European Water Community News

Keeping you updated on water research in Europe

Issue. No.1 - July 2011

The partners of the IWRM-Net project launched two calls for research to support public policies in the field of water. The first began in October 2007 and the second appeal was launched in late 2009, with the following themes (1) The impact of climate change and adaptation of the Integrated Water Resources Management (2) Water scarcity and drought; (3) Economics for IWRM: social and environmental assessment for decision making.

From that call 6 projects were financed along with the IWRM-Net Scientific Coordination Project, which aims to ensure continued support of the research projects in both administrative and scientific terms. Three challenges to achieve this can be identified:

(1) Provide an interface between research projects funded IWRM-Net and the Core Group and wider IWRM-NET partners;

(2) Create synergy between research projects, between projects and programs of the IWRM-Net partners and other research networks and initiatives related to water;
(3) Support the dissemination of scientific results in an integrated manner to the Core Group, the scientific community and finally to potential users of research.

This work will be delivered through the promotion of interdisciplinary scientific exchanges and synergies and facilitated by the International Office for Water (IOW).

The scientific results will be disseminated to potential users of the knowledge. In support these goals there are three meetings proposed; a kick off meeting, a midterm and final event common to all projects.

An important aspect is the further development of an online scientific community for water research. www.europeanwatercommunity.eu

Transdisciplinary and thematic discussions will be organized by IOW to support the science policy interface for the WFD, including the CIS-SPI ad-hoc group and the water Joint programming initiative.

To initiate this community and assist in its role of scientific expertise, IOW has organised a group of experts to participate in working groups, write articles and support the conferences.

Contents

The SCP secretariat is managed by the International Office for Water and funded by the Ministry for Ecology, Sustainable Development, Transport and Housing in France.

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PROJECT: IMPACT

Why scale matters in river management

Climate change is an additional stressor for river biota besides other anthropogenic pressures like catchment land use and river training. It has been widely stated that these pressures at large spatial scales affect the local ecological status, may even constrain the effect of local restoration measures, and should be considered in River Basin Management Plans. Most river managers are aware of obvious constraints like water quality and migration barriers but other large scale pressures like missing source populations and the effect of discharge changes on sediment and channel dynamics are rarely considered.

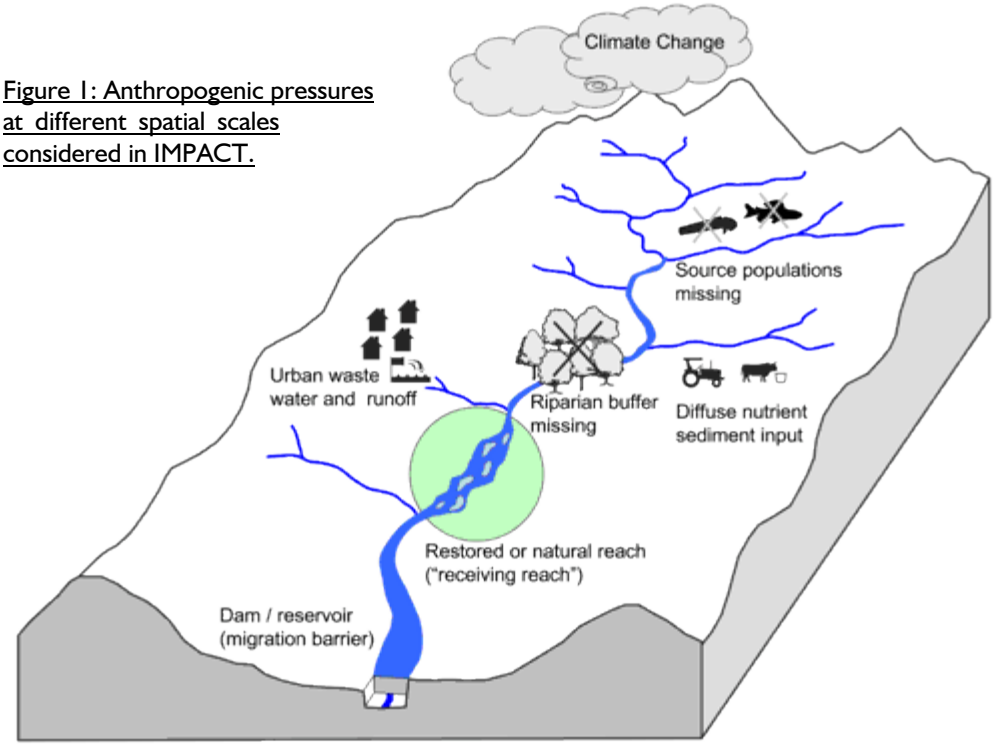


Figure 1: Anthropogenic pressures at different spatial scales considered in IMPACT.

The basic idea of IMPACT is to assess the relative importance of anthropogenic pressures operating at different spatial scales for the ecological status of restored or near-natural reaches ("receiving reach" in Figure 1), to identify the main bottlenecks, and to answer the following research questions:

- What can you expect from local reach-scale restoration measures given the remaining pressures at larger spatial scales?
- How important are discharge changes due to Climate Change compared to other anthropogenic pressures?
- Will discharge changes due to Climate Change have a major influence on natural reference conditions?

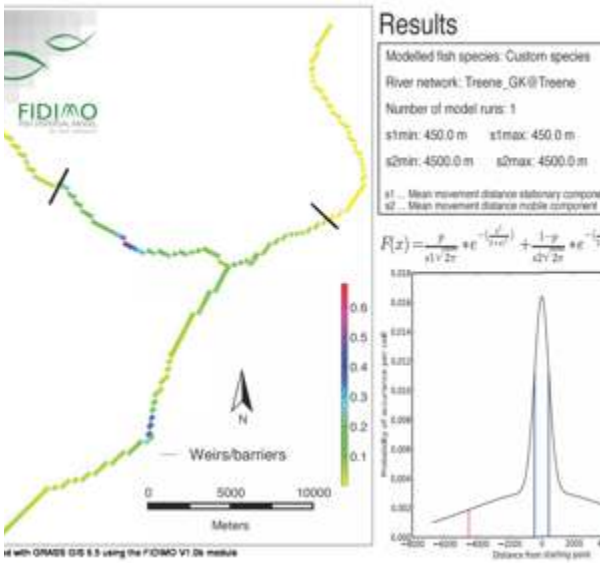
This will be done by coupling physical and biological models:
- catchment rainfall/runoff models to predict discharge, nutrient, and sediment load,
- morphodynamic models to assess changes of channel form and dynamics,
- habitat models to describe fish and invertebrate assemblage that can be expected in the reach given the modelled abiotic conditions.

In addition and for the first time, dispersal models will be developed and included in the coupled model to assess the distance species move within an engineering time scale, and to describe the species pool available for colonizing the restored reach (see contribution on FIDIMO in this newsletter).

IMPACT is funded by the following national agencies: German Federal Ministry of Education and Research (grant no. 02WM1134), French ONEMA (Office National de l'Eau et des Milieux Aquatiques), and Portuguese Foundation for Science and Technology.

FIDIMO

A dispersal model for fish from the IMPACT project



There is increasing evidence that even restoration measures which lead to an increase in local habitat diversity had no positive effect on river biota, yet. This might be simply due to the fact that fish and invertebrates were not able to reach and colonize the restored river in an engineering time frame.

The presence of barriers like dams obviously determines if a restored reach can be colonized, which is already considered in most River Basin Management Plans. Moreover, the presence and distance of source populations and many other factors influencing fish movement determine if a restored reach can be colonized and how long it takes (e.g. habitat requirements, population size).

As one task in the IMPACT project, the Fish Dispersal Model FIDIMO has been developed to predict fish movement and dispersal and to assess the (re)-colonization potential. Dispersal was modeled in a Geographic Information System (GIS). It is different from other, terrestrial dispersal models in two ways: First, fish movement is restricted to the river corridor in contrast to the radial dispersal of terrestrial species. Second, most individuals of a fish population are rather stationary while only few move longer distances. These different components can be modeled best by a specific mathematical dispersal function (two superimposed normal distributions), which is not provided by most current GIS software packages. FIDIMO links the strength of GRASS GIS to model linear and branching elements like river networks with the open source library of algorithms and mathematical tools for the Python programming language (SciPy).

The results strongly depend on two input files: (i) The presence and location of source populations, which can be provided as random points or by user defined coordinates. While the input of user defined coordinates will probably give the most accurate results, the presence of species is rarely known for entire catchments. Alternatively, species distribution models can be used in a preliminary analysis to model the presence of species based on proxy variables which are available at the catchment scale (e.g. land use data). (ii) The form of the dispersal function describing fish movement is based on empirical data which show some scatter. To account for this, a range (min / max) can be supplied and FIDIMO randomly selects values in a number of model runs to assess uncertainty and model sensitivity.

The basic idea of FIDIMO is to apply the dispersal function on a rasterized river network. Maps of several topological characteristics of the network (distances, flow direction, stream order) are exported to SciPy. The probability of species occurrence is calculated for each raster cell based on the locations of source populations and the species-specific dispersal function. The branching nature of river networks is considered and the mobile component is split at each river junction, i.e. most individuals move up the main stem and some enter the tributary according to the size of the river. If information on the location and passability of barriers can be provided, the model considers that a specific share of the fish is stopped from moving further and accumulates in front of the barriers.

Model output:
The output maps show the probability of occurrence after the model timesteps (see Figure). Based on the results it is possible to assess if and how many individuals will probably reach a restored section in the model time, which has further implications for planning and prioritizing restoration measures and assessing restoration success. In addition, the model can be used to assess the effects of weir removal, estimating recovery times of fish populations, to predict the spread of invasive fish species, and to assess the maximum distance between restored reaches acting as stepping-stones for meta-populations.

This task of the IMPACT project was funded by the German Federal Ministry for Education and Research (grant number 02WM1134).

PROJECT:

ICARUS

The ICARUS project aims at identifying adaptation strategies to climate, social and economic, and land use change for water management in the Mediterranean, yet focusing on three areas in particular, the Venice Lagoon Watershed (italy), the Jucar Basin (Spain), and Western Algarve (Portugal).

This goal requires several preparation phases to take place contemporaneously, as it has been occurring since the inception of the project, September 2010. Firstly, information is gathered from previous European project (e.g.SCENES, FUME; CIRCE; NOSTRUMdss, and so forth) and reports (e.g. SCENAR2020) on future climate, socio-economic, and land use scenarios of change between now and 2030. The project partners purposefully chose a short to medium-term time frame in order to provide more immediately useful information to the end-users, i.e. farmers, when they design adaptation strategies.

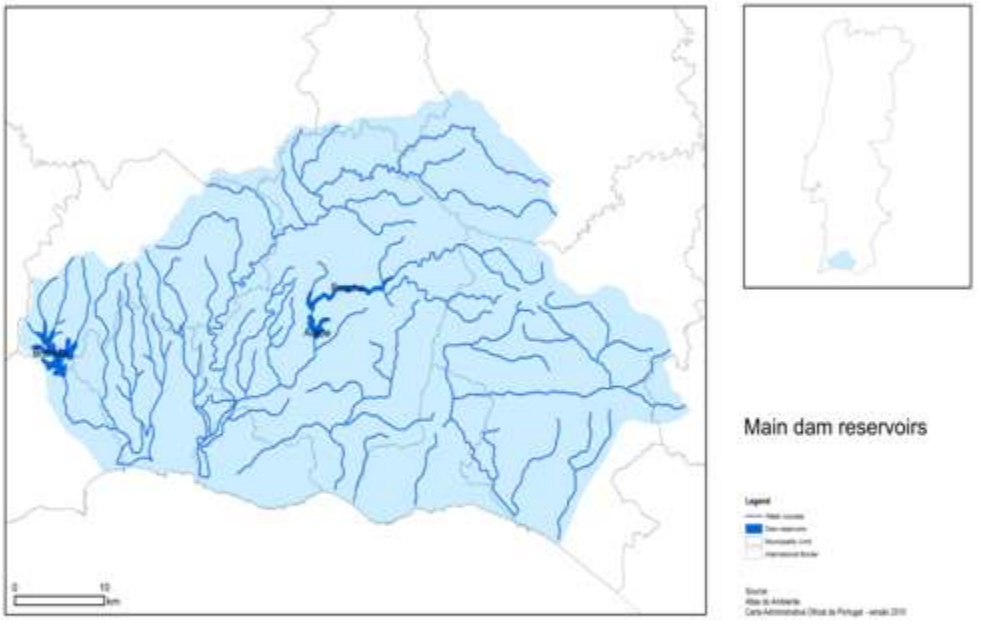
Secondly, a necessary baseline information on the present and potential use of scarce water resources in these regions is provided, regarding agrarian practices of water use and explanatory factors (hydrological, biophysical, historical, social and economical), technical and organizational innovations, through both a review on previous research and field surveys and interviews. These works pretend to identify the specific adaptation strategies –frequently combined— already developed by these actors. These tasks will allow carrying out a comparative analysis of the different irrigation systems placed in the three regions according to their potential for saving water.

Thirdly, for sounder adaptation strategies, partners provide stakeholders with an updated review of legal and institutional framework in which decision are taken on water and, specifically, irrigation management. In addition, we will analyse the needs of local population in terms of water consumptions and eventual conflicts that may ensure between sectors.

In the second year of the project, a intense participatory phase will take place, where first future adaptation strategies will be identified, then their social, economic and environmental sustainability will be evaluated with the support of a decision-support tool, developed in previous European project, which will be updated for this ad hoc use. In the end, all information collected during the project will create the grounds for (i) a framework for participatory integrated irrigation water management, which can be tested in other Mediterranean contexts and (ii) identify prospective adaptation strategies for sustainable irrigation in Southern Europe agriculture.

NEW STUDY AREA

The new study area is located in Algarve (southern region of Portugal) and in regional terms it encompasses an area of around 209 000 ha, which include four mediu size dams / reservoirs (Bravura, Odelouca, Funcho and Arade) and two irrigation perimeters (Alvor; and Silves, Lagoa and Portimão). However, the detailed study will be developed in the Arade Catchment (of around 97 900 ha) concerning the irrigation perimeter of Lagoa and Portimão with around 2300 ha of irrigated area.



PROJECT:

CLIMAWARE

Impacts of climate change on water resources management Regional strategies and European view

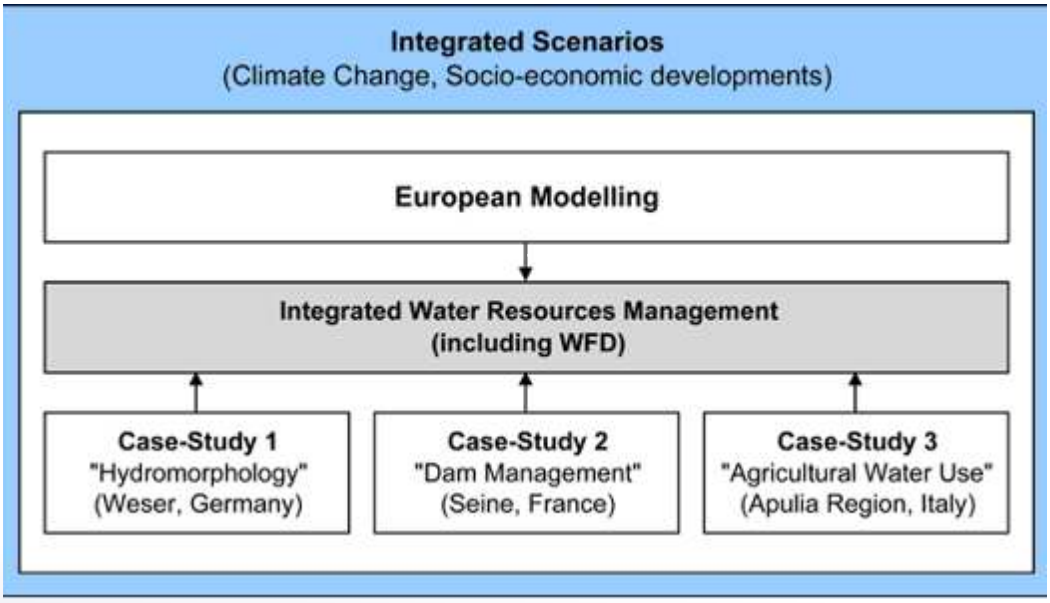
The five CLIMAWARE partners come from France, Germany and Italy. The underlying motivation of the project is that climate projections as prepared by the IPCC predict changes in precipitation and temperature, which will impact regional water availability.

A further challenge for water management schemes are expected changes in water consumption in various sectors due to climate change such as a higher water demand in agriculture or in industries for cooling. The aim of this project is to develop integrated planning tools for a sustainable water resources management that take account of the impacts of climate change. As the EU Water Framework Directive (WFD) demands river basin management plans and programmes of measures, these tools have to be analysed as well and adjusted accordingly. A problem of making recommendations for adjustments are uncertainties related to climate change projections.

CLIMAWARE considers both the European and regional scales of water availability. The Center for Environmental Systems Research at the University of Kassel, Germany, selects the integrated scenarios and conducts modelling on water use and availability at the European scale to assess the change in the hydrologic regimes and water use of different sectors. Subsequently three case studies in three different regions (Weser – Germany, Seine – France, Apulia – Italy) investigate the impact of climate change at a regional scale by the means of region-based hydrological and hydrodynamic models and water management strategies. The case study of the Department of Hydraulic Engineering and Water Resources Management at the University of Kassel, Germany, investigates the impacts of climate change on regional river systems (Weser). Cemagref and Les Grands Lacs de Seine from France evaluate in another case study the impacts of climate change on the management of the Seine reservoirs and its adaptation.

The Istituto Agronomico Mediterranneo di Bari (CIHEAM-IAMB), Italy, investigates the impacts of climate change on the agricultural water use in the Apulia region.
The primary objectives of our research are to:

- elaborate quantitative projections of changes in river flows and their consequences on flood and drought occurrence and sectoral water uses.
- analyse the effects of climate change on the hydromorphological reference conditions of rivers and therefore the definition of "good status".
- define adaptative management rules/strategies for dam management and irrigation practices.
- investigate uncertainties in climate model – scenario combinations.



Thanks to the involvement of different stakeholders in each country, the results and recommendations developed within the project time should be accounted for in future policy making.

The kick-off meeting of the CLIMAWARE project was held in october 2010 in Kassel, Germany where each partner presented its case study and where a common approach was set-up. As different scenarios on climate change exist, one of the challenges of this project was to discuss the scenarios used for modelling to have a comparable basis. The next project meeting will take place next September in Bari.

EXPERT VIEW

Water Scarcity and Drought:

Author: Maggie Kossida, NTUA (mkossida@chi.civil.ntua.gr)

Identification of gaps and research needs to enhance proactive management in Europe

Adequacy of fresh water resources is flagged in international discussions on sustainable development. Conflicts on the allocation of resources have exacerbated the need to adapt sustainable water strategies which account for the future requirements of the economic sectors, the human needs and the ecosystems welfare. Yet, the increasing pressures, induced by natural and anthropogenic driving forces, have led to considerable imbalances of water resources in many places in Europe.

Over the past 30 years drought's impacts have dramatically increased in the EU (total costs 100 billion €) while 17% of its territory have been affected by water scarcity to date [COM(2007)414]. In recognition of the acuteness of the problem, different initiatives have been put forward from the EU Commission (in-depth assessments, 2007 Communication and follow-up, targeted studies) and the different countries, yet there are major gaps in our knowledge and understanding of these phenomena, lack of adequate monitoring of their state and evolution, and limited data to allow in depth analysis, resulting in a poor ability to proactively manage and mitigated their impacts. The aim of the current article is to highlight some of these gaps, which call for further targeted research in order to obtain the necessary tools for proper WS&D management in Europe, and further bridge the relative science-policy breach in this field. These gaps are categorized as follows:

1. Conceptual and methodological gaps, which relate to the definitions of WS&D, the causalities among drivers-pressures-impacts and responses, the concepts of vulnerability and adaptive capacity. The fact that both WS&D operate on many levels and scales as a result of many complex factors and affect different

sectors, often make the definitions directly related to their impacts. Wilhite and Glantz (1985) analyzed more than 150 definitions. The absence of a universally accepted definition adds to the confusion about the occurrence and severity of these phenomena, while many of the existing definitions do not adequately define them in meaningful terms for scientists and policy makers. The thresholds for declaring drought are arbitrary in most cases. Furthermore, there is a significant gap of knowledge and lack of coherent methodologies when it comes to defining and assessing Europe's vulnerability to WS&D. The scope of WS&D vulnerability assessment is to identify environmental, social and economic co-determinants of drought impacts (Ribot, 1996). Vulnerability is determined by three components: exposure, sensitivity, adaptive capacity. To assess vulnerability one must have a clear view of the drivers, pressures, state, impacts and responses and their cause-effect relations. Drivers result in pressures, which adversely change the state, causing thus impacts which call for responses. Yet, a response measure can mitigate an impact, or change a driver, or become itself a driver that changes a pressure. This interplay is inherently complex, and requires in-depth analysis in order to be able to define how the different variables affect one another. Currently, there are limited studies (even more limited EU cases) where these cause-effect relations are investigated in order to provide insight into understanding the full dimension of the WS&D parameters interplay. Finally, regarding the definitions of the different adaptation measures, a common typology is currently missing, resulting in confusion since interpretation of the measures is based on subjective judgement.

2. Data and information gaps

As stated in the 2007 EU Communication, policy action on WS&D needs to be based on high-quality information on the extent of the challenge and projected trends. Existing EU and national assessment and monitoring programs are neither integrated nor complete. Reliable information on the extent and impacts of WS&D is indispensable for decision-making at all levels, yet there are significant data gaps, especially when it comes to the socio-economic parameters. Data on impacts are not widely available, nor has a common typology been developed. It is well known that they can in

generally be classified under environmental, social and economic, yet the wide variety of impacts makes it necessary to develop an EU harmonized reporting framework so that misinterpretations are avoided. A similar approach has been adopted by the US National Drought Mitigation Center who has developed an "impact reporter" providing metrics for baseline comparison across the US. Furthermore, information on the effectiveness of response measures and economic policy instruments is also lacking. Research in this direction is highly needed, developing the necessary common criteria and tools to allow and facilitate such assessments.

3. Planning and Implementation gaps

The current state of implementation of integrated solutions to combat WS&D in a proactive (rather than crisis) manner is inadequate. Research on specific issues can facilitate the process, focusing on:

(1) the engineering design of adequate monitoring, forecasting and early warning systems (key parameters, spatiotemporal scales, data integration and analysis, forecasting methodologies, improved delivery, etc.).

(2) the definition of proper indicators and thresholds to be used for the development of Management Plans: The characterization of WS&D and the identification of its on/offset require different indicators and quantification for triggers. Single indicators often prove inadequate for decision makers while multiple indicators and triggers can be useful, yet many challenges arise when we try to combine them (e.g. scales incomparability, statistical inconsistence of thresholds etc.) (Steinemann et al., 2005). Thus research is needed to enhance the selection of proper indicators, not only based on scientific merit, but on their value for operation decision-making as well.

(3) the definition of a common WS&D Vulnerability Assessment Framework: Although vulnerability to floods is well studied in Europe, this is not the case for WS&D, and as result no harmonized framework for such an assessment exist. Due to the fact that WS&D impacts are not as direct, the effects of the mitigation measures are not currently evident, and the adaptive capacity of a population highly depends on the socio-economic setting, it is very complex to define the associated vulnerability and risk.

(4) the development of concrete and harmonized guidelines for WS&D Management Plans: Although efforts have been made towards common guidelines, many technical issues are not adequately tackled, and the objectives and requirements of the WS&D MPs remain loose.

4. Governance and Policy gaps

Currently no EU legislation exists regarding the management of WS&D. The WFD provides some basis, touching on issues of exemptions and encouraging DMPs as supplementary measures. Yet, the full range of WS&D issues are not addressed in the WFD. It is important to notice that when defining WS&D conditions in an area one must also account for environmental and other requirements (e.g. treaties in transboundary rivers) and thus consider this volume as practically unavailable for abstraction. This can significantly change the water stress picture of an area, yet this is not always accredited. EU countries governance schemas in relation to the management of WS&D highly differ, and coordination among stakeholders is not always well planned or detaily prescribed in the relevant MPs. Improvement of the national policy and governance in needed in many cases, and enhanced communication between the developers/researchers and the end-users must be established so that the developed tools are designed to fit the specific user' needs, while their users are adequate trained into using them for decision making. Whether an EU piece of legislation on WS&D is needed, remains to be explored and researched, both in terms of necessity as well as selection of the adequate form.

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PROJECT **ESAWADI**

Utilising the Ecosystem Services Approach for Water Framework Directive Implementation

The Mondego river

The Ecosystem Services Approach (ESA) has received a lot of attention over the last 6 years for instance through the United Nations Environment Programme's Millennium Ecosystem Assessment or The Economics of Ecosystems and Biodiversity (TEEB) initiative of the European Commission and Germany. Over the same period, the WFD economic requirements have proved a considerable challenge for water administrations, both in terms of data and methodologies. Up to now, there has been no assessment of how the ESA can contribute to addressing this challenge.

The Dordogne

ESAWADI will work on linking the economic elements of the WFD and the current "state-of-the-art" regarding the ecosystem services assessment. Through this project, the methodological linkages between the two concepts (ESA and WFD) will be investigated. Our main academic innovation will not be to further develop ecosystem services valuation methodologies but to assess the potential added-value of the ESA in the WFD decision-making process, including stakeholder participation.

The contributions of the ESA will be assessed in three ways:

(1) In terms of linking ecosystem services provision and the WFD definition of "good ecological status" for water bodies;

(2) In terms of non-monetary assessment of ecosystem services and WFD economic requirements (cost effectiveness, disproportionality of costs, cost recovery…);

(3) In terms of improving stakeholder involvement and understanding of the WFD implementation and integrated water management decision-making measures.

The project builds on 3 case studies in France, Germany and Portugal. While a coordinated approach will be used by developing and answering the same core research questions in all case studies, each national case study will deal with different ecosystems at different scales, and shall therefore also focus on site-specific issues.

The French case study takes places at the middle stream of the Dordogne River. The case study will look at the issue of *physical and hydromorphological good status*, with the hypothesis that it is on these aspects that the ESA approach may be the most helpful for engaging with stakeholders on the relevance of local water implementation measures and for addressing WFD economic requirements. Both regional structures (the Adour-Garonne Water Agency and EPIDOR) and local structures have to find operational solutions to implement locally the RBMP (River Basin Management Plan) and achieve good ecological status of the Dordogne water bodies by 2015.

The Portuguese case study will look at the relationship between "good ecological status" and the provision of ecosystem services in the case of the Mondego River estuary, in collaboration with the Administração da Região Hidrográfica do Centro. A previous study in this area undertook a driver-pressure-state-impact-response (DPSIR) analysis, and identified the main services, stakeholders and pressure sources in the system. The IMAR team is currently testing the DPSIR framework surveys with different stakeholders. ESAWADI will test whether the ESA can facilitate communication between researchers and stakeholders.

The German case study takes place in the transboundary German/Dutch Ems River basin. It will focus on riverine connectivity. It aims to identify how the ESA can contribute to the decision-making process in relation to measures and further interferences with riverine connectivity in the German Ems River Basin esp. connected to the justification of exemptions according to article 4 of the WFD and the "disproportionality of costs" criteria. The experiences and lessons learnt from each case study will be synthesized to provide possible guidelines for using the ESA in WFD-implementation as well as policy recommendations for water authorities.

The Ems River

The ESAWADI methodology builds on the assumption that using a ecosystem services approach for policy design and implementation in the field of Integrated Water Resource Management, will enable to better integrate the ecological status of ecosystems and their impact on economic and social well-being; and therefore, bring stakeholders closer to the ecological issues at stake.

ESAWADI is a project managed by a multidisciplinary team of water management consultants, university researchers, economists and policy experts, led by ASCONIT Consultants, in partnership with CREDOC France, seeconsult (Germany), Intersus (Germany) and IMAR – Instituto do Mar (Portugal). For more information on ESAWADI, please have a look at our website at: http://www.esawadi.eu.

FUNDING PARTNER

Projekt Management Agency Karlsruhe

(PTKA)

Projekt Management Agency Karlsruhe (PTKA)

Since October 01, 2009, Forschungszentrum Karlsruhe has merged with the Universität Karlsruhe into the Karlsruhe Institute of Technology (KIT). The KIT is logistically divided in two campuses, campus north and campus south. Although the Project Management Agency Karlsruhe (PTKA) is located at campus north and also keeps an infrastructural connection to the KIT (e.g. IT- and some administrative services) PTKA is an institutionally independent unit, will consist of two main sections (i) Water, Environment and Nuclear Safety Research (WTE) and (ii) Production and Manufacturing Technologies (PFT).

Irrigation of maize (JürgenGrocholl)

On behalf of the Federal Ministry for Education and Research (BMBF) the water section of PTKA coordinates and manages research and development projects. PTKA assists the Ministry in the strategic planning of research programmes and calls for proposals as well as the evaluation and selection of projects. The allocation of subsidies, the administrative support for running projects and dissemination of results as well are additional tasks taken over by PTKA.

Among others PTKA is responsible for managing of research projects funded in the national Framework Programme "Research for Sustainable Development" of the German Federal Ministry of Education and Research (BMBF).

NaWaM
Nachhaltiges Wassermanagement

Within that national funding programmes there are specific activities, so called "Förderschwerpunkte" which are related to a diversity of different thematic topics. In the frame of a new priority theme "Sustainable Water Management" (German NaWaM) there are five thematic topics, which build the frame for the upcoming calls. Those are

- Water and Energy
- Water and Environment
- Water and Health
- Water and Nutrition
- Water and Urban Areas

Potato bloom (KlausBurke, WKA)

Further IWRM-related funding activities supported by PTKA are:

1. River Basin Management
2. Flood protection
3. Water technologies
4. IWRM (special attention to developing countries)

In the recent past section PTKA-WTE manages about 450 research and development projects with a budget of about €50 Million per year; 59 of these are directly related to the IWRM framework.

In the on-going 2nd IWRM.Net funding initiative there are 6 projects out of which 4 are with German participation: Climaware, ESAWADI, IMPACT, Water2Adapt. All of them started successfully in 2010 and some first results were gained. As an example and representative pictures for the Water2Adapt project two pictures of the German case study are provided here. The study site was changed to the administrative district "Soltau-Fallingbostel" because this region is more affected by droughts than the former one and thereby represents the criteria of investigation in more closely.

PROJECT

Water Cap and Trade

In a context of climate change, structural water deficits and climate extreme events are expected to become more frequent, putting at stake the mechanisms currently used for sharing water between economic sectors and among users. The IWRM project *Water Cap & Trade* will investigate whether and how water markets (WM) – or systems of tradable water quotas – could become a feasible policy option for water allocation under increasing scarcity conditions.

The underlying assumption is that the use of a "cap and trade" approach could simultaneously guarantee environmental protection, as required by the Water Framework Directive, and enhance flexibility in allocation to maximize water use utility and possibly reducing conflicts. Our research team recognizes that a lot of economic modeling has already been carried out to assess potential economic gains of implementing WM in various countries. Models were in particular used to predict water sales and purchase curves, the intensity of trade, price levels and the total welfare gains. However, in cases where markets have actually been established afterwards (Spain, California), trade intensity has been much lower than predicted by economic models.

There is evidence that economic agents are reluctant to engage in water trading for a number of reasons which need to be investigated. One of the key decisions taken during the kick-off meeting held in January 2011 in Montpellier was to focus our research effort on the design of WM scenarios that can be considered as credible policy options by stakeholders. Indeed, the consortium members postulated that the discussion of simplistic WM scenarios, slightly adapted from Anglo-Saxon experiences, would inevitably lead to rejection by stakeholders. This implies working out sophisticated description of WM scenarios which should incorporate elements from local economic, institutional, cultural and technical contexts. The team also recognizes the need to be creative while designing such scenarios, making the best possible use of the great diversity of water market experiences conducted in different states of Australia and Northern America (Canada, USA), in Chile, Spain as well as in developing countries (Pakistan, India).

Significant efforts have thus been made to document existing WMs around the world. The case of Spain, where such markets function relatively well since 2005, has been extensively documented (report available on request). We actually expect that French and Italian stakeholders will be more sensitive to experiences conducted in a nearby European Country than to Australian experiences. This material will soon be used to developed scenarios to be debated with stakeholders in regional arenas and with experts at the national level. Preliminary scenarios have already been defined for improving existing water markets in the Tajo-Segura basins and Guadalquivir-South basins in Spain.

In parallel with this first activity, different methodological approaches are currently being developed by the project team to test and fine tune WM scenarios with stakeholders. A limited number of workshops were organized with a few farmers in one of the French case study. A game simulating the functioning of water market has been designed and tested with students, before being deployed in a real case study (end of 2011). A semi-structured questionnaire has also been developed for conducting interviews (planned end of 2011).

In Spain, a National Advisory Group, comprising high-level stakeholders and experts has been formed and had a first meeting, which was followed by a seminar on water markets with experts from different fields and stakeholders. Similar events should soon take place in France (October 2011) and Italy. In Italy, preliminary interviews have been conducted with irrigation boards and the subject was discussed with experts at a conference in Florence.

The development and use of economic models for simulating possible development of water markets scenarios will only be take place at the end of the project, once the scenarios have been stabilized with stakeholders.

More information at
www.capandtrade.acteon-environment.eu

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The Water Cap & Trade project is carried out by a team of agricultural, environmental and resource economists from the French Geological Survey – Brgm (Fr), ACTEON (consultancy comp., Fr), Cemagref (agriculture & environment research center Fr), the Technical c University of Madrid (Sp) , the University of Cordoba (Sp) and the University of Bologna (It).

PROJECT

Water2Adapt

Resilience enhancement and water demand management for climate change adaptation

Water2Adapt project seeks to analyse the economic and social effects of droughts, and explore the drought risk management policies and measures that increase the preparedness and resilience to future drought events. The latter are expected to increase in frequency and intensity in changing climate throughout Europe. The project analyses in depth selected drought events with respect to the direct and higher order economic effects, social hardship in both urban and rural contexts, while taking into account the institutional framework of the drought risk governance in Spain, Germany, Portugal and Italy. In doing so, the project is filling in the gap of knowledge that precludes adoption of well informed and context specific climate adaptation and risk mitigation policies.

Droughts are temporarily breaks of water replenishments through precipitation and inflow. They are low-frequency (low tail/bound of probability distribution function) but ordinary events, results of climate variability. Deficient precipitation reduces water stocks and flows and affects water accessibility; and causes interruptions in replenishment with subsequent changes of physical environment (soil moisture, water and air attributes) and physiological conditions of plants and animals. Individually or in combination, these three effects set off successive processes such as intrusion of saline water in coastal aquifer or increased risk of wild fire as a result of accumulated combustibles. The effects of deficient precipitation are often amplified by atmospheric conditions (temperature, wind) that favour evaporation and further increase water demand. Direct effects pertain to water-use sectors hit by a drought such as agriculture, hydro- and cooling-water dependent energy production, water navigation, water-intensive manufacturing and households. At the same time water is an important input to production, a crucial lifeline for utility services and a means of transport for good and passengers. During drought events, the sectors hit directly are likely to curtail their activities and production, collect less revenues, lay-off staff, and postpone all but critical investments. These direct losses set off a sequence of 'up'- and 'downstream' reactions which affect their suppliers and customers.

The W2A consortium explores the social costs of drought, the benefits of drought risk mitigation policies and the influence of both of community resilience.

The Water 2 Adapt project http://www.feem-project.net/water2adapt/index.html

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Bob Harris

Forty years of working at the interface between research and environmental policy and decision-making has taught me that there are no magic solutions for the easy transition of new insights from research to where it could be used. The transfer process is just that, a process… a lengthy one. Scientists produce, and love, data and information, but policy-makers need understanding and wisdom. So *data* must be translated, but this doesn't happen in one simple action. First it needs to be turned into *information*, and then information into *knowledge*. Knowledge leads to *understanding* and, if we add in experience, ultimately to *wisdom*. With wisdom comes vision and design. With wisdom, we can create the future rather than just grasp the present and past. But achieving it isn't easy; we have to move successively through the other categories.

This transition process, following the wisdom hierarchy ascribed to Ackoff, is often ignored in the modern world where the managers and funders of science often want quick and easy results – 'what's your science programme doing/ever done for our business', is a difficult question when the answer is obscured by a journey, which may have been 5 or 10 years or more. The beginning point is often forgotten. We must recognise the steps in the transition if we want to try and speed the process up. For example displaying data as information – attractive charts or maps; using conceptual models, often as tools to engage others who possess different knowledge.

Having the users of research involved as partners from conception to finish is essential for the quicker uptake of new knowledge. There is an old Chinese proverb, which still holds true today: *"Tell me and I'll forget; show me and I may remember… but involve me and I'll understand."* Showing and involving are therefore better ways of transferring and exchanging knowledge than more traditional ways like conferences or publishing papers.

The UK government research programme Demonstration Test Catchments is an example where both the local stakeholder community and policy-makers are completely involved in understanding the link between farming practices and water quality to ensure that developing policy is underpinned by strong evidence and stakeholder support – *for more follow the links at:* www.lwec.org.uk/activities/demonstration-test-catchments

My personal musings on science policy interface..

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If you have any comments please send them to r.harris@sheffield.ac.uk