NATO/CCMS pilot study 'Integrated Water Management'
Progress report after the 3rd Workshop
Värska, Estonia, 11 – 15 June 2004

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1 Introduction

The main objective of the pilot study is exchanging and combining expertise in water system research, considering different dimensions of water management and their intra and inter relations (Fig. 1). The dimension *Integration of knowledge* represents the required competences; it includes natural scientific as well as social and economical aspects, considered as basic information about the functioning of water systems and the chains of the water users, both including conceptual knowledge as well as a situation analysis. The *Organizational Integration* dimension concerns all relevant competences and participation of stakeholders and means an important support for the efficiency of the water management. The *Legislative basis* dimension is the regulating basic framework including and combining all legal aspects.

The knowledge brought together by means of the pilot study, has to contribute to the knowledge of Integrated Water Management in general, including the necessary differentiation, given the wide variety of conditions in the different types of basins or watersheds. Therefore, both theoretical studies on the functioning of water systems, organisation and legislation as well as specific cases will be discussed.

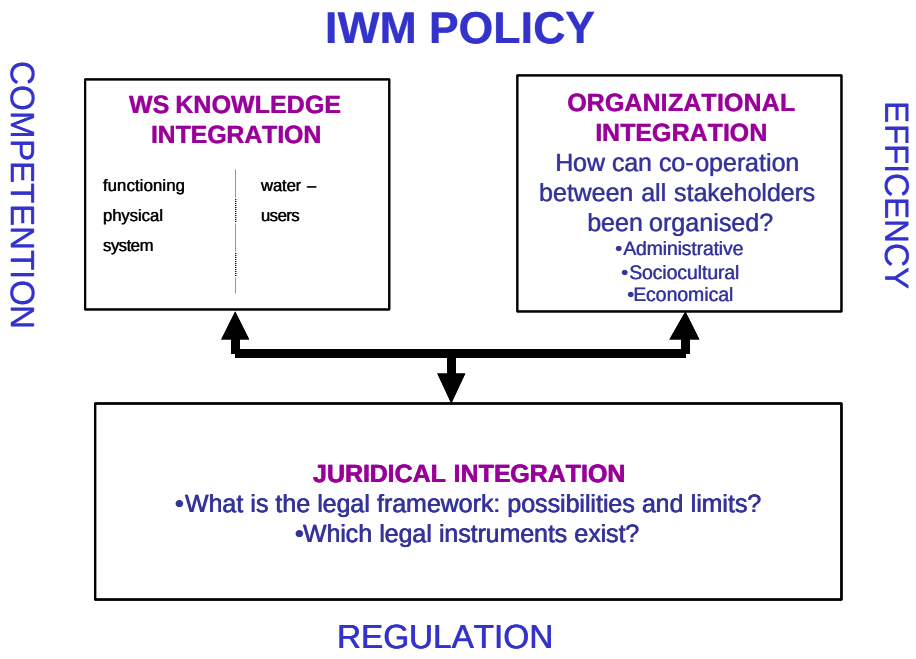

Fig. 1. Different aspects of Integrated Water Management

2 Conceptual background

Setting the scene: a water system approach

Water is a "sine qua non" for life and due to the increasing human population and our growing needs the amount of water needed is increasing steadily (Gleick, 2003). On the other hand, the available water resources are declining. Furthermore, water is not only needed for man but also for all ecosystems.

The main question that has to be addressed is then of course how to use and divide the available water between all users (man and ecosystems) now and in the next generations.

The water system can be seen as a kind of reactor, directing the precipitation through different pathways (physical, chemical and biological processes) back to the atmosphere or sinks like deep groundwater. A water system is:

> *"a coherent and functional unity of surface water, groundwater, riverbed, riverbanks and technical infrastructure, including the occurring plant and animal communities and all associated physical, chemical en biological characteristics and processes".*

It is clear that, in the past until now, the water system has been changed to a large extend to fulfil our water demands. It is equally clear that the way we are using and changing our water system is not sustainable. In recent years, the concept of integrated water (resources) management has been developed. The idea behind this concept dates back to the first UN conference on the human environment in Stockholm (1972), but mainly to the Conference on Water at Mar del Plata in 1977. The next step was the International Conference on Water and Environment in Dublin (1992) where ideas were put forward to the UNCED conference later that year in Rio. Within Agenda 21 this was incorporated:

> *"The holistic management of fresh water as a finite and vulnerable resource, and the integration of sectoral water plans and programs within the framework of national economic and social policy, are of paramount importance for actions in the 1990's and beyond. Integrated water resources management is based on the perception of water as an integral part of the ecosystem, a natural resource and social and economic good, whose quantity and quality determine the nature of its utilization. To this end, water resources have been protected, taken into account the functioning of aquatic ecosystems and the perenniality of the resource, in order to satisfy and reconcile needs for water in human activities" (Chapter 18, paragraphs 18.6 and 18.8)*

So far, efficiency of water management was equated with maximum use of water resources by users (Calder, 99). Environmental and ecological considerations as well as downstream users were given little attention. In a demand driven situation the response to water shortage was to augment the supplies, hence even more reducing the incentive to manage water in a sustainable way! This resulted in a severe deterioration of the natural functioning of the water system. This in turn impairs human use. The reduction of the flow e.g. can severely impact water use: it reduces the assimilative capacity and the discharge of pollutants may lead to toxic conditions and extra costs to public services for the treatment of water.

This brings us to a first crucial question: can we determine the carrying capacity of a water system and in what ways can we manage (increase) this carrying capacity.

Are we able to determine the carrying capacity of a Water System?

Carrying capacity of a watershed could be defined as the amount of water that is available for human use taking into account the amount necessary for the ecosystem so that they can still fulfil their ecosystem functions, which deliver essential ecosystem goods and services to our society (Fig. 2). Related to the socio – economic system, the water system includes three groups of functions: sink, source and life support system. The pressures of using the water system as a source, a sink or a life support system, respectively have mainly impact on the water quantity; the water quality and on the services provided by the natural system and as a consequence immediately on the socio – economic system.

How multiple use and often-conflicting demands can be brought in line with what the natural system can support. During long time, water management has been approached mainly (or even only) from a technological viewpoint. The water system was engineered and problems were solved technically when they appeared. River systems have been manipulated in order to fulfil functions and conditions for human activity without considering consequences, unless some local ones. Therefore, problems were shift in space and time. In this way, the carrying capacity is not considered. All pressures on the natural water system have a feedback effect on human welfare and wellbeing, herewith starting a vicious circle by impacting the socio – economic system again. Preventing the start of this degradation spiral can only be reached by respecting the carrying capacity of the water system.

In order to determine the carrying capacity, a system approach is urged. Therefore, we have to consider the physical and the biological water system as well as the water use processes (water chains) and their interrelations. Land use plays a crucial role and especially agriculture and silviculture can have a pronounced impact on the availability of water. Further, the different storage mechanisms as well as efficiency of water use and reuse determine the carrying capacity. Therefore, shifting from policy and management mainly focussed on impacts on the SINK to tackling pressures on SOURCE and LIFE SUPPORT is urgently needed. Combining all preconditions for preventing to pass the carrying capacity determine the so-called “environmental space”. The services that have to be considered for the ‘environmental space’ are production, information and regulation.

It is necessary for each water basin to create a balance between the “functioning of the water system” and “the impact of the water chain” on it. Therefore, water uses should be tuned to the system and we should shift from adapting the system to the demand to adapting the use to the supply limits of the system. Since factors as technology, demography, society change, preconditions for the carrying capacity have to be dynamic.

Integrated Water Management is a / the tool to respect the necessary preconditions.

Development of river basin plans

If we can determine the carrying capacity, how can we then ‘translate’ the necessary conditions into planning and management? River basin plans are the crucial instruments synthesising the different choices made. How to make these choices? Pricing may be a good approach.

Sustainable development, protection of biodiversity, and the stand still principal are environmental principles that can influence the water system directly. The precautionary principle, a source oriented approach and rational water use should have an influence on the water chain as well as welfare and the human perception on the water system.

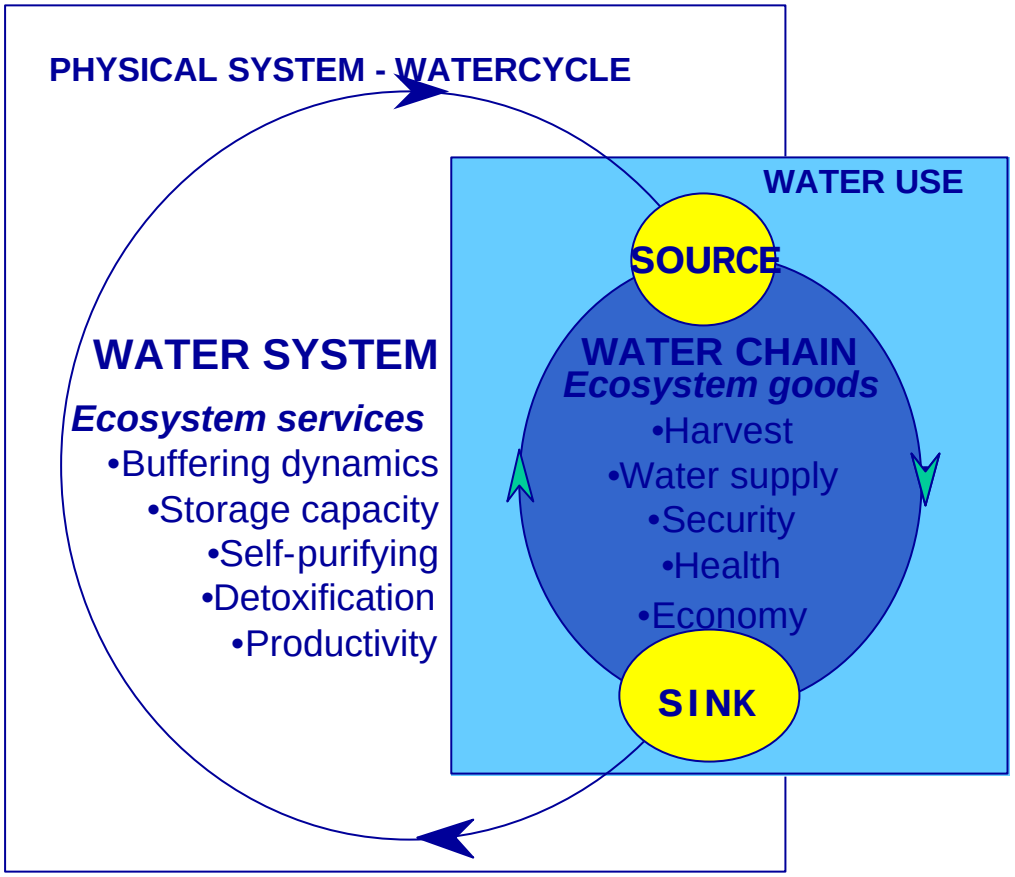

Fig. 2 the water system and the water chain (Bergmans et al., 1999)

3 Final aim and expected outcome

The pilot study aims to learn from comparison by presenting examples to build upon, to prepare publications of scientific papers with concepts, not detailed guidelines, to establish a network for initiating new projects and to enforce capacity building in all participating countries (Figure 3).

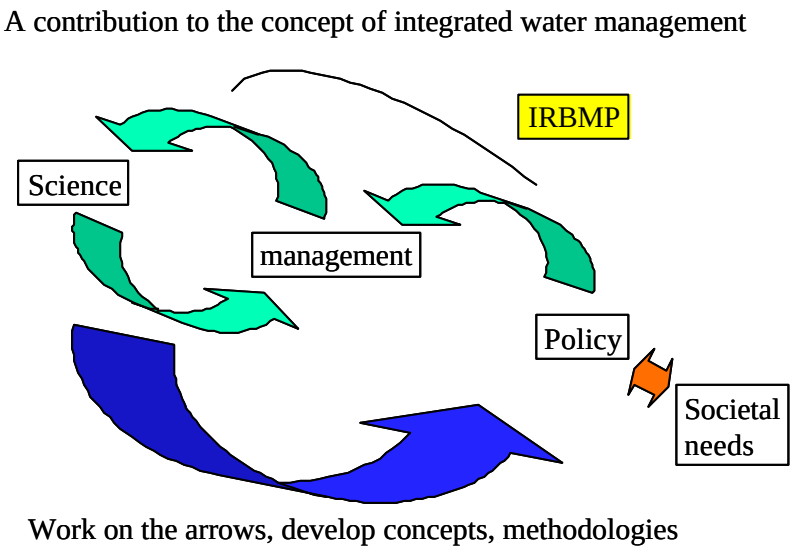

Figure 3 Objective of the IWM pilot study

Expected outcome of the pilot study

Determining indicators defining the carrying capacity of a water system. Whereas the carrying capacity is a point of departure for the development of concepts for river basin management plans, participation and transboundary cooperation get main attention. An important input for these concepts is the comparison and evaluation of IWM in given basins. This information will be the input of a NATO advanced science shop, which should be the final contribution for a book.

4 Methodology

The pilot study addresses to specific issues, requiring an integrated approach. Therefore the pilot study participants work alternately during plenary meetings and in working groups. Participants can belong to research institutes, universities, governmental authorities and non-governmental organizations (NGOs). Exchange of information and discussions mainly takes place during workshops. The pilot study lasts three years. Two workshops a year are organised.

The working groups are organized according the agreements made on the plenary sessions of the workshops. Each working group stresses on given topics, taking into consideration possible common grounds with other working groups. Case studies and theoretical research is subject of discussion. Each working group prepares the theme for the next workshop. A working group leader coordinates the preparation and delivers a discussion text, a selection of cases and a programme.

The workshops are partly plenary, including also separate working group meetings and an excursion to a relevant case. Therefore workshops are organized at different basins The WG-leader chairs the WG-meetings and prepares the programme for the WG in cooperation with the other WG-leaders and pilot study director. The pilot study director and the WG-leaders will form a 'steering committee' for the pilot study.

A final workshop should be more comprehensive and could make use of the input of a NATO Advanced Research workshop, NATO Science for peace projects and other research projects.

At the first workshop four working groups have been installed and for each working group specific questions to be addressed have been formulated. For each working group, a working group leader has been chosen. These working groups continued during the second and the third workshop. The installation of new working groups can be discussed at any moment.

1. Environmental indicators / human health
2. Public participation
3. Transboundary Aspects
4. Goods & Services

1. Environmental indicators / human health

What are the requirements to achieve health objectives? Acute disease, chronic, recoverable?

What parameters must be measured, should be measured, could be measures?

How to define carrying capacity (water use, uptake of pollutants…)?

Linked to the formulation of goals, for what do we need goals?

WG-leader: L. Lavkulich, University of British Columbia, Canada.

2. Public participation

How do we decide who should be involved?

How do we involve the community (the ladder)?

How do we ensure that everyone has the same information and same voice at the table?

Make a comparison of the different systems (e.g. contract de rivière…)

WG-leader: J. van Ast, Erasmus University Rotterdam, the Netherlands

3. Transboundary

How can we derive equitable solutions to transboundary water contamination/withdrawal, risks of inundation?

Can we develop a procedure for developing equitable user pay for contamination/water withdrawal?

How can we divide the resource between different stakeholders (e.g., agriculture – industry), impact of droughts on this division?

Comparison of basin commissions.

WG-leader: G. Roll, Peipsi Center for Transboundary Cooperation, Estonia

4. Goods and services / policy analysis

Valuation of ecosystem services.

Ecological services/policy analysis.

How do we ensure that the right kind of science is done to meet policy objectives?

How do policy makers ensure what the right kind of information is collected (beside allocation of money).

Role and value of floodplains.

WG-leader: M. Fisunoglu, Cukurora University, Turkey.

In order to determine first which costs and benefits should be valued to have tools for policy makers and water managers for adapting policy a (temporary) junction with the working group environmental indicators / human health has been proposed. Afterwards a goods and services working group can work separately aiming to express goods and services in financial comparable values.

Basins and addressed questions and themes

Peipsi

How can we determine the contribution of a number of jurisdictions (land-use) on the pollution /contamination of lakes/rivers?

Can we use GIS and then modelling techniques to ascertain impacts and costs?

Public participation.

Transboundary aspects.

Narew

What role do natural areas have in water management? Biodiversity, ecosystem services.

Schelde

What are the impacts of intensive human activities on water quality/remediation?

How to create « space for the river » in an overcrowded basin?

Scaldit – WFD (2000/60/EC)

Mediterranean

How are transboundary effects influenced by government priorities/ strategies?

WWTP.

Central Asia: Aral Sea, Syr Daria & Amu Daria

Problem of water shortage, irrigation restoration and change in land use.

5 Activities of the third workshop

1st workshop, Antwerp (Belgium), 21 – 24 May 2003

2nd workshop, Genoa (Italy), 28 – 31 January 2004

3rd workshop, Värska (Estonia), 12 – 15, June 2004

Objectives

- Preparation of papers by the working groups.
- Establishing a framework for future of the working groups: what about the present working groups; what about the installation of new working groups.
- Preparing a publication.
- Planning of the next workshops and initiation of a NATO Advanced Science shop application.

- Discussion of a questionnaire to prepare a publication.

The third workshop was organized to finalize the working group papers on indicators / human health, on participation and on transboundary aspects. These papers should be published in a book, financed by the Italian National Research Council (INRC). The content of this book was discussed and deadlines were set. The framework of the final publication, including methodology and planning, was also discussed and outlined. This final publication should include the outcomes of the pilot study. The preparation of an application for a NATO advanced science workshop was initiated. If the group can realize to organize the NATO advanced science workshop, the outcomes should be subject of the final publication as well.

The installation of new working groups was discussed: River Basin Management Planning and Integrated Modellling. The participants decided to work mainly plenary in the future around given themes.

On the first day during a plenary meeting, new participants presented new cases and the working group leaders informed about the state of the art of the working groups: environmental indicators/human health, participation, transboundary issues. During the second day the working groups met separately. On the third day the outcomes of the working groups were discussed plenary and integrated. The further planning of the pilot study and the publication of results were discussed.

The activities of the working groups took place in the framework of developing the content for the cases and a working group paper in the INRC publication.

Working group Environmental Indicators / Human Health

Working group leader is Les Lavkulich.

Working group members are Roberto Sacile, Elisa Ulazzi, Dorota Miraslaw, Jurate Kriauciuniene, Ivanka Dimitrova, Phil Jordan, Violeta Visan, Violeta Stoleru, Marleen Coenen, Riccardo Minciardi, Michela Robba, Carlo Giupponi, Joaquin Izquierdo, Mahir Fisunoglu.

A guiding framework for the cases has been developed:

- Goals for water management: ecological and human carrying capacity.
- IWhat needs to be measured? Critical
- What should be measured? sensitive
- Consideration of trends, limits or thresholds: Input and output of the system; allows production – mitigation; allows framework for economical analysis.
- Risk, complexity, and uncertainty: unknown science, interaction, variability (natural or human induced), and perception.
- Scale: temporal and spatial.
- Developing decision-making tools: communication with stakeholders; socio – economic analysis.

<u>The follwing case studies have been presented and discussed</u>

Impact of Ignalina nuclear power plant on the cooler – lake Druksiai (Jurate Kriauciuniene, Lithuania)

Goals: to evaluate the changes in the lake ecosystem due to the impact of the nuclear power station.

Indicators: water temperature (effects on the ecosystem)

Establishment of the Iskar reservoir minimum sanitary storage capacity (Ivanka Dimitrova, Bulgaria)

Goals: drinking water supply

Indicators: water storage dynamics

Comments about water quality monitoring (Violeta Visan, Romania)

Goals: water quality

Indicators: chemical water parameters for the entire basin

Recognition of hydraulic conditions in the upper Narew river system and their influence on the regional development (Dorota Miraslaw, Poland)

Goals: water level for ecosystems; discharge for agricultural users

Indicators: water level and flood extended (hydrographs)

Saltwater intrusion in the coastal aquifers of Cervia municipality (Elisa Ulazzi, Italy)

Goals: avoidance of water salinity for agricultural users; survival of pinewood

Indicators: salinity seasonal changes.

7 or 8 individual papers (cases) will be written.

Les will draft the working group chapter for part 3. It will consist of an introduction, based upon the discussion text and it will be followed by illustrative examples, representing a synthesis of the individual papers.

Format for the illustrative examples:

- "The ecosystem"
- Defining the goals + who sets them.
- Identification of indicator(s) and sub indicators: what should be measured / limits / thresholds
- Input and output of the system.
- Summary.

Working group Participation

author: Jacko van Ast

Working group leader is Jacko van Ast

Working group members are Leo Santbergen, Jacobo Feás, Abdellatif Khattabi, Ute Menke, Manuela Rosa, Marie-Camille Talayssat, Jan Bocian, Mike Bonell and Jan Staes

The work of our group on participation was heading for three goals:

1. finishing the draft paper about participation in water management
2. identifying cases of participation
3. delivering input to the general discussions

With respect to the first objective, we wrote a paper with an analysis of participatory decision-making processes for sustainable water management. We learned from our own interactive paper-writing process that for an iterative, collaborative, cooperative way of working it is necessary to have earmarked a certain amount of time. Nevertheless, as a result of the earlier time investments of Antwerp and Genova, we concluded our draft paper rather successful.

With respect to the second objective, we are heading to compare existing concepts, definitions, perceptions, methods and models for participatory decision-making processes and want to make a stakeholder analysis. In this second paper we want to describe, analyse and compare examples of participatory decision-making processes on different scales. For example temporal (short and long term) and spatial related to administrative (municipality and smaller) and political (global, international, national, regional, local, personal) levels, in which hierarchy plays an important role (top down, bottom up or from the side?).

We divided participation in a pluralistic and corporatist version, pointing at respectively the general public (democracy) and organised interest groups (stakeholders). We identified interest and influence of stakeholders, social learning, capacity building, information, trust and gender as important concepts for participation. Other crucial elements are:

The type of decision:

- policy plan (strategical or operational?, integrated? cyclic?)
- project
- single subject or integrated?
- incidental

Type of problem

- integrated or single issue:
- water quality, water quantity, nature, industry?
- upstream - downstream?
- common view on cause and solution?
- crisis?

Style of governance

- facilitative,
- co-operative,
- delegating,
- participative,
- consultative,
- authoritative

Public participants

- number of stakeholders,
- public NGO
- science
- other: status, power etc.

Process:

- political and policy culture?
- independent organiser?
- the Initiator in the case (who identified the problem?)
- is participant decisive at least at one moment in the process?
- financial compensation (will damages be compensated?)

Size and spatial diversity of the water system

Social indicators

- BNP,
- unemployment,
- economy

With respect to the third objective we also contributed in Värska to a draft toolbox for water managers and discussed some cases:

- Netebekken, (River Schelde);
- Rhine
- Lake Peipsi

Working group Transboundary issues

no summary report yet

6 Further planning

The working groups should finalize with a text in the INRC book. During the coming workshops the main focus will be on integration and integrated modelling on the framework of the development of River Basin Management Plans. The next workshop will be organized plenary focussing on given themes and if necessary or desirable ad hoc discussion groups can be organized.

Themes: Technical information, Computing as integration tool, Economics.

An application for a NATO advanced science workshop will be prepared. The NATO advanced science workshop should be organised before the last pilot study workshop, herewith having the opportunity to prepare the outcomes for publication. This Advanced Science Workshop should be organized in Canada in April 2006. The input for this workshop will be the information gathered by the questionnaire which is under development.

Workshop	Location	Time
4th	Portugal	2 – 6 March 2005
5th	to de decided	September / October 2005
Advanced Science Workshop	Canada	April 2006
6th	Poland	June / September 2006

Preparation of the 4th workshop

The 4th workshop will be held in Portugal, from 2 to 5 March 2005. Tomaz Dentinho and Manuela Pires Rosa will organize it.

Main parts of the programme

- Themes.
- Local experts.
- Final publication.

For each of the proposed themes 3 to 4 presentations and a time for discussion should be foreseen.

Jan Bocian and Jan Staes will prepare the programme for the theme '**Technical information**'.

Roberto Sacile will prepare the programme for the theme '**Computing as integration tool**'.

Tomaz Dentinho and Mahir Fisunoglu will prepare the programme for the theme '**Economics**'.

Tomaz Dentinho and Manuela Pires Rosa will prepare a programme with **local experts**.

Questionnaire

To compare Integrated Water Management in function of the development of River Basin Management Plans in different basins and / or countries, an outline of a questionnaire has been introduced. Comparison of IWM in different basins / countries in function of the development of

The headlines were discussed end should be further developed. Therefore the participants agreed upon the following task division.

Part of the questionnaire	Author / responsible
Physical characteristics and land use (according HELP format)	Carmen de Jong
Socio - economics	Tomaz Dentinho
Legal and institutional framework	Jacko van Ast
Interests / uses	Bo Holst
Participation	Jacko van Ast
Transboundary issues	Gulnara Roll / Natalia Alexeeva
Methodology - toolbox	Jan Bocian / Jan Staes

Deadline for the questionnaire = 15 September 2004. All participants can add comments until 30 September. Definitive questionnaire will be ready at 1 November 2004.

7 Publications and dissemination of contributions and results

Lombardo C., M. Coenen, R. Sacile and P. Meire, 2003 "Integrated Water Management – Pilot Study", Ambasciata d'Italia – Bruxelles - Quaderni Europei N°5, p. 214.

The Italian National Research Council will support a publication, including papers related to the 2nd and the 3rd workshop. It will be published at the beginning of 2005.

Final publication: including the outcome of the Advanced Science Workshop.

Registered participants can make use of a community on Blackboard to facilitate the exchange of texts and comments.

CD-rom with presentations of the 1st workshop.

CD-rom with presentations of the 2nd workshop.

Italian National Research Council Publication

This book should represent the outcome of the second and the third workshop, respectively held in Genova (Italy) and Värska (Estonia).

The Italian National Research Council (INRC) finances the publication of the book. It should contain 150 to 200 pages and will be printed in 250 copies. The book will consist of three main parts, preceded by a preface of the INRC and by an introduction of the pilot study director and co-director.

- Part 1: Concepts of Integrated Water Management*: general presentations of Genova*
- Part 2: Basin reports / cases. The cases should illustrate the range of issues of water management. Format of the cases: introduction with geographical settings followed by problem description. Deadline for the individual papers = 15 November 2004 on Blackboard.
- Part 3: reports of the working groups. These reports concern an integrated paper, consisting of an introduction, based upon the discussion text, followed by illustrative examples. Deadline for the introduction draft = 31 August 2004, for the examples = 15 November 2004.

Title	Author(s)	Responsible	Number of pages
Introductory part			
Preface			
	INRC	Roberto Sacile	2
Towards integrated water management			
	Patrick Meire, Roberto Sacile, Marleen Coenen	Marleen Coenen	10
Part 1: Concepts and approaches of integrated water management			
Integrated water management in the Mediterranean area			
	Giorgio Roth	Roberto Sacile	10
A methodological approach for supporting the development of river basin management plans for the framework directive			
	Carlo Giupponi	Roberto Sacile	10
Two key issues in transboundary river management: river restoration and conflict management.			
	Andrea Nardini	Roberto Sacile	10
Beliefs and preferences influencing participatory decision-making processes			
	Manuela Pires Rosa	Manuela Pires Rosa	10
Knowledge discovery in environmental data (hydrological data?)			
	Joaquin Izqierdo	Joaquin Izqierdo	10
The HELP programme of UNESCO			
	Michael Bonell	Michael Bonell	10

Part 2: Cases			
Lake Peipsi case study			
	Natalia Aleexeeva / Gulnara Roll	Natalia Aleexeeva	5
Issues of management of the transboundary lake Constance			
	Jürg Blöch	Jürg Blöch	5
Schelde nutrient cycling			
	Tom Cox / Stefan Van Damme / Patrick Meire	Patrick Meire	5
Draa River, Morocco			
	Carmen de Jong	Carmen de Jong	5
Guadiana River, the Portugese – Spanish transboundary waters			
	Tomaz Dentinho	Tomaz Dentinho	5
Establishment of the Iskar reservoir minimum sanitary storage capacity			
	Ivanka Dimitrova	Ivanka Dimitrova	5
	Phil Jordan	Phil Jordan	5
Approaches to Integrated Water Manegemnt in Caucasus: the Kura – Aras River Basin Management			
	Peter Kavelashvili	Peter Kavelashvili	5
Impact of Ignalina nuclear power plant on the cooler – lake Druksiai			
	Jurate Kriauciuniene	Jurate Kriauciuniene	5
Transboundary river contract Semois- Semoy between Belgium (Wallonia) and France			
	Jérôme Lobet	Jérôme Lobet	5
The Escaut / Schede transboundary river basin			
	Eric Masson	Eric Masson	5
Recognition of hydraulic conditions in the upper Narew river system and their influence on the regional development			
	Dorota Miraslaw	Dorota Miraslaw	5
	Michela Robba / Roberto Sacile	Roberto Sacile	5
Nete system analysis / sector participation			
	Jan Staes / Patrick Meire / Renaat De Sutter	Jan Staes	5
Saltwater intrusion in the coastal aquifers of Cervia municipality			
	Elisa Ulazzi	Elisa Ulazzi	5
Part 3: reports of the working groups			
Environmental indicators / human health			
	Les Lavkulich	Les Lavkulich	15

Participation			
	Jacko van Ast / Manuela Pires Rosa	Jacko van Ast	15
Transboundary issues			
	Gulnara Roll	Gulnara Roll	15
Conclusions			
	Patrick Meire / Roberto Sacile / Marleen Coenen	Marleen Coenen	5

Final publication

Three main parts

1. IWM in the different basins, to be prepared by each participant
2. To be prepared by ea new working group 'integrated planning and integrated modelling'
3. Concepts on IWM – RBMP: general introduction + input of all working groups

A questionnaire with open questions and key – words is drafted; the working group planning and modelling should adapt it. A first survey can be presented at the 4th workshop. Comparison and evaluation of the basins will be worked out at the 4th workshop.

8 Participating countries

Members of NATO

Belgium, Canada, France, Germany, Greece, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Turkey, United Kingdom

EAPC - NATO

Estonia, Latvia, Lithuania, Romania, Slovakia, Slovenia

EAPC partner countries

Georgia, Moldova

Mediterranean dialogue

Morocco

Cooperation with other CCMS pilot studies

Environmental Decision-Making for Sustainable Development in Central Asia.

Cooperation with international organizations

UNESCO - IHP – HELP (Hydrology for the Environment, Life and Policy).

9 References

Bergmans A., M. Coenen, P. Konings, I. Loots, P. Meire, A. Schneiders, M. sys, P. Van Bockstal, J. Van de Welle, R.F. Verheyen, 1999. *Integraal Waterbeheer in Vlaanderen: concept, metodologie en structuren.* In opdracht van het Vlaams Integraal Wateroverlegcomité, Universiteit Antwerpen.

Boràs S., M. Coenen, N. Grishin, J. Kriauciuniene in Verheyen R.F., M. Coenen, edited by T. Baum, 2002. *Methodology, Focalization, Evaluation and Scope of Environmental Impact Assessment. Final Report.* NATO/CCMS Report No. 260.

Calder I.R. 1999. *The Blue Revolution.* Earthscan Publications Ltd., London.

European Commission 2003. *Water for Life.* http://europa.eu.int/comm/research/water-initiative/index_en.htm).

Gleick P., W.C.G. Burns, E.L. Chalecki, M. Cohen, K.K. Cushing, A. Mann, R. Reyes, G.H. Wolff & A.K. Wong 2003. *The World's Water 2002 - 2003. The Biennial Report on Freshwater Resources.* Island Press, Washington.

Provi ncie Utrecht, 1998. *Definitienota tweede waterhuishoudingsplan.*

Schneiders A. & R.F. Verheyen, 1998. 'A concept of integrated water management illustrated for Flanders (Belgium)' *Ecosystem Health*, Vol. 4, no 4, December 1998, Blackwell Science.

United Nations, 1993. *Agenda 21*, Chapter 18, paragraphs 18.6 and 18.8.

Appendices

1. Programme of the third workshop
2. List of participants f the third workshop