed on certain aspects in water management. The Newater uncertainty guidance seeks to combine guidance information from various sources on uncertainty aspects in water management into a document that covers (most of) the entire water management cycle.

#### **4. EXAMPLES OF SITUATION IN WHICH UNCERTAINTY WAS IDENTIFIED AND AKNOWLEDGED TO BE IMPORTANT, AND STRATEGIES TO DEAL WITH THEM**

How real world situations in IWRM can be tackled with respect to uncertainty, which strategies can be followed and what uncertainty guidelines (UG), if any, can be used. In addition, it is described what tools may be useful. This collection of examples may act as an eye opener for practitioners who have to deal themselves with similar situations and therefore need guidance / inspiration on how to achieve that.

Each situation/NW case study (Guadiana, Orange, Rhine and Tisza) is described along the following lines: what is the issue, why uncertainty matters,

What kind of uncertainty is there, and how the uncertainty can be tackled by the tools (describe how tools have been applied, what was the result and how the result have inspired confidence)

#### **5. UNCERTAINTY IN SCIENCE – POLICY INTERFACE IN IWRM**

#### **6. LINKS, REFERENCES AND ANNEXES**

## Dissemination plan:

The UG document will be divided into 4 publishable parts. Each part will be eventually published in a peer reviewed scientific journal. The 4 parts together, adjusted in content and layout for the target group of practitioners and policy makers, will be combined to constitute the uncertainty guidance document. The final document will be disseminated in pdf format through the Newater Portal. An introduction and reading guide will complete the above content and make it easily accessible by the target group. Finally, a chapter with main messages from the guideline will be included in the NW Guidebook to Adaptive Management. Importantly, examples from case studies will be an integrative means and will increase the documents readability and practical usefulness. The 4 parts contain:

1. **Brugnach, M., Mysiak, J., van der Keur, P., et al.**. Concepts and strategies to deal with uncertainty in adaptive water management.

Content: chapter 2 & additional material. Examples from Rhine, Guadiana and Tisza basins

2. **van der Keur, P., Brugnach, M., Mysiak, Henriksen, H.J., Refsgaard, J.C. et al.**. Uncertainty guidance in adaptive water management.

Content: chapter 3 + 4 for Rhine, Guadiana + Tisza catchment.

Paper based on review of existing uncertainty guidance in water management + follow up on Newater D.1.1.3 paper (van der Keur, et al., 2008) going from identification of uncertainty in IWRM to assigning guidance to steps in IWRM process (essentially replacing the last column in paper tables with guidance resources).

3. **Mysiak, J., Brugnach, M., van der Keur, P. et al.**. Uncertainty and policy making: a case for adaptive water management.

Content: chapter 5 + examples from Rhine, Guadiana and Tisza.

Uncertainty can obstruct policy making, create gridlocks and polarize scientists and policy makers alike. In other cases the persistent uncertainty stimulated public dialog and innovative solutions. Paper will examine the role of uncertainty in policy making processes and in science advising these processes. It will look into some case such as projection of sea level rise and flood prediction models and the use of these predictions in and for policy making.

4. **Henriksen, H.J., Brugnach, M. et al.**. Uncertainty guidance – Emergent complexity and presencing. Uncertainties related to “situated in context” and “emergence” as part of multi stakeholder dialogues in learning cycles.

Content: chapter 6 + examples from Guadiana.

Participants and actors involved in learning cycles may not simply respond to stimuli presented in a rational way, but rather select aspects according to their own identity partly and at times non rational. Blind spots, information hidden for others and self (JOHARI window/Theory-U) and interaction between stakeholders therefore influence and hindering learning provide sources of uncertainty which it is important to be aware of when organising learning cycles as part of adaptive IWRM, and which actors will have to deploy the full range of and settle in order to sort out controversies about water management. Here the nature of groups, actions objects and facts (Latour, 2007) act as sources for uncertainty important to be aware of and mutually acknowledge, plan for and respond to. Possible ways for better understanding the blind, the hidden and the unconscious as sources of uncertainty when travelling the MTF learning cycle and related to emergent complexity & presencing could consider organisation-in-the-mind and organisational role analysis, listening posts and social dreaming designs.

### 3. NeWater Insights for EU Policy Processes

Contact organisation: USF (Claudia Pahl-Wostl, Ilke Borowski)

#### Exact target group:

EU, EC, EuP:

European Policy communities linked to development and implementation of major EU water policies (Water Framework Directive, Flood Directive, European Water Initiative)

#### Extended description of Product:

This product is a policy demand driven synthesis of major NeWater results and policy insights based on the experiences from within the Newater project. For the dissemination of results, these insights should contribute to promoting NeWater results at policy level, i.e. at the level which sets the frame for practical management. Instead of having only a set of independent policy briefs that are largely supply driven (how can insights from scientific research be communicated to a policy audience), this product will start with a demand driven perspective (what are burning policy questions/issues and what does NeWater, both regarding its specific outputs but also based on general insights gained during the project, contribute to addressing them). In the next step the Terms of Reference for a pragmatic study will be developed:

1. To identify gaps in EU policies (WFD, Flood Directive Green paper on adaptation to Climate Change, EUWI) related to major NeWater themes (flexible and adaptive management strategies, uncertainty, climate change impacts and adaptation, trans-boundary issues, institutional aspects such as participation and sectoral integration).
2. To map NeWater insights to these gaps and recommendations how to improve in the short- and mid-term
3. To identify the kind of products and events to best disseminate these insights

This study will include the compilation of results already available within NeWater, further desk studies of relevant documents and additional interviews with relevant EU policy makers and key researchers from the Newater teams.

During and based on this study a strategy for developing and better tailoring the policy messages will be developed and implemented.

#### Dissemination plan:

Most likely the product will include a synthetic brochure. The final format will be decided during the process.

The product(s) will be presented during:

- o Final Newater conference in November
- o Relevant meetings at national and European level, incl. meetings within the CIS structure
- o Possibly a meeting in Brussels with representatives from different DGs.
- o Possibly a stakeholder meeting in Brussels for broader dissemination of the main insights;
- o World Water Forum in Istanbul, 2009.
- o Stockholm World Water Week, 2009.

Some results but most likely not the final product should be developed for the policy event organized by the WU during the World Exhibition in Zaragoza, September 2008.

## 4. Book on “Climate Change Adaptation in the Water Sector”

Contact organisation: **ALTERRA (Pavel Kabat, Fulco Ludwig)**

### Exact target group:

WBA, NPC, WB, WUA, PWA, NGO, IWO, AC

This book is intended for both the future and current generation of advanced professionals within the water sector. Kind of water professionals we are thinking about are, manager working for water boards, river basins, irrigation specialists, professionals designing large scale water infrastructure projects, large dams etc. Also professionals working for international organizations such as the world bank, Unesco, UNDP, FAO and NGOs within manage water are a target audience. In terms of the future generation we focus on MSc or advanced BSc students, for example the book could be used in M.Sc. courses on Climate and Water and the book could also be used for capacity building in developing countries.

### Extended description of Product:

Today’s climate variability already has a large impact on water supply and protection. Millions of people are affected every year by droughts and floods. Future climate change is likely to make things worse. Many people within the water sector are aware that climate is affecting water resource management but they are unsure how to incorporate climate information into their management structures. Currently no book is available for the water sector on how to adapt to climate change and variability. **So the main purpose of the book is to offer a compendium of specific adaptation strategies for water managers and decision makers.** After reading this book, water professionals and advanced students should feel much more comfortable in using climate data in decision support and/or managing water resources. They will know what kind of data/information on climate change and variability is available and how it can be used within the water sector.

Half the book will be text describing the water and climate adaptation issue and what options are available for the water sector to adapt to climate change and cope with climate variability. The second part will be used for specific case studies written on invitation by the core editorial group. After an introductory chapter on the core issues of the book the first part discusses the general background of climate variability and change and it specifically discusses what and how climate information is made available which is of interest to the water sector. Then, we discuss possible climate change and variability impacts. The next chapters are about what kind of actions are available to cope with climate variability and to adapt to climate change. The book specifically discusses how water managers can use seasonal climate forecast and climate change scenarios. The last chapter of part I discusses how to climate proof a specific region or sector.

There is no book yet which informs senior water managers about how to adapt to climate change and variability

Both the current and future generation of water managers will after reading this book know where to find information on climate change impacts and adaptation and will be better prepared to judge if and how their water management should be changed due to changes in climate

## Outline of Climate Change Adaptation in the Water Sector

### Part I

1. Introduction **Fulco Ludwig** with Pavel Kabat
2. Climate Variability and Change – **Bart van der Hurk with Daniela Jacob**
  - 2.1 Climate variability and seasonal forecasts
    - 2.1.1 El Niño Southern Oscillation (ENSO)
    - 2.1.2 Predicting climate variability
    - 2.1.3 Regional differences in the predictability of the climate
    - 2.1.4 Availability and formats of seasonal forecasts
  - 2.2. Recent climate change and evidence that climate is already changing
  - 2.3 Future Climate change
3. Using and specifying climate scenarios in water resource management (10) **Daniela Jacob with Bart van der Hurk**
  - Describing how climate scenarios can be used for water resource management and designing infrastructure, including discussing downscaling and possible problems with using these scenarios, especially for extreme analyses
  - Examples on how climate scenarios are used for water resource management
  - Tailor made scenarios (examples from the Climate changes spatial planning tailoring project)
4. The impacts of climate on water (5-8) **Fulco Ludwig**
  - 4.1 Impacts of climate change on the hydrological cycle (FL)



- 4.2 Recent changes in water availability and extreme events (FL)
- 4.3 Impacts of climate change and variability on water storage, delivery and protection (FL)
- 4.4 Socio-economic impacts of climate change related to water resources
- 4.5 Possible institutional impacts of climate change (MM)

5. Managing current climate variability **Eelco van Beek** with possibly (Jaap Kwadijk, Hans Middelkoop)

- the reasons for managing climate variability – to manage water resources, protect people against floods, optimize energy production and guarantee domestic and industrial water supply

5.1 Current practices of using climate data for the design of water infrastructure (10-15) (Eelco van Beek with Hendrik Buiteveld)

- brief explanation of how “rule curves” are currently designed using historical flow data or historical climate data.
- two examples of how data were used to design infrastructure, possible examples could include:
  - flood protection structure along the Rhine
  - irrigation in the Murray Darling Basin (Bryson Bates)
  - Series of dams along the Moldau (Watch project partners)
  - Design of the Aswan dam (Jaap Kwadijk)

5.2 Current/historical practices in Managing climate variability (8, Eelco van Beek with contributions by Fulco Ludwig)

- 4.2.1 Floods
- 4.2.2 Droughts
- 4.2.3 Hydropower
- 4.2.4 Utilities

5.3 Changing perspectives in managing water resources (Eelco van Beek with Jaap Kwadijk) –

- IWRM

- example on changing perspectives while building the Oosterschelde dam, from a fully closed dam to a storm barrier with movable gates.

6. Improving management of current variability through the use of Seasonal Forecasts (FL, 5)

- 5.1 Recognizing and knowing historic and current climate variability
- 5.2 When to use climate forecasts
- 5.3 how to use climate forecasts (including some examples)
- 5.4 Impacts of climate change on managing climate variability

7. Adapting to climate change – **Jeroen Aerts with Peter Drogers**

- 7.1 Conceptual changes need for climate change adaptation
  - 7.1.1 Understanding Adaptation
  - 7.1.2 Conceptual Implications for the Water Sector
  - 7.1.3 Relationship between Conceptual Implications and IWRM
- 7.2 Strategic climate change adaptation options
  - 7.2.1 Illustrating Strategic Alternatives
    - 7.2.1.1 Coastal Zones
    - 7.2.1.2 Large River Basins
    - 7.2.1.3 Drought and Arid Zones
  - 7.2.2 Decision Making (path selection)
  - 7.2.3 Risk management
- 7.3 Operationalizing Risk Management as a core mechanism for Climate daptation
  - 7.3.1 Directed Implementation
  - 7.3.2 Enabling adaptation to climate and water risks – systemic approaches

7.4 Connecting the dots: Integrating Conceptual, Strategic and Operational Considerations in Case Areas

- 7.5 Conclusions

8. Climate Proofing (5) **Jeroen Veraart**

Part II Case Studies Peter Drogers with Jeroen Aerts

- Climate change and Spatial Planning in the Netherlands, Buntsma et al.
- Climate change and alluvial aquifers in a (semi-)arid environment – examples from Yemen. J.A.C van der Gun (IGRAC)
- Climate change and Umgeni Water Supply Company S W Gillham & M J Summerton



- Adaptation to climate change and social justice: challenges for flood and disaster management in Thailand Louis Lebel, Tira Foran,<sup>1</sup> Po Garden<sup>1</sup>, Jesse B. Manuta
- Adaptation measures in Metropolitan water supply in Perth, Australia by Bryson Bates
- Seasonal forecasts and water distribution in the Philippines, Casey Brown
- Institutional adaptation to climate change - current status and future strategies in the Elbe basin Sabine Möllenkamp and Britta Kastens

## **Dissemination plan:**

- Please describe in detail your plans for the dissemination of the products (eg. name of Journal, name of conference, etc.)

Book will be published by Earthscan. The Co-operative Programme on Water and Climate will take the lead on distributing the book. Hopefully Newater can fund the purchase of extra copies to be distributed to key stake holders and to the developing world.

## 5. Water resources scenarios for CS regions

Contact organisation: ALTERRA (Pavel Kabat, Fons Jaspers)

### Exact target group:

EU, NPC, WBA

### Extended description of Product:

'Water Resources Scenarios for CS regions' provides a unique insight in the process of scenario development on water shortage and gives estimations of future water stress based on socio-economic and climate changes at global, continental and river basin scale. Water stress situations between Newater case study areas can be compared.

The synthesis study combines the use of regional climate models with research on 'scenarios of future water use and demand within the concept of sustainable water resource management. Ensembles of rainfall projections from regional climate models (RCM) will be used to develop probability distribution functions for future water availability in different basins. Output from RCM's are available at resolutions (for 10x10 or 50x50 km<sup>2</sup>) suitable for water resource management in the river basins.

Water withdrawals can be estimated based on global/ local drivers such as population growth and GDP and the related domestic, industrial and agricultural water use (including Ecological flows). The climate scenarios provide amongst others the relevant variations of temperature and rainfall conditions for water withdrawals. Over certain periods (*e.g* 2050) the waterGAP model can simulate water shortage and water stress for different river basins. The use of certain preconditions makes the predictions more accurate and will support vision and scenario development in the river basins and on continents, in countries and other political entities.

River basin managers and national planners from water related sectors can use the results in their future planning. EU policy may use the outcome for 2050 for visions on their long term development and the consequent review of water related legislation (directives). The study will be presented as a journal paper to be published in 2008/2009 guided by a policy teasing branch activity.

### Dissemination plan:

The paper on 'Water resource scenario's for case study regions' will be a co-production between NeWater partners of WP 2.2 and WP 2.6 where basic processes and applications were developed till its actual level. More time and contribution from others will be needed to collect the more site specific data and analysis to come to meaningful products for all Newater basins.

## 6. Cross-comparison of climate change adaptation strategies across regions (NeWater Case Study river basins)

Contact organisation: PIK (Valentina Krysanova)

### Exact target group:

WBA, NPC, WB

### Extended description of Product:

Basis of the cross-comparison is the paper on “Practices and lessons learned in coping with climatic hazards (floods and droughts) at river basin scale” by Valentina Krysanova et al. and two Questionnaires by Patrick Huntjens on: 1) State-of-the-art of River Basin Management in dealing with climate-related extreme events, and 2) Physical interventions in river basins as a response to climate-related extreme events. The paper is in press in *Ecology and Society*. The Questionnaires were already distributed in several NeWater CS basins, and responses are partly collected, but not yet analysed.

For the cross-comparison it is planned to analyse responses on the following eight major questions from seven CS basins:

1. Understanding of climate change in the regions: is it happening? Which changes of climate are expected?
2. Understanding of expected climate change impacts on water and water-related sectors in the regions.
3. Understanding of climate change adaptation strategies in general and specifically for the regions. Which measures are needed in the regions?
4. Evaluation of the adaptive capacity of the governance regimes (based on the Patrick’s Questionnaire No.1).
5. Existing strategies and measures in the regions that would help to adapt to climate change.
6. Planned measures for adaptation to climate change in the regions.
7. Missing measures and barriers for adaptation in the regions.
8. Status of adaptation measures implementation in the regions.

Such a cross-comparison of climate change adaptation strategies across large regions in Europe, Asia and Africa was not done before, and will be beneficial for water managers and policy makers at the water board and national levels in these and other river basins for improving preparedness to the expected climate change impacts.

#### Methodological approach

The time is short, and it is difficult to involve many policy makers and water managers at different levels in all seven Case Study river basins (Amudarya, Guadiana, Elbe, Nile, Orange, Rhine, Tisza) in the new survey. Therefore, already collected results in the paper and obtained as responses on Questionnaires (still to be analysed) will be used as a basis, and the still missing responses will be collected by the representatives of Case Studies.

Some results from the paper by Krysanova et al. on expected climate change in the seven Case Study basins and on coping strategies with climate hazards will be used for Questions 1, 2 and 3 listed above.

Question 4 on adaptive capacity of governance regimes will be fully covered by the results of P. Huntjens’s Questionnaire eliciting knowledge on the regime characterization, which includes the following categories:

- Agency,
- Awareness Raising & Education,
- Top-down versus bottom-up governance,
- Cooperation,
- Policy development & implementation,
- Information management & sharing,
- Finances and cost recovery,
- Risk management,
- Effectiveness of (international) regulation.

This is important since we assume that adaptation strategies developed by a more adaptive regime are more effective. Then the adaptation strategies could be analyzed as outcomes of the regime at play.

The Questionnaire on Physical interventions in river basins by P. Huntjens could provide substantial data on Questions 6, 7, and 8 listed above.



Different methods will be used in the regions to get the still missing responses from the regions (seven CS basins: Rhine, Elbe, Tisza, Guadiana, Nile, Orange, Amudarya):

- interviews with policy makers (national and water board levels),
- distribution of a Questionnaire and analysis of responses,
- national Reports,
- CS team opinion based on previous interviews and questionnaires.

This research still has to be done. It will be organized by representatives of seven CS basins, who already expressed their interest and will participate in the planned Workshop in Amsterdam 7.04.2008.

## **Dissemination plan:**

The results will be published as several Journal papers and presented at the relevant conferences:

- the first paper by Krysanova et al. is in press in Ecology and Society and was presented at the CAIWA conference,
- the second paper by Huntjens et al. is planned for the Journal Global Environmental Change,
- the results of the Adaptation Strategies survey on eight points listed above will be presented at the final NeWater conference (later a Journal publication is possible).

## 7. A formal description of a process to analyse dynamic vulnerability and adaptive capacity in coupled socio-ecological systems

Contact organisation: SEI (Tom Downing)

### Exact target group:

EU, EC, EuP, WBA, NPC, WB, AC:

Different aspects of this process are of interest to different stakeholder, academic and policy communities, and the purpose of this product is that it can be broken down to be applied where relevant. For example, the vulnerability analysis and KnETs application would be of value in informing policy instruments while the agent-based modelling as a tool is mainly of interest to the scientific community. However, results from applications and comparative analyses of this whole process would be interest to policy makers and water managers.

### Extended description of Product:

- Dynamic vulnerability links naturally to adaptive management frameworks, albeit extending a single-stress, sectoral focus to coupled socio-ecological systems. This is a challenge for adaptive water management, where water links to fundamental stresses in many sectors, economies and vulnerable socio-economic groups. Narratives, at a personal, community and institutional level, may help illustrate the dynamic nature of vulnerability. However, this needs to be translated into a formal representation in a robust way that can be verified, validated and replicated. It is particularly important to capture the qualitative shift from one complex of vulnerability (e.g. resource-dependent self-provisioning livelihoods) to another (e.g. transient communities in economic and social relations at multiple scales) under scenarios of uncertainty to envision where boundaries of predictability may lie and, importantly, where surprise and new vulnerabilities may emerge.
- This product is intended to provide a robust framework to analyse characteristics and dynamics of vulnerability and adaptive capacity in water management regimes, using a range of methods, under the assumption that different tools and approaches are appropriate at different stages of research and in different contexts.
- Certain experiences so far have involved translating qualitative narratives to formal rules of decision making, verification and validation on these rules through a process of social learning and use of these rules in more formal models such as agent based models, to simulate dynamic vulnerability and transitions towards adaptive management under scenarios of uncertainty (this is currently described in D2.1.2b). For example:
  - Applying a process that uses a dynamic vulnerability lens (including multiple stresses, scales, heterogeneous actor networks etc.), knowledge elicitation tools (KnETs) and agent based modelling).
  - Insights from comparative analyses of this process in case applications in the Orange, Tisza and Guadiana are being undertaken.
  - Incorporating semi-formal rules from KnETs into an agent-based model (this may be incorporated in the synthesis product on Uncertainty Guidance).
- A broader description of this process has been documented and contributed to by WPs 1.7 and 2.4 and all partners in 2.1 in D2.1.2. Case study partners from the Tisza, Guadiana and Orange have also helped to develop this. Collaboration has taken place through workshops and followed up with fieldwork where the tools were applied. This broader document provides a description of a variety of tools, approaches and starting points, including the MTF, vulnerability indicators, LASER framework etc.
- The range of experience so far in NeWater will also be captured in a simplified form, possibly using a matrix similar to the one shown below. This will enable the multiple methodological pathways that can be explored when examining AWRM to be considered, depending on the target group and the context involved.

	<b>Adaptation needs and strategies</b>	<b>Policies and institutions</b>	<b>Implementation of AWRM</b>
<b>Qualitative methods and narratives</b>	LASER framework (2.4)	Institutional analysis in the Orange (PIK)	?



<b>Profiles, indicators, participatory mapping, knowledge elicitation</b>	Conceptual modeling in Tisza (2.5), KnETs application in Tisza and Guadiana (2.1, 1.7, 3.5) WPI (2.4)	MTF application in Orange (1.7, PIK)	Vulnerability profiles
<b>Coupled systems, agent-based modeling, economic analysis</b>	Normative value based agent-based model (2.1)	Agro-economic model for the Guadiana (1.7)	WEAP integration of the model, agent-based modeling

- All work packages will be invited to contribute to the product further to produce a more comprehensive framework of methodological pathways (matrix above) which can be taken given a specific problem.
- This product will be dependent on sufficient input from other work packages as a comprehensive account of the diverse interdisciplinary and methodological pathways used in the project will be important to capture.
- Without this it will remain the product of work that is ongoing by work package 2.1 and a refinement of D2.1.2b.

### Dissemination plan:

- For the science community: publications in journals like Ecology and Society, Global Environmental Change amongst others. Several conference papers already accepted (e.g. Resilience conference, Stockholm 2008, GECAFS). Further conferences and sessions.
- For the policy community a collection of policy briefs would be appropriate with guidance on where, when and how to apply the process.
- For water managers – potential publication in Guidebook coordinated by WB4 on tools, Train the Trainer workshops on methods, and contribution to Special Issue on Participatory Processes.

## 8. A special feature on: “Implementing participatory water management: recent advances in theory, practice and evaluation”

Contact organisation: Lisode (Yorck von Korff), USF (Sabine Moellenkamp)

### Exact target group:

WBA, NPC, WB, WUA, PWA, AC:

Water managers, other participation practitioners, the various scientific communities that are discussing participatory natural resources management

### Extended description of Product:

Many current water planning and management problems are riddled with high levels of complexity, uncertainty and conflict; so-called “messes” (Ackoff 1979) or “wicked problems” (Rittel 1973). These problem situations are increasingly entering the public policy sphere as resources and individual implementation power becomes scarce, and conflicts between water users and interest groups proliferate, adding a previously over-looked social dimension to the complex systems being managed. The need to consider the values and preferences of these “stakeholders” and for them to collaborate in decision making processes related to water management has led to a multitude of new methods and procedures being proposed (i.e. HarmoniCOP 2005; Mostert et al. 2007; Hare et al. 2003). The concept of adaptive management (Pahl-Wostl 2007), increasingly recognised as one of the central requirements for sustainable water management in rapidly changing physical and human environments, is one of these responses. Despite an increasing uptake of such methods around the world, little scientific research, investigation or critical reflection on the concrete advantages and disadvantages of using these methods has been undertaken, nor exactly how they can most appropriately be used to encourage transition to more sustainable ecological, social and political regimes in different cultural and spatial contexts (Stringer et al. 2006). ***This proposed special feature makes a start on this large research agenda by outlining recent advances in theory, practice and evaluation of implementing participatory water management, based on an extensive range of case studies that have been implemented and analysed by cross-disciplinary research teams.***

It has been suggested that one of the means for developing and sustaining desired ecological, social and political states is through the practice of stakeholder involvement and public participation: A recent Ecology and Society article stated that “[p]ublic participation is both a prerequisite and an element of good governance and the sustainable management of natural resources” (Enserink et al. 2007).

Even if this notion of participation remains contested and has been qualified (Fiorino 1990; Coliagnese 1997; Johnson 1997; Webler 1999; Delli Carpini et al. 2004), the contributors of this proposed special feature subscribe to the hypothesis that *if stakeholder involvement and public participation (i.e. “participation” as we will label it here) are performed in a skilful manner (adhering to good practice and utilising adapted theoretical aids for the prevailing political, cultural, social and thematic conditions), they are likely to:*

- *Improve the management of uncertainties* including those related to the state of the resource - in this case water - which is driven by a myriad of other uncertainties including climate, hydrological, behavioural and political factors;
- *Create collectively desired and more sustainable ecological, social, economic, and political states* – in this case for water management and its linked socio-ecological systems;
- *Encourage adaptive resource management practices* by developing the capacity of stakeholders to sustain constructive, flexible and adaptive reactions to future uncertain events that will occur in their supporting complex adaptive systems.

One of the principal objectives of this special feature is therefore to provide some responses to the question of ***how participatory processes can be skilfully implemented and their effects evaluated*** so that the above highlighted effects in the domain of water planning and management can be achieved.

Even though major factors that contribute to successful participatory processes have already been identified (e.g. Beierle and Cayford 2002; Rowe and Frewer 2000; Poteete and Ostrom 2004), there is still significant uncertainty among water managers and scientists about how public participation may be effectively implemented in varying political, cultural social, and geographical contexts (for a research agenda see Rowe and Frewer 2004; and specifically on public participation and culture see Enserink et al. 2007). This means that especially (but not only) in Europe, where there is the requirement to apply the Water Framework Directive (including Article 14 which regulates public participation), more knowledge is needed on exactly how public participation and stakeholder involvement can be effectively implemented to drive sustainable water management.

The special feature will therefore provide a close focus on the question of how to implement participatory processes in water management and which kind of novel mechanisms can be used to support these processes in complex, uncertain and conflict-ridden socio-environmental contexts. Thematic areas to support this objective will comprise:

- The implementation and evaluation of participatory practices in situations of resource and political conflict;
- The implementation and evaluation of participatory processes in different cultural, political and geographical contexts;
- The use and evaluation of varied forms of participatory modelling (using tools such as Cognitive mapping, Bayesian Belief Networks, hydrological models and others) for supporting adaptive management;
- Theoretical and practical insights on the ways in which learning through participatory processes can be derived and measured.

In contribution to these thematic areas of interest, some articles will have a main theoretical focus on the description of a particular mechanism (such as a mental mapping) and the results that were obtained through the use of this mechanism, while other articles will be more explicit on the question of how certain mechanisms have been practically applied in different water management contexts (i.e. under international transboundary conditions, in “transition” and developing countries vs. countries with long participatory management traditions). Despite these differences, all articles will provide an overview of the state of knowledge related to their specific focus (e.g. the application of specific public participation processes in an authoritarian cultural context, the participatory construction of Bayesian Belief Networks etc.). The aggregate sum of the papers should therefore create an extensive insight into current participatory water management practices in Europe and beyond. Confronting the state of the art theoretical reviews with the actual experiences and evaluations of the participatory methods applied in the case study applications should provide advances in the existing knowledge; including insights on how water and its linked socio-ecological systems can be adaptively managed in a participatory manner under conditions of uncertainty, complexity and conflict.

We have received proposals for 20 papers – 13 from the NW community and 7 from the AquaStress community. All papers have yet to be written or at least finalized. The internal deadline is 30 June 2008 for the majority of articles with the exception of the synthesis article which should be finished by the end of October 2008.

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## **Dissemination plan:**

Special feature in *Ecology and Society*

## 9. Newater Guidebook on Adaptive Water Management

Contact organisation: FEEM (Jaroslav Mysiak), OUCE (Caroline Sullivan)

### Exact target group:

WUA, PWA, NGO

### Extended description of Product:

The NW Guidebook is meant to collect experiences, lessons learned and presentations of the main outcomes of adaptive water management, with other words all knowledge and experiences accumulated in the Newater projects. First part of the guidebook is dedicated to presentation of the challenges faced by water management practices and how these challenges have been dealt with so far. The evolution of the IWRM concept will be briefly summarised and from this perspective the foundation of an adaptive management laid out. In the next section the tools developed, enhanced and tested in case studies will be presented, showing how they integration can contribute to making the management practices more flexible and informed of remaining uncertainties and risks. The second part of the guidebook will consist of concise stories and lessons learned in the NW case studies.

The distinguished experts and projects with similar orientation as Newater will be invited to contribute to the Guidebook

Climate change and other environmental pressure will further increase the complexity of water management. The NW Guidebook is meant to provide guidance and best practice examples how these challenges can be addressed. In doing so it will establish links to other policy oriented guidance documents and making it accessible for those who look for an advice.

The readers will be given practical examples of how different, even conventional tools can be applied to meet the requirements of adaptive management and cope with challenges posed by e.g. climate change.

The Guidebook relies on the available results and research carried out in the project. No additional research is necessary apart of that foreseen in the last Implementation Report. The concise presentation of the content and review by policy partners however represent additional tasks which have been accommodated in the WP42.

#### The structure of the Guidebook:

1) EXECUTIVE SUMMARY

#### PART I - CONCEPT AND TOOLS

2) INTRODUCTION - Making a strong case for AWM

2.1 Challenges of river basin management

2.2 Ways these challenges have been addressed to date

2.3 The AWM concept in terms of development and application

2.4 Management tools, an introduction and main lessons learned from case

2.4 The AWM concept in terms of training and capacity building

3) WORKING TOWARDS AWM

3.1 Detail the issues from 2.1

3.2 Three to five key outcomes from the experience of developing and piloting AWM

3.3. Three to five lessons learnt from the experience of developing and piloting AWM

3.4 five, or however many there are, key benefits of using AWM

4) TOOLS AND INSTRUMENTS FOR ADAPTIVE MANAGEMENT

4.1 Participatory processes

4.2 Modelling, impact assessment tools and decision support systems

4.3 Uncertainty guideline

4.4 Assessment of vulnerability and adaptive capacity

....

5) AWM - TRAINING, CAPACITY BUILDING AND KNOWLEDGE TRANSFER

#### PART 2 – CASE STUDY REPORTS

6) ADDRESSING RIVER BASIN MANAGEMENT ISSUES

6.1 Introduction

6.2 Classification of stories



6.3 Explain the structure of the case stories

7) CASE STUDIES

8) ACKNOWLEDGMENTS, ANNEXES, INDICES, ETC

## **Dissemination plan:**

The Guidebook will be published as a book and disseminated through the NE Portal as free pdf document (or series of pdf documents). The Guidebook will be in English but we plan to initiate partnership with major NGOs providing guidance for environmental management (e.g. IUCN, WWF, OXFAM) for an eventual translation and dissemination through their own network. Once a draft version is available, information about it will be sent to major research and policy newsletters, Cordis and other EU dissemination channels. Newater policy partners will be kindly asked to review the draft version available early enough so that the suggestions and comments can be dully incorporated. The final version of the Guidebook will be incorporated into the NW Portal; part of the content will be used to develop a concise presentation of the AM on the portal. The Guidebook will be presented at the NW Final conference, Nov 17<sup>th</sup>.

## 10. NeWater portal

**Contact organisation: USF, FEEM (Christian Knieper; Jaroslav Mysiak)**

### Exact target group:

WBA, NPC, WB, WUA, AC

### Extended description of Product:

An innovative way for the dissemination of scientific results is the establishment of web portals, where information products of a certain domain are presented to specific target groups in a user-friendly way. NeWater will develop a portal as an integrated section within the WISE-RTD (<http://www.wise-rtd.info>) to disseminate relevant NeWater results and experiences, e.g. from case study research. WISE-RTD acts as a web directory. It is offering approved structures and search algorithms that have been adjusted to practitioners' needs and that can be applied for NeWater input. Researchers can record own results and enter a broad spectrum of additional information, which helps practitioners to find and apply these results easily. In this way, contributors can influence where their products are presented to the users.

The MTF (synthesis product no. 1 by WB 1) becomes the basic fundament for the NeWater portal structure and pursues two objectives:

1. Making NeWater results available for practitioners in an easy way
2. Making practitioners familiar with the MTF as a tool for adaptive and integrated water management

Tools from NeWater will be linked to specific processes from the MTF.

As the WISE-RTD is on the track to become the central portal for European knowledge transfer in the field of water related research, NeWater will be able to reach a broad audience of practitioners, thus getting on board water managers for the concepts of adaptive water management. Generally it will have two target audiences, scientists and practitioners. Scientists may use it to understand the NeWater MTF concept and learn from practical applications as they can be presented, practitioners may learn from NeWater concepts and may use tools or guidances linked to it.

WB 4 takes a supervisory role and the collaboration with GWP shall be used to develop a usable user interface and to link relevant tools to it. Furthermore, by usability tests we hope to iteratively improve the portal and its interface. By the WISE-RTD - NeWater collaboration we have a win-win situation. While NeWater can benefit from an established environment, WISE-RTD will profit from additional input and usage.

For the collaboration meetings are scheduled to discuss structure and content of the portal. The WISE-RTD – NeWater collaboration is a direct consultation process between the WISE-RTD development group (SPI-Water) and the USF.

The following work has still to be done:

- Improvement of user interface as well as user tests and corresponding improvements
- Finding meaningful keywords that link NeWater results to the portal structure
- Integration of the NeWater section into the official WISE-RTD
- Registration of NeWater research results in the portal, supported by guidance

### Dissemination plan:

- Description in a sub-chapter of the NeWater Guidebook (synthesis product no. 9 by WB3 and WB4)
- Presentation at the final NeWater GA
- Dissemination in the course of regular WISE-RTD dissemination

## 11. Guidance and training material for transition to adaptive water management

Contact organisation: GEUS (Peter van der Keur)

### Exact target group:

WBA, WB, WUA, PWA:

Practitioners, i.e. water managers in river basin water management. The guidance and training material will be tightly linked to the Newater online-curriculum on transition to adaptive management targeted towards the academic community.

### Extended description of Product:

A training and guidance package has been developed which is intended for use by practitioners and water managers in river basins and should provide a resource to support their role in the implementation of methods for making a transition to adaptive water resources management. The training and guidance package has been developed by making use of the ‘broker-concept’, i.e. balanced between what is identified as a ‘knowledge gap’ identified within the Newater case studies and what can be provided by tool developers and enhancers to facilitate the transition process toward adaptive management. The novelty of this product is therefore a training package orientated towards transition to adaptive water management and tailor-made applications for selected trainees in a wide range of river basins. The training package has been applied in seven Newater case studies as Train-the-Trainer (TtT) workshops, where local practitioners as potential trainers have participated and where the intention is that they should disseminate their received skills further to a wider stakeholder community. All training packages include an introduction on adaptive water management and helps the trainees to see the training package within the context of adaptive management. Tools have been evaluated by the participating trainers with feedback also supplied by GWP regional representatives. The benefit for users is the tailor-made tool selection for supporting adaptive water management, but also the flexibility of including other tools from outside the basin and apply it under the conditions of the current basin. Research has still to be done on the assessments of TtT training packages and subsequent quality improvement and assurance.

Tools have been evaluated by with feed back of GWP region. The TtT workshops, the IWRM stage (Block) as well as the themes within a Block for which the G&T package was applied and the tools used that supported transition to adaptive water management are described in detail in Table 1.

The final training and guidance will be integrated in the Newater Portal, as part of WISE-RTD. The final training package will also be linked to the Newater online curriculum and vice versa.

Table 1: Training and guidance packages as developed for TtT workshops, including tools for supporting transition to adaptive water management.

TtT workshop	Block (IWRM stage), theme, (theme owner), theme goal	Tool description (developer)
<b>Elbe</b> , May 2007  GWP region / contact: Central, Eastern Europe	<b>IWRM stage:</b> Prepare Strategy and Action Plan / Build Commitment to Actions <b>Theme: Use of Integrated Assessment (models) (Alterra)</b> - 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 is 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	<b>Tool: Waterwise (Alterra)</b> <i>Description:</i> Waterwise is an interface for existing models on hydrology and spatial planning for optimization of economical land use us streams in relation to desired water quality and flow down-streams It can be used for land and water use planning and. It covers regional hydrologic interactions, effects of land use on water quality, on agriculture and on nature.
<b>Guadiana</b> , September 2007  GWP region / contact: Mediterranean	Block 2: Analyse Gaps Block 3: Prepare Strategy and Action Plan / Build Commitment to Actions	<b>Tool: Bayesian Network (GEUS)</b> <i>Description:</i> A participatory modelling technique for getting groups of stakeholders to identify and analyse the impacts of uncertainties, problems

	<p><b>Theme: Participatory Integrated Assessment (Uni EXE)</b></p> <ul style="list-style-type: none"> <li>- Gain 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</li> <li>- Learn how to prepare strategies and action plans, 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.</li> </ul>	<p>and their solutions. Integrates social, economic and physical knowledge and data.</p> <p><b>Tool: Evolutionary multi-objective Optimisation (Uni Exeter)</b>  <i>Description:</i> GenetXL provides optimum trade-off between multiple conflicting management goals which should be considered simultaneously. It provides a set of non-dominated management scenarios; and addresses uncertainty in decision making process.</p>
<p><b>Amudarya</b>, September 200</p> <p>GWP region / contact: Central, Eastern Europe</p>	<p>Block 1: Establish Status / Build Commitment to Reform</p> <p><b>Theme: Development of Stakeholder Commitment (Seecon):</b> The participants should get an overview of the range of methods for organised stakeholder and general public participation, for the purpose of building commitment to a planning process.</p> <p>They learn how to select between methods depending on the goals of the planning process and goals of participation.</p> <p>They have hands-on experience of a selection of methods (cognitive mapping and group model building) in the area of organized stakeholder participation such that they know how to build up commitment within this group of stakeholders.</p>	<p><b>Tools: Group Model Building / Cognitive Mapping (SECON)</b>  <i>Description:</i> Builds up group commitment to problem solving as well as providing a means of eliciting social, economic and physical system knowledge from stakeholders and sharing information between them. It is also a participatory modelling technique.</p>
<p><b>Kromme Rijn</b>, November 2007, <b>Tisza</b>, March 2008,</p> <p>GWP region / contact: Central, Eastern Europe</p>	<p><b>IWRM stage:</b> Establish Status / Build Commitment to Reform</p> <p><b>Theme: Stakeholder and Institutional Analysis (TU Delft/ RBA)</b></p> <p>Understand how stakeholder analyses can be used to establish status and build commitment to reform in water management practices.</p>	<p><b>Tool 1: Enhanced stakeholder issue analysis (TU Delft/ RBA)</b>  <i>Description:</i> The purpose of the enhanced stakeholder-issue analysis tool ( role play, group discussion, individual /group reflection, rope exercise, etc.) is to show in what manner the water system influences and is influenced by the network of stakeholders. To understand this, the stakeholders thus need to learn about the network within which they find themselves and how the goals, interests and aims of the various stakeholders show the pluriformity, mutual dependency, closedness and the dynamics of the stakeholder network structure.</p> <p><b>Tool 2: DANA, (USF)</b>  Hands-on tool workshop, <a href="http://www.dana.tudelft.nl">www.dana.tudelft.nl</a></p>
<p><b>Orange</b>, March 2008</p> <p>GWP region / contact: Southern Africa</p>	<p><b>IWRM stage:</b> Implement Frameworks</p> <p><b>Theme: Adaptive flexible Implementation Plan (Cranfield)</b></p> <ul style="list-style-type: none"> <li>- Understand the context of 'independent' working methods of water institutions of the past but why institutional arrangements of the past are no longer adequate today</li> <li>- Gain awareness of institutional change required for AWRM implementation</li> <li>- Understand the inhibitors of change</li> <li>- Gain awareness of change enabling concepts and tools</li> <li>- Gain practical, transferable knowledge of Agile Project Management and tools and techniques, and learn how to manage randomness and uncertainty incrementally, by responding rapidly and flexibly to change while keeping stakeholders engaged.</li> <li>- Understand how this will help in day-to-day management of the implementation of strategies at the basin-level</li> <li>- Learn while doing and with others about Change Management for adaptive flexible implementation planning for AWRM.</li> <li>- Gain the ability to incorporate changing, and learning-while-doing-with-others into a normal way of operating</li> </ul>	<p><b>Tool: GWP Handbook (Cranfield)</b>  <i>Description:</i> The updated book, which previously only focussed on IWRM, includes a supplement outlining additional AM concepts. Also, instructions for running a social simulation or social learning exercise based on these concepts will be provided.</p> <p><b>Tool: ICIW (Alterra)</b>  <i>Description:</i> 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</p> <p><b>Tool: Agile Project Management Training (Cranfield)</b>  <i>Description:</i> Training on how to do project management while taking into account uncertainty, unpredictability, multiple stakeholders and feedback.</p>
<p><b>Nile</b>, February 2008</p>	<p>Block 1: Establish Status / Build Commitment to Reform</p> <p><b>Theme: Dealing with multiple Actors (COPP)</b></p>	<p><b>Tool: Multiple Actors Behaviour Simulation (COPP)</b>  <i>Description:</i> This tool allows learning in an</p>



<p>GWP region / contact: Meditaranean, East Africa</p>	<p>This part of the training aims at motivating members of a stream basin community to collaborate and showing them how: by learning people how to behave and interact in situations with multiple actors, ambiguous issues and diverging frames. The context used for learning this is the domain of natural resources management.</p> <p><i>Block 3: Prepare Strategy and Action Plan / Build Commitment to Actions</i></p> <p><b>Theme: Use of Integrated Assessment models (Alterra)</b> Stakeholders should become familiar with the model functionality offered by an integrated assessment tool Waterwise that has been implemented within an optimization framework. The training should assist stakeholders to find common ground for options to consider. It should motivate the stakeholders to invest in this kind of tool by:</p> <ul style="list-style-type: none"> <li>- thinking further about objectives and land/water management options for the Nile basin;</li> <li>- providing data.</li> </ul> <p>A subgroup of the technically proficient participants should be introduced to the 'works' of Waterwise, thus providing 'seeds' for the dissemination of confidence in the used techniques.</p> <p><i>Block 4: Implement Frameworks</i></p> <p><b>Theme: Adaptive flexible Implementation Plan (Cranfield)</b> Understand the context of 'independent' working methods of water institutions in the past and why institutional arrangements of the past are no longer adequate today. Gain awareness of institutional change required for AM implementation. Understand the inhibitors of change. Gain awareness of change enabling concepts and tools.</p>	<p>experience-based way about multiparty collaboration, diverging problem definitions, dealing with different interests, negotiation and conflict management.</p> <p><b>Tool: Waterwise (Alterra)</b> <i>Description:</i> Waterwise is an interface for existing models on hydrology and spatial planning for optimization of economical land use us streams in relation to desired water quality and flow down-streams It can be used for land and water use planning and. It covers regional hydrologic interactions, effects of land use on water quality, on agriculture and on nature.</p> <p><b>Tool: ICIW (Alterra)</b> <i>Description:</i> 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.</p>
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### Dissemination plan:

The training and guidance package will be disseminated as a document (downloadable as pdf from Newater portal) and as an integrated part of the portal. The CAIWA paper (Henriksen et al., 2007) will be extended and refined for publication in scientific journal. Finally, a summarised version is included as a chapter in the Newater guidebook.

## 12. Online Teaching Curriculum in Adaptive River Basin Management

Contact organisation: USF(Caroline van Bers)

### Exact target group:

AC: instructors of Masters and PhD level programmes in water/environmental/resources management, hydrology and related disciplines

### Extended description of Product:

The NeWater Project together with the Global Water System Project have launched a comprehensive teaching curriculum in adaptive river basin management aimed at instructors of Masters and PhD level programmes in environmental/resources management, hydrology and related disciplines. The curriculum is available in the form of teaching modules on the internet which may be used online or downloaded. The URL is

<http://watereducation.gwsp.org>

The first set of downloadable modules introduces water management in the context of global change and concepts and methods of adaptive management and integrated water resources management. Topics include, for example, resilience and adaptive capacity, water policy mechanisms, uncertainty analysis, vulnerability assessment, participatory processes, performance indicators, monitoring and more. A recommended number of ECTS (European Credit Transfer System) credits are suggested for each module. The topics presented includes presentations with explanatory notes, exercises, discussion questions and background readings. The site also provides relevant links and case study profiles for teaching purposes. Interested educators may use teaching materials online, or they may download and adapt materials as needed, as long as any materials or information used are cited with the appropriate reference.

#### Learning Modules

##### 1. Global Change & Water Resources

- Global water cycle
- Water, climate and development

##### 2. Introduction to Adaptive Management

- Basic concepts of Adaptive Management
- Integrated Water Resources Management
- Resilience and adaptive capacity
- Water policy mechanisms
- Role of uncertainty in water management

##### 3. Adaptive Management Methods and Tools

- Vulnerability assessment
- Governance regimes
- Participatory processes
- Group model building
- Performance indicators
- Information gathering & monitoring
- Integrating economics
- The role of transitions management

##### 4. Managing Transitions to Adaptive Water Management (under development – avail summer 2008)

- Drivers of and barriers to change
- Learning processes in facilitating change
- Managing change for effective river basin management
- Analysing transitions
- Integrated Sustainability Assessment
- Transition modelling
- European Water Framework Directive



**Case studies** from developed and developing countries are used to demonstrate management concepts and methods, including in particular the 7 NeWater project river basins: Rhine, Elbe, Tisza, Guadiana, Nile, Amudarya, Nile and Orange

A **complementary training course on teaching adaptive water management** takes place April 1-2, 2008 in Osnabrueck, Germany. The course provides academic instructors with a introduction to adaptive water management and an orientation of the website so that individuals can adapt materials to their own teaching needs. This training course will be repeated in mid-October 2008 in New Delhi, India as part of the IHDP meeting. More courses will be planned depending on the success of these initial training courses and also on funding.

More information concerning the online curriculum please contact:

Caroline van Bers, Institute of Environmental Systems Research, University of University of Osnabrück  
cvbers@usf.uos.de, or Daniel Petry, Global Water System Project daniel.petry@uni-bonn.de

## **Dissemination plan:**

The curriculum will be accessible via the NeWater Portal and linked within the Guidance and Training Material.