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TWINBAS

Twinning European and third countries' river basins for development of integrated water resources management methods

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Final Report Work Package 3: Public Participation

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IVL

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IWR

GOBIERNO DE CHILE
CONAMA
REGION DEL BIO BIO

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1 Summary

To ensure the effective implementation and achievement of the objectives of water management, EU member states have to encourage active involvement and ensure consultation and access to background information.

The objectives of this work package have been:

- To develop a consistent and efficient structure for stakeholder involvement, consultation and public access to information, taking into account the prevailing cultural, socio-economic, democratic and administrative traditions, and addressing poverty and gender issues.
- To develop process guidelines for identification of users and stakeholder water requirements that are transferable to other river basins in the regions of the case studies.
- To evaluate the applied methods during the process and in final evaluation report.

Work within WP3 included development of a structure for stakeholder involvement, consultation and public access to information. Furthermore, work included development of process guidelines for identification of users and stakeholder water requirements that are transferable to other river basins in the regions of the case studies. Finally, applied methods were evaluated.

In general, the experience from the public participation process is very positive and TWINBAS has by intimate collaboration with the major public stakeholders in each basin and each partner country significantly contributed to the transfer of research results and methods to major stakeholder institutions in the countries of the twinned river basins.

1.1 Biobío

In Biobío important changes have taken place since 2003 when the communication plan was written. These changes refer to the environmental conditions as well as to politics and institutional and social arrangements.

During the last two years, CONAMA has conducted workshops for stakeholders in three separate areas of interest:

The formulation and implementation of the "Secondary Water Quality Standard for the Biobío River" (2WQS), that involved stakeholders at two levels in two consecutive processes: the first during the formulation of the Standard with participation of the most important water users – that is, the forest industry, pulp mills, agriculture represented by irrigation committees, chemical industry, oil refinery, the drinking water producer ESSBIO, and others.

The second workshop was carried out during the formal process of Public Participation consisting of a 60 days period where all interested stakeholders were entitled to formulate observations to the proposal. These observations were taken into account before the final consolidation of the standard. One full day workshop including presentation and discussion was held in that timeframe. It is worth mentioning, that this is a common practice, structured by law applying to every process of standard formulation in Chile and therefore well-known to the population. Besides the workshop, the public was informed in newspapers and on the internet.

The results from the workshops include a socially accepted and known Quality Standard for the waters in the Biobío Basin, a key stakeholder map containing specific interests, and a non formal approach scheme between stakeholders.

The integrated river basin management perspective, specifically related to the TWINBAS project: on this topic a series of workshops and seminars were conducted basically with the aim to inform different stakeholders about the ongoing research and its current results and to enhance awareness of possible consequences of climate change and water scarcity within the river basin. The workshops resulted in better common understanding of the concept of River Basin, enhanced awareness of the importance of Integrated River Basin Management and better knowledge of the current environmental, social and economic situation of the Biobío River Basin and its strategic importance for the nation's energy production.

Special importance was put on the **educational sector**, both at basic, junior and university levels. Under the proposal of Education for Sustainability, Teacher Training Courses were held for 100 teachers, as well as a School competition to create a logo and a slogan for the Biobío River. The results include putting into practice, cross curricular units of "Water and Sustainable Development" and in this way the construction of an available database of best practices regarding water education. Design of a logo and slogan for the river.

Lessons learned from the stakeholder involvement in Biobío:

The different stakeholder interests are strong and in general a comprehensive knowledge of the river basin concept is weak.

It is much more viable to approach integrated water management through an initial concrete proposal regarding water use or quality, than to start setting up an administrative framework, different to the existing power structure.

Pilot experiences of integrated river basin management are more likely to succeed in smaller basins with less strategic importance.

In the case of Chile the sustained, ongoing effort conducted by various governmental and academic institutions has resulted in a Policy for Integrated River Basin Management, that must prove its efficiency during the coming years, and therefore needs the support from the international water community to succeed.

1.2 Nura

From early on in the work concerning public participation it became apparent that although the national Kazakhstan Water Code specifies that there has to be stakeholder participation it has not yet been adopted. Management is controlled by the National Water Committee and the major stakeholders had no concept of each others plans. For example, the Kurgaldzhino park authorities had no idea that substantial amounts of water were to be extracted for the new Capital city of Astana while non of the stakeholders other than the park authority knew that on signing the RAMSAR convention to allow the site to become a RAMSAR site, has an undertaking that the State will ensure its sustainability (Under the USSR it was a RAMSAR site but with the foundation of Kazakhstan re-registration was needed).

The project carried out discussions with most of the major stakeholders to establish each others perception of water management and their plans for future abstraction. The information formed the basis for structuring a workshop in Astana. Although the original concept was to explore what form of stakeholder participation might be appropriate the main outcome of the workshop turned out to be mainly educational, with participants learning for the first time what each others plans and aspirations for the use of the River's water resources are. Not surprisingly this created considerable heated debate. At the end of the stakeholders meeting many of the participants agreed that a more effective mechanism was needed to engage them in the planning process, not least to enable them to temper their ambitions with the available water resources.

Three of the stakeholders came to the international workshop in Stockholm. The main value of this workshop was that a) many of the problems they face also occur in other countries, and b) there are different ways of doing things in different countries all of which are aimed at the same outcome.

We produced a paper on the new legal Water Code in Kazakhstan, which is compliant with the EU water Directive, on what legal and institutional reform would be needed to bring about the full implementation of the water code to ensure sustainable water resource management in Kazakhstan. The paper also looks at models used by other countries to ensure compliance with the code and to ensure public participation.

The second workshop in Kazakhstan aimed at developing a mechanism for improving public participation, either along a new approach or one similar to those adopted in other countries, however, at the end of the conference it was clear that there are many real obstacles that need to be overcome before effective stakeholder participation can take place.

One of the key issues that was widely recognised was the need for structural re-organisation within the public water sector. A memorandum was written for Government outlining an organisation structure that could better meet the Governments Goals and objectives than the present structure.

1.3 Okavango

There is at present a particular lack of dependable information tools and communication mechanisms for the management planning process in the delta. Considerable work is required to develop and implement these. While hydrology is recognised as being fundamental to the behaviour of the delta, it is also necessary to develop a sound understanding of ecological, social and economic conditions, and linkages among these.

In many respects, stakeholders in Angola hold the key to the sustainability of the Okavango Delta, in terms of managing the waters flowing in to the delta. A special effort was made by TWINBAS to identify the stakeholders in the upstream basin, and assess their views and possible future actions.

Participation in the planning process commenced an early stage, with traditional council (kgotla) meetings held in 33 settlements. Lessons learned was the provision of government services to the communities of the delta is inadequate due to lack of communication, no action taken on previous raised issues, lack of feed-back from government departments, and consequently little or no influence on decisions from the local communities.

Local land users have profound knowledge based on lifelong experience, and as such are better informed than the technical experts, but they do need more information and technical knowledge, through educational workshops, to contribute meaningfully. There is a need for a central data and research institution, focussing on well targeted research, with data and results readily accessible to all stakeholders.

Given the fundamental importance of water to the environment of the Okavango Delta, two stakeholders' consultation workshops related to water resources were held in February 2005 and June 2006 accompanied by bilateral meetings with each stakeholder, to broaden the scope for an effective information exchange. In summary, the response of the stakeholders to the information provided on water resources issues was positive on the whole meeting their needs.

1.4 Norrström

The approach outlined in the communication plan for Norrström was to identify and get acceptance for a programme of measures using an iterative communication process based on

meetings with a working group of farmers and point source stakeholders, with large meetings at crucial points, and for IVL to provide scientifically-based analyses of the effects of the measures discussed at these meetings. This approach was developed in collaboration with major stakeholders and would be an operational test of the official Water Authority process, with IVL participating. It should be noted that agricultural leaching was in focus, since domestic treatment plants and other point sources have advanced treatment facilities and contributes less to nutrient pollution than the agricultural sector. The downstream parts of rivers Sagån and Svartån were selected cases.

However, it proved difficult to engage the farmers, individual property owners as well as the local representatives of the Federation of Swedish farmers. The reason for this was found to be; 1) The notion among farmers that they have already implemented measures to reduce leaching of nutrients but are still seen as environmental 'villains', and 2) the fact that the Federation of Swedish Farmers (LRF) did not entirely support discussions on mitigative actions at this stage, since modelling of nutrient leaching did not take into account information from each farm, and thus could give misleading results for individual farmers or groups of farmers.

After a series of meetings between IVL and the main stakeholders the approach was revised. Based on this approach IVL collected detailed information on management practices and soil characteristics from each farmer in a selected area, the catchment of Lillån, a tributary to Sagån with a size of appr. 200 km^2. Information was collected through visits and personal interviews. The modelling was re-iterated with this data and the results evaluated in comparison with modelling results that used commonly available soil data and statistics on fertiliser use and management practices. With this more detailed basis, effects and cost-effectiveness of measures were then analysed.

The main conclusion of the results were that the farmers and LRF were right; local detailed data is required in order to provide accurate modelling results and possibilities to analyse effects of relevant measures (also excluding measures that have already been implemented). These findings are highly relevant to the continued work with farmer involvement in the efforts to reduce eutrophication of Swedish lakes as well as the Baltic Sea.

To support future stakeholder involvement, IVL developed a webtool for dissemination of information on the status of water bodies, to provide a discussion forum, information on the WFD and links to stakeholders. This work was mainly done in TWINBAS, and finalised in TWINLATIN.

1.5 Thames

Some of the techniques from the Environment Agency's stakeholder participation toolkit were used in the NERC LOCAR (Lowland CAtchment Research) programme[1,2], studying water resource issues in the English chalk lowlands and involving the Pang and Lambourn catchments of the Thames River Basin. In these catchments, groundwater is an important source of water, and Winter rainfall is important to top up aquifers and maintain low flows in streams in Summer. However, in recent years, several streams have dried up in Summer, and fish and plants have been adversely affected. It is believed that changes in land use and agricultural practices have altered the patterns of movement of sediments and chemicals. LOCAR investigated the interactions between surface and groundwater, and the interactions of animal and plant life with stream chemical and sediments.

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[1] Douglas, I. (Ed). 2006a. Integrated Catchment Research – Science for lowland river management: Achievements and Applications. NERC, Swindon, UK.

[2] NERC. 2006b. Go with the flow – Science to help manage our lowland rivers, now and in the future: Highlights from the Lowland Catchment Research programme (LOCAR). NERC, Swindon, UK.

Public participation activities in the Pang and Lambourn catchments of the Thames basin during the LOCAR programme were limited by the resources available, but included:

- Project Team comprising representatives from the project funders, researchers, the catchment service team and the Agency
- Stakeholder Forum in the form of an internal project team within the Agency who are the primary stakeholder
- Meetings in person with landowner to negotiate access their land to install monitoring equipment and visit sites to download data
- Presentations by the Project Steering Group to interested stakeholder groups
- Website providing a source of information, though largely for researchers
- Brochures describing the project aimed at the interested general public

LOCAR was driven by scientific curiosity, the requirements of the WFD, and a commitment to deliver science that will contribute to national needs. Perspectives of the success of LOCAR varied between different stakeholder groups. Water researchers saw it as a model project in which scientists from different disciplines worked together to provide water managers with the knowledge they need. Indeed, the water regulators (e.g. the Environment Agency) found the results to show that the processes controlling water and pollutant movement were far more dynamic than previously thought, providing invaluable scientific underpinning to help develop required regulatory frameworks, whilst the water industry (e.g. Thames Water) found the results to provide sound science on which to base investment decisions in identifying and developing new environmentally sustainable yet cost effective water sources for drought-prone southern England. Other water users (e.g. farmers) could see how an action on part of the catchment could create impacts elsewhere, and that sustainable management of the land and water go together. Local communities felt that the project had given them a new understanding of the significance of their river. The Project Team felt that earlier stakeholder involvement may have improved the relevance and integration of some of the science.

The LOCAR outcomes directly address key needs of the Environment Agency's Integrated Catchment Science Strategy but, though relevant to policy, must be translated effectively to be useful in practice, particularly at different scales. However, much of the knowledge gained through LOCAR is generic and widely applicable to large areas of England and other countries.

2 Introduction

The EU Water Framework Directive (WFD) is legislation establishing a legal framework for concerted action in the field of water policy. The overall aim is to protect surface waters and groundwaters using a common management approach and following common objectives, principles and basic measures. The core environmental objectives are to prevent deterioration of aquatic ecosystems and to restore polluted surface waters and groundwaters to good status in terms of ecological and chemical parameters by 2015. Other objectives are to promote the sustainable use of water, to reduce pollution of water, to lessen the effects of floods and droughts, and to introduce a coordinated approach to water management based on the concept of river basin planning (RBP).

To ensure the effective implementation and achievement of the objectives of water management, EU member states have to *encourage* active involvement and *ensure* consultation and access to background information. The process of public participation is specified in Article 14 of the WFD:

- Active involvement in all aspects of the implementation of the WFD by stakeholders;

- Consultation in three steps of the planning process by the general public;
- Access to background information by the general public.

Access to background information and consultation are the lowest levels of public participation and are a core requirement of public participation. The government makes documents available for written comments, organises public hearings or actively seeks the comments and opinions of the public through, for example, surveys and interviews.

Active involvement is a higher level of public participation, considered as best practice. Stakeholders are invited to contribute actively to the planning process by discussing relevant issues and their possible solutions. There are three main levels of active involvement:

i. Involvement in development and implementation of plans;
ii. Shared decision-making, for example, by including major water use sectors in river basin organisations;
iii. Self-determination, where part of the management is handed over to interested parties, such as water users associations.

3 Objectives

The objectives of WP3 are:

- To develop a consistent and efficient structure for stakeholder involvement, consultation and public access to information, taking into account the prevailing cultural, socio-economic, democratic and administrative traditions, and addressing poverty and gender issues.
- To develop process guidelines for identification of users and stakeholder water requirements that are transferable to other river basins in the regions of the case studies.
- To evaluate the applied methods during the process and in final evaluation report.

The work has resulted in the following deliverables:

- Communication plans for the five river basins (delivered earlier)
- Work package report, including an evaluation report (this report)
- Two twinning workshops for stakeholders (see description under respective basin)

4 Description of Activities in the Basins

4.1 Biobío

4.1.1 Introduction

The Biobío is par excellence a historical river, its presence has motivated important milestones in Chilean history, and its surroundings have formed a territory that, modeled by man, has given birth to a culture of collision - encounter and reciprocal assimilations among the indigenous population and the European. The river is the natural structural element of the regional landscape, and without doubt, the most important factor of regional identity. It has conditioned life of the inhabitants of the region, influencing in multiple aspects that go from those related with the security of the urban settlements and economic growth, till those that have to do with cultural and artistic expressions.

Its name is the name of the Region and according to columnists from the XII and XVIII centuries, the words "Bío-Bío" would be an alteration of "Yyi-vyi", onomatopoeia related to the noise that “the meek waves make when they are curled". The natives call this river Butalebu that translated to Spanish means big river. And indeed it is, running from the high Andean Mountain Range 314 km to the Pacific Ocean, passing small and bigger cities on its way carrying the impressive amount of 2000 m3/ s of water in the rainy winter months, and stretching its sandy bed 2 km wide in the dry summer.

But at the same time it is an element of division. For 400 years it constituted the limit between the Spanish conquerors and the Mapuche nation, fortifications and cities were build and torn down in a century long struggle and only after the war between Chile and Peru in 1879 the territories south of the Biobío river were “pacified” by the Chilean Government army, still mobilized after the war.

Its waters once navigable from Talcahuano to San Rosendo were and are considered treacherous, and can only be crossed by bridges at seven points along its course; of these; four are located near the outlet into the Pacific Ocean, in the big Metropolitan conglomeration of Concepción, San Pedro de la Paz and Talcahuano. The Biobío Basin contains two Regions, four Counties and, 31 Municipalities, of which 22 belong to the Biobío Region and 9 to the Araucanía Region.

The river itself constitutes boundary between all, which means that human settlements have developed *by* the river but *not across* the river, or sailing *in* the river and therefore in a certain sense with their back to the river. And thus, on the riverside in flood prone lands, poor settlements have been raised, garbage has been dumped or contaminating industries have been installed. Only in recent years , after 1991, an increasing awareness of the environmental importance of the water resource, and other natural resources have arisen, and been taken into account by different public and private planning initiatives. And it is clear that communities relate and recognize the river itself, or its tributaries separately, and not the basin as a whole system. Clearly the basin concept requires certain level of abstraction and is usually considered a theoretical construction.

For the purpose of citizen involvement in the implementation of integrated river basin management, this sort of complex relation between people and the Biobío River may be important.

The following describes the activities of public participation undertaken in the framework of TWINBAS and outlines a possible course of action for the future Management Plan.

4.1.2 Objectives of the Participation Process

Overall

To ensure a stakeholder involvement process that aims at effective stakeholder involvement and public access to information about the Twinbas project, the environmental situation of the Biobío River Basin, and set grounds for commitment to the future Management Plan and its implementation.

Specific

1. To incorporate the concept of river basin into the vocabulary and common understanding of a broader public, including teachers and students at basic and secondary level.
2. To execute activities that enhances the awareness of the river basin users regarding the sustainable use of the water resources.
3. To elaborate a proposal for an Action Plan in collaboration with key stakeholders, and to propose it’s implementation in short, medium and long term.

Public Participation Models

Article 14 of the Water Framework Directive (WFD) prescribes three different forms of public participation:

1. Public access to background information
2. Citizen and stakeholder Consultation in three steps of the planning process
3. Active Involvement of stakeholders in all aspects of the planning and implementation of the Integrated River Basin Management

The process in the Biobío basin has fully incorporated models number 1 and 2, initiated 3 and extended the process to education and training at basic and high school levels.

4.1.3 General Description of the Activities

Communication Plan

In the second stage of the project, CONAMA, developed a Communication and Diffusion Plan of the Twinbas project, that counted on precise tools to suitably spread the projects aim and results.

The purpose of this awareness program was to obtain a profound understanding of the possible threats and present conditions of the river basin, as well as future projections respecting climatic change, according to the analyzed behaviour of the diverse productive activities that are developed in the river basin.

The emphasis in the message was concentrated on:

- spreading the available information of the river basin from an economic - social perspective (historical approach, main users, quality of the water of the river in different sections, future investments); its importance for local biodiversity, regional and international (species flora and fauna, ecological roll, importance of a sustainable use, successful international experiences), and its context in the Twinbas Program.
- the importance to preserve the water and soil resources inalterable within the river system, with the purpose to maintain the balance and the permanent provision of the environmental services.
- the benefit of integrated and sustainable use of the resources, as well as, the consequences of bad and inefficient planning.
- the significance of good management at Political and Institutional level.

Tools

This Plan included both direct face to face communication with the users of the river basin and public diffusion of the project by means of written media.

The following tools were implemented:

a. **Meetings**

   Stakeholders, Advisory Counsel CONAMA

b. Workshops

   At county level; cross sector based

c. Seminars

   Start and finish stakeholder and public

d. Surveys

Teachers and participants in seminars

e. **Training courses**

Teachers

f. **Contests**

School students

g. **News bulletin, Publication, web site, mass media**

General public

Meetings

The Twinbas project was presented to the **Advisory Counsel of CONAMA Biobío** integrated by two representatives from the private sector (Forest and Pulp Mills, The Commerce and Construction Chamber) two representatives from the academic sector, two representatives from the NGO´s, two representatives from the worker Unions and one member representing the Regional Government. This counsel took into consideration the proposal of Integrated Management of the Biobío River Basin, discussed and identified the main uses in the basin. Furthermore each member acts as a permanent link between the Environmental Authority and their respective interest group as the Counsel meet on a regular weekly basis.

The relationship and involvement of **Key Stakeholders** in the Biobío River Basin concerning implementation of environmental measures and management is of a more ample and permanent nature than that integrated in the Twinbas Project. As a fact the nine largest water users and dischargers have performed a co-operative privately financed Monitoring Project of the surface water quality in the whole basin during 13 years. These are: the Hydro Power company (Endesa Chile), three paper and pulp mills (CMPC Celulosa, INFORSA, Norske Skog), one large agro industry (Agroiansa), the regional water company (ESSBIO), the footwear producer (Gacell), the oil refinery (ENAP BioBio) and the big steel company (Huachipato) the monitoring program is executed by EULA and its results constitute the main parameters available on the quality topic, also used in the Twinbas Project. This group meet regularly and discuss the results of the program, make adjustments where considered adequate and release publications of the findings, such contributing to the transparency of the state of the environment.

Due to the technical competence acquired and results obtained, the above mentioned and other stakeholders such as competent Governmental Agencies (the Regional Water Direction, Ministry of Agriculture, formed the Operative Committee coordinated by CONAMA Biobío, with the task to analyse, agree on and propose the Quality Standard for the Protection of Superficial Continental Waters for the Biobío River Basin, from now on referred to as the Quality Standard, whose aim is to establish the total quality of surface waters, able to protect, maintain and recover the water quality, safeguard the potential water use, protect and preserve the aquatic communities, the wild life and the ecosystems, maximizing the social, economic and environmental benefits of waters.

This process was initiated in 2004 and has been running simultaneously with the TWINBAS initiative until April 2006, when the formal Public Participation process was concluded and the project entered its last phase of approval by the Directory of CONAMA at national level. It is expected that this standard will come into operation by the end of 2007.

The above mentioned is an example of a participatory process of the type active stakeholder involvement associated with the characterisation process and the planning and establishment of programmes of measures. In this case the discussions were not without conflict and specially the issue of biological indicators caused disagreements. breaking up the expected alliances, where for instance the private water company favoured a biological indicator and the public Water directory didn’t. Anyway there is a common positive attitude towards the compliance with the new regulatory quality standard.

Workshops

During the Twinbas project cycle (November 2005) two workshops were conducted in the counties of Biobío and Concepción.

The purpose of these was to:

- Present the Twinbas project.
- Present the current situation for the water resource and the potential risks due to climate change, biodiversity loss, future economic development
- Obtain preliminary concern issues and protection priorities from organised multisectorial groups. That is, farmers, small and medium businesses, teachers, public servants, health workers, university students, irrigation committees, rural water committees NGO´s among others.

In order to achieve this, about 70 representatives from different sectors were invited, and after the "expert presentation" the audience worked in smaller groups on the identification of priority lines of work. Brainstorm and creative solutions methods were used. The outcome of this consultation process was a widespread consensus that, while the current quality in the basin doesn't seem too bad, and the studies actually find it of "Good Quality" in most of its reaches, it is important to improve the management scheme, the cross sectorial cooperation and the access to information and education.

All the inputs were systematized and ranked according to a timeframe where the most urgent are listed first.

The results of this systematization are shown below:

1: To set up a multisectorial "River Basin Committee ", with representation of all the productive, governmental, private and community sectors.
2: To promote environmental education and citizen participation, as a means to enhance general knowledge and awareness of water issues.
3: To create mechanisms of cooperation between the public and private sectors to foment the transference of technology, information and strategies of water management .
4: To carry out an inventory of laws and regulations that directly or indirectly affect the water resource, in order to identify convergences, divergences and contradictions, between them and to harmonize, rank and prioritize the effective laws
5: To develop in a sustainable way the economic, tourist and recreational potentialities that the Biobío river basin offers.
6: To urge the Government to create technical, financial, administrative and political coordination bodies for the execution and pursuit of the actions proposed by the River Basin Committee.

Seminars

Two public seminars were held at the start and finish of the project cycle.

A broad array of stakeholders and citizen groups were invited, counting a total of 75 participants.

The first seminar aimed at establishing very early on a network for the exchange of information and experience between water professionals throughout the Biobío River Basin and other national and international Basins.

The second one held in April 2007 presented the conclusions of the project and the proposal of further development of the Management Plan.

Surveys

Two surveys were conducted to evaluate the participants "water literacy" and to screen the general impression of the changes occurred in the river basin in the last decade regarding to alterations in biodiversity and the impact of this in their daily lives.

Training courses

Teacher training courses were held for 100 basic and secondary teachers during a four month period in 2006.

The course was an integrated part of the effort to implement Education for Sustainable Education in the Biobío Region, complying with the UN Decade of ESD. Since 2003 an ambitious program has been conducted by CONAMA in coordination with the Ministry of Education, Ministry of Health, the National Forest Corporation, and the National Fishing Services. It promotes an Environmental Award for schools that incorporate environmental management, cross curricular treatment of environmental issues, and local resource studies into their daily practice. The course topic was "Water and Sustainable Development" and in addition to delivery of extensive information and material, about the river basin, the global water situation, etc. an innovative pedagogical approach was implemented. The teachers were to plan and put into practice a cross curricular unit of water education, that included the study of a nearby water course or body and a concrete action to benefit that water body. The ten best, won a journey along the "water route" from the Laja Lake in the National Park of the same name, to the nearest drinking water facility, where they had a guided tour. The Regional Water Company played a crucial role in the delivery of information, the visits and transportation of the school children.

At the end of November a big exhibition, counting more than 500 students showing their ideas of sustainability to the public, culminated their efforts. An environmental – arts festival were held and the awards delivered.

An important result is the existence of a database with examples of best practices on Water Education in the Biobío River Basin.

The Award Programme called "National System of Environmental Certification of Schools" is ongoing and fast growing. At present 105 schools are participating in the region and in 2007, fifty new schools are expected to join. It is planned to group schools according to their pertinence to different sub basins and promote their active participation in special designed "monitoring" activities, and restoration campaigns in neighbouring water bodies. Furthermore resource efficiency in school administration, is an integrated part of the award scheme. In 2007 an advanced Quality Standard, including indicators and evidence is being implemented in the participating schools in the Biobío Region, as a pilot experience for the whole country. This is expected to constitute a big change in current pedagogical practices, and put students at an advanced level regarding comprehension of environmental sustainability methods and practises. Not to forget the effort to change unsustainable consumption habits. Yet to fully implement these intentions, and the positive impulse, more financial and technical/ pedagogical resources are needed.

Contests

A special contest for School students was launched in the Twinbas framework consisting in the creation of a logo and a slogan for the Biobío River Basin. It was called "The Biobío in our lives", and also had a component of storytelling. The winning logo is now the official mark for the River Basin and its organizations. To assist the children in their work, ten short workshops were conducted in different parts of the Basin related to the river, its history, importance and biodiversity. The result was 185 proposals of logos and short stories.

This is the winning logo and slogan, proposed by a young boy:

On the first of June 2007 the second contest was launched, this time a photo contest of "Life by the River", also supported by workshops in digital photo and nature.

News bulletin, Publications, web site, mass media

A series of written material have been released regarding the Twinbas project.

A news bulletin was elaborated that summarized the activities that EULA Center of the University of Conception has generated and the objectives and benefits to consider the planning of the economic activities for the integrated management of the natural resources in the river basin. Basically the bulletins are informative and aimed at an informed audience.

The website has not been maintained, and a more frequent communication network is needed to obtain real and timely information, interaction and coordination.

The press and mass media has informed about the project in relation to special events, such as seminars, and the launching of contests, where a press conference has been called. Never the less, it is not clear that the broad general public is aware of the whole River Basin issue. Some media events though may have changed that a little, as there is a marked concern about the prognosticated heavy and concentrated rainfalls, that inevitably causes flooding in extensive populated areas of the cities, and also in rural areas. Also the currents debate about climate change has influenced in the general interest of water issues and resources management problems.

Final Publication Elaboration:

The Final Publication includes a summary of each one of the work packages of the Twinbas Program, its objectives, the obtained results and their benefits for the Region.

It will be edited and distributed to the participants of the programmed activities and the regional authorities, universities, professional institutes, social organizations, river basin organizations, and environmentalist groups.

4.1.4 Results

In the preceding chapter some concrete results of the stakeholder involvement and the participatory process have been mentioned. Although a list of the results of this process and the Twinbas Project in general will provide a more concise picture of the current state of the art of the Integrated River Basin issue.

- Maybe the most significant long term result is the Chilean Government decision to implement a **National River Basin Strategy** that should change sectorial resources

management for an integrated management based on river Basins as a territorial unit. Three Basins have been selected as pilot experiences, among them the Itata River Basin in the Biobío Region.

- Besides the obvious **social benefit** of an active promotion of stakeholder involvement at all levels of the basin, this development also have created a better knowledge of the different conflicting interest, again leading to attempts of seeking rapprochement.
- A **stakeholder map** has been developed and made available for water professionals and key stakeholders
- The **concept and methods** of Integrated River Basin Management has been generally understood and accepted.
- **Water Education** has been integrated in a number of schools and best practices have been conducted.
- A ranked list of **prioritized lines of work** has been developed by all interest and user groups.
- An initial **Steering Committee** has been constituted with the participation of the Governmental Sector, that is: CONAMA, the Water Direction, The Regional branches of the Ministries of Agriculture and Planning and the Center EULA. Its main task is to outline and constitute the multi sectorial River Basins Committee.
- The measure program regarding the **Emission Standard** for wastewater discharge into the River Basin is fully operating.
- The **Quality Standard** is developed with stakeholder participation, and soon to be implemented
- **Important improvements of the water quality.**

One of the most important concrete achievements for the water quality is the impressive speed of the improvement of wastewater discharge in the whole basin:

By May 2007, 100% of the household wastewater is treated in modern treatment plants of European standard, applying primary and secondary treatment and thus preventing tons of polluting matter to enter the waters, as shown in the table below. This achievement has been accomplished in seven years and has required an investment of $ 185 Million US Dollars.

WWTP THAT DISCHARGES INTO THE BIOBIO RIVER BASIN

Nombre Planta	Flow l/s (2006)	Population (Hab)	DBO_5 (kg/day)	SST (kg/day)	NKT (kg/day)	PT (kg/day)	Treatment Type
Concepción	1.130	388.913	25.662	23.096	17.450	3.670	Activated sludge with disinfection
Santa Juana	12,66	7.863	235	199	77	5	Activated sludge with disinfection
San Rosendo – Laja	42,6	21.997	673	673	154	S/I	Activated sludge with disinfection
Hualqui	17,5	12.853	476	414	111	23	Activated sludge with disinfection
Quilaco (1)	2,48	1.732	42	32	8		Activated sludge with disinfection
Nacimiento	53,1	22.341	1.005	1.005	251	50	Activated sludge with disinfection
Quilleco	2,78	1.942	37	37	11	0	Activated sludge with disinfection
Yumbel	24,9	12.514	534	427	117	21	Activated sludge with disinfection
Mulchén	50,7	21.881	1.162	930	232	49	Activated sludge with disinfection
Santa Clara	3,02	2.284	40	40	11	0	Activated sludge with disinfection
Los Ángeles	193	121.428	5.117	4.255	1.299	194	Activated sludge with disinfection
Huépil	9,43	7.469	88	55	23	0	Activated sludge with disinfection
Cabrero	32,9	14.060	441	397	110	22	Activated sludge with disinfection
Monte Águila	6,73	6.192	96	47	35	7	Activated sludge with disinfection
Negrete	2,72	4.326	224	224	101	14	Aerobic Lagoons with disinfection
Santa Bárbara	22,3	7.344	413	317	141	1	Activated sludge with disinfection
TOTAL		655.139	36.246	32.149	20.131	4.057	

¡Currently all these waste waters are treated. The last WWTTP is Santa Bárbara that started to function in May 2007!

4.1.5 Evaluation of the Participatory Process

Considering a number of factors that have had influence of this process, it has been satisfactory too some extent, basically the results are real and the overall stakeholder involvement and public participation have contributed to this. Never the less there is a long way to go before a full functioning Integrated Management Plan is in place. Basically there is still a sort of waiting too see how the Quality Standard will be implemented, and work out. We do see an approach between the key stakeholders regarding this issue though. The general involvement of the basin communities is still lacking and we definitely need to obtain, organize and put into available form the basic real time and updated information on River Basin characterization at a more specific level.

4.1.6 Generating the River Basin Management Plan

At this moment it is necessary to identify the precise steps to continue the impulse the Twinbas Project has given to the organization and progress towards integrated basin management. In the following an outline for the next stage is presented.

Contents of minimum information to generate the Management Plan

Proposal of the contents and minimal information that it is necessary to consider in order to identify priority zones, to execute actions, to diagnose the current situation of the inserted communities in the basin, to characterize and to identify organizations, among other aspects.

PRIORITY IDENTIFICATION

Areas of concentration of small land owners or farmers of subsistence
Land use
Level of degradation of the soil: identification of zones sensitive to erosion
Grade of wear of the water resources (swindling, risks of floods, contamination)
Levels of organization: community, productive, economic, etc.
Human resources and available materials: universities, centers of investigation, centers of extension and training
Available infrastructure
Present municipalities in the basin
Present users in the basin
Environmental situation:, critical environmental problems, climate changes.

SURVEY OF THE ECONOMIC, SOCIAL, ENVIRONMENTAL AND POLITICAL SITUATION OF THE IDENTIFIED BASIN USERS

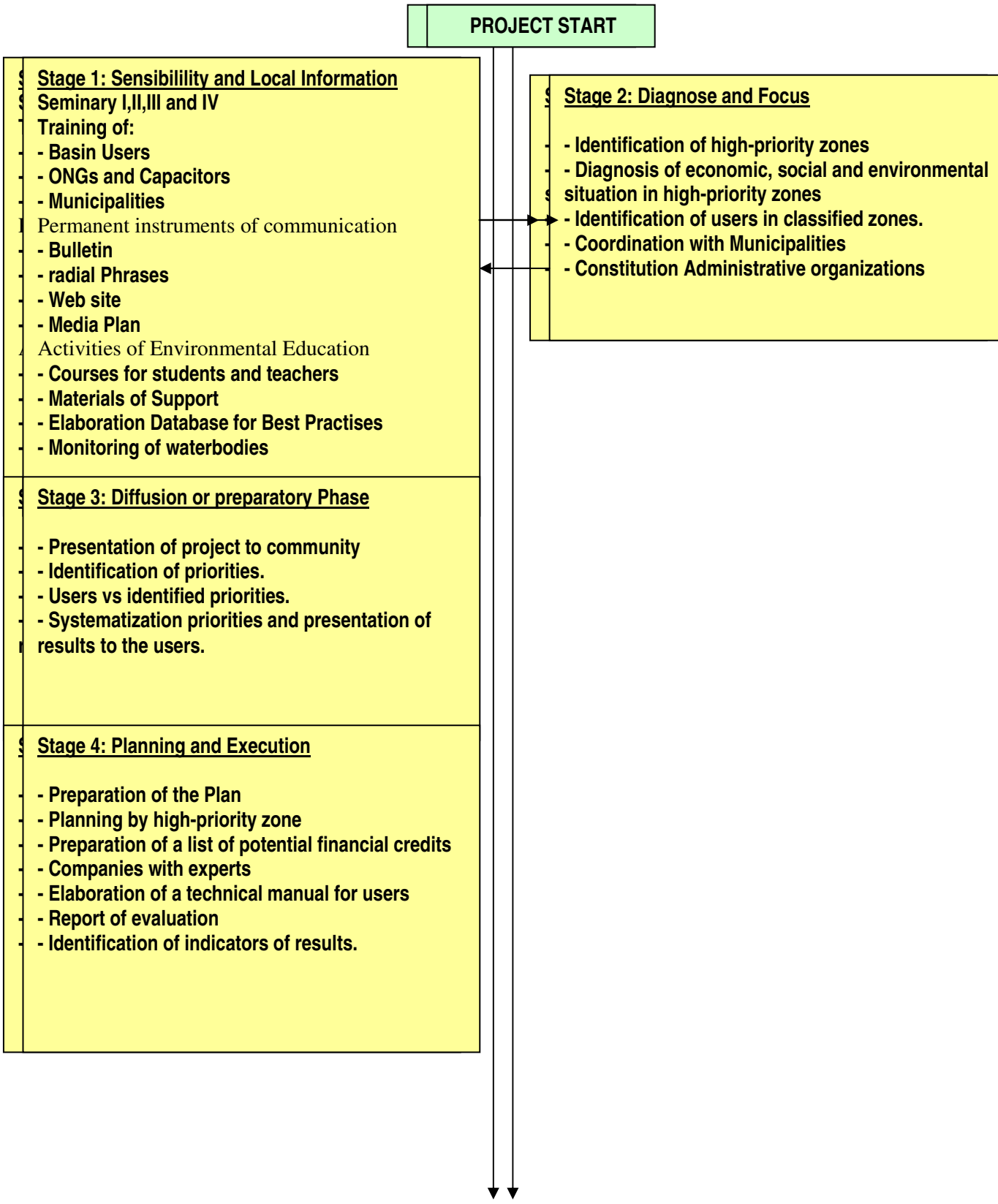
SOCIAL ASPECT
- present Organizations - Relation of the organization with financing agencies - Technical Attendance for the programs of the organization - Social Attendance (health) - Ways of solving communitarian problems (are organized, they go to the authority, etc.) - Degree of participation of the women, young people and children. (integration of the family) - Cultural Activities spread by the organization - Access to the Health, education - Infrastructure available (ways, potable water, mains)

ECONOMIC ASPECT
- Capital indicator (own machinery, equipment infrastructure, etc.) - Identify land use (crops, rotation of crops). - Participation in cooperatives and organizations - Available work force - Level of commerce - Credit access
AMBIENTALES ASPECT
- Soil fertility - Water Quality - Degree of soil degradation - Practices of conservation of soils and waters used by the owner - Identification of some environmental specific problem - Analysis of the destination of the garbage (animal, human)
POLITIC ASPECT
- Local authorities with which user have major relation - Knowledge of the regulations applicable to the handling of soil and the water - Some experience in integrated river basins planning and management.

IDENTIFICATION OF PRIORITIES

(Workshops)

COMMON PROBLEMS	**A L T E R N A T IV ES OF S O L U TION (PRIORITIES)**
Depletion and deterioration of the resource	
Conflicts of use.	
Decrease of availability	
Increase of the demand	
Absence of planning	
Etc.	


PROJECT START
Stage 1: Sensibilility and Local Information
Seminary I,II,III and IV
Training of:
- Basin Users
- ONGs and Capacitors
- Municipalities
Permanent instruments of communication
- Bulletin
- radial Phrases
- Web site
- Media Plan
Activities of Environmental Education
- Courses for students and teachers
- Materials of Support
- Elaboration Database for Best Practises
- Monitoring of waterbodies
Stage 2: Diagnose and Focus
- Identification of high-priority zones
- Diagnosis of economic, social and environmental situation in high-priority zones
- Identification of users in classified zones.
- Coordination with Municipalities
- Constitution Administrative organizations
Stage 3: Diffusion or preparatory Phase
- Presentation of project to community
- Identification of priorities.
- Users vs identified priorities.
- Systematization priorities and presentation of results to the users.
Stage 4: Planning and Execution
- Preparation of the Plan
- Planning by high-priority zone
- Preparation of a list of potential financial credits
- Companies with experts
- Elaboration of a technical manual for users
- Report of evaluation
- Identification of indicators of results.

SCHEME OF THE ACTION PLAN FOR TWINBAS AND FUTURE ASSOCIATED ACTIONS

In agreement with the lines of work identified by the main actors of the river basin, the activities for a future Plan of Action Plan looks like this.

General Framework for the Action Plan

Action Area	**Activities**
1.- To consolidate in short term the creation of a "Committee of River basins", with representation of all the productive sectors, public, private and community in general.	To consolidate the appointment of the committee of river basins and to present it to the Regional Authority
2.- To urge the Government to form instances of technical, financial, administrative and political co-ordination for the execution and pursuit of the actions that will comprise in the multilateral agreements established by the Commission of River basins.	To prepare agenda of proposals of work of the committee that includes the creation of local committees, environmental diagnose and the Management Plan for the river basin in agreement with the objectives of the territories of planning i the region
	To present proposal agenda of work to the Regional Authority
3.- To promote the awareness, environmental education and citizen participation.	To prepare a program of environmental education, that includes qualification of teachers and workshops for students
	To prepare a program to develop the capacities of the local communities and the rural organizations, such as the cooperatives of agriculturists, through the information and qualification to impel the conservation and sustainability of the water resources by means of programs as those referred the integrated handling of plagues, soil conservation, quality of the water, diversification of cultures and handling of solid waste.
	To promote massive educative campaigns in the communitarian radio a for the public in general.
4.- To create mechanisms of cooperation between the public and private sectors to foment the transference of technology and information and strategies of management of water resources.	To determine the state of the art situation in the river basin determining the availability of the water resources, and the efficiencies of use of the water within the river basin. By the others, to determine the evaluation of the costs of recovery of the river basin in agreement with the Plan of Action
	To develop a program of forestry of the protective strips of the water bodies
	To develop to a program of conservation and soil improvement.

	To develop methodologies of water Planning and natural management that contemplate the resource of the river basins
	To develop program of investments for different sectors (forest, agricultural, industrial, civil society) which it includes programs of information, qualification and investigation on the best practices to foment the development of innovations in agricultural technology, that includes models in the field of the integrated systems, with emphasis in the productivity, the yield, the efficiency and the environmental protection that water allows to the suitable use of the resource.
	To propose methodologies for the accomplishment of the economic analyses of the services related to the water and of the mechanisms of financing of such to end identifying common elements that they allow the establishment of indicators
	To promote the creation of demonstrative river basins with application of integrated handling.
5.- To carry out an inventory of laws and regulations that affect directly or indirectly the water resource soon to identify convergences, divergences and contradictions, and to deliver an attack to harmonize, to hierarchize, and to prioritize the effective laws	To elaborate an inventory of the laws relative to the use and handling of the water resource, determining competitions of the different involved organisms.
6.- To develop in sustainable form the economic potentialities, tourist and recreational that offers the river basin of the Biobio river.	Development of a data base of the information corresponding to the water cycle as a whole, the quality of the water and the exploitation systems of the water resource the river basin.
	To develop a plan of tourist development that promotes recreational activities of low impact and harnesses these activities in the river basin.

4.1.7 Conclusions and Discussions

This objective, although complex, is feasible of being reached fundamentally due to the positive predisposition that nowadays exists in multiple actors to advance towards schemes of agreement and negotiation of interests. Even, it is possible to detect very concrete demands, as both of the users, as of the civil society in general, to improve the environmental conditions of their territories. With the purpose of generating a conceptual frame on this subject, the National Commission of the Environment has sent to all the Chilean regions a series of inter-

institutional lines of work that allow to define future actions around the integrated management of water resources.

4.2 Nura

4.2.1 Background

Kazakhstan is one of a significant number of states that have recently re-formulated their policy and legal frameworks relating to water, including e.g. South Africa, Georgia and Kyrgyzstan. The country suffers from serious water problems mainly due to the costly legacy of the extensive industrial and agricultural works undertaken during the Soviet era. Although water resources are not scarce, they are generally not used efficiently (GWP, 2004 & Hannan, 2006), and the country is now on the brink of a major water crisis. Kazakhstan has been identified by the United Nations Development Programme (UNDP) as a country facing severe water management problems, which may be detrimental to its long-term economic growth (UNDP, 2003).

The Nura river in central Kazakhstan terminates in the Kurgaldzhino wetlands west of the capital Astana (Tanton et al., 2001). The particular difficulties faced on the Nura are peculiar to it alone, but the broader aspects of stakeholder participation apply equally to the Nura and to other rivers in Kazakhstan. Stakeholder participation is a novel concept in the country, and water users are more accustomed to centralised decision-making and the paternalism of the Soviet system.

Part of the purpose of this study was to examine some of the steps that have been taken in Kazakhstan to ensure effective stakeholder participation within the water policy framework, focusing in particular on the establishment of representative River Basin Councils and on the availability of information. These were the two issues repeatedly raised as the outstanding areas of concern by stakeholders in interviews conducted during the field trip.

The Nura River is a highly regulated closed system in central Kazakhstan. It is unusual in Kazakhstan insofar as it is not a transboundary system. Its only connection with international waters is the Kanysh Satpaev Canal (formerly known as the Irtysh-Karaganda Canal), which connects the upstream reaches of the river with the Irtysh River before the latter flows into Russia. It is characterised by generally low flow levels, with flooding in the early spring (UNECE, 2000). At 978 km in length, the Nura rises in the Karkaralinsk mountains, flowing west through the Karaganda region and past the new capital city Astana, until finally discharging into the Kurgaldzhino wetlands and Lake Tengiz, one of the most important wetland sites in Central Asia[3] (see **:** Figure 4-1).

Principally as a result of significant pollution discharges from the highly industrialised city of Temirtau, reaches of the river downstream of this point are heavily contaminated with mercury. Heaven et al. (2000) estimate that more than 135 tonnes of mercury lie in the riverbed and floodplain of the river in the 75 km below the source at the acetaldehyde plant, AO Karbide, in Temirtau. The earlier work of the UNECE (2000) suggested that this figure was nearer 50 tonnes. The World Bank is currently engaged in a project to clean up this pollution.[4] The presence of mercury in the water is one of the main reasons why the Nura-Ishim canal has not been used to transfer drinking water to the burgeoning new city of Astana.

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[3] In May 2007, the wetlands will officially become Kazakhstan's first designated Ramsar site. Further information on the wetlands and their international designation can be found on the RAMSAR website at www.ramsar.org, and at www.wetlands.org/RSDB/default.htm.

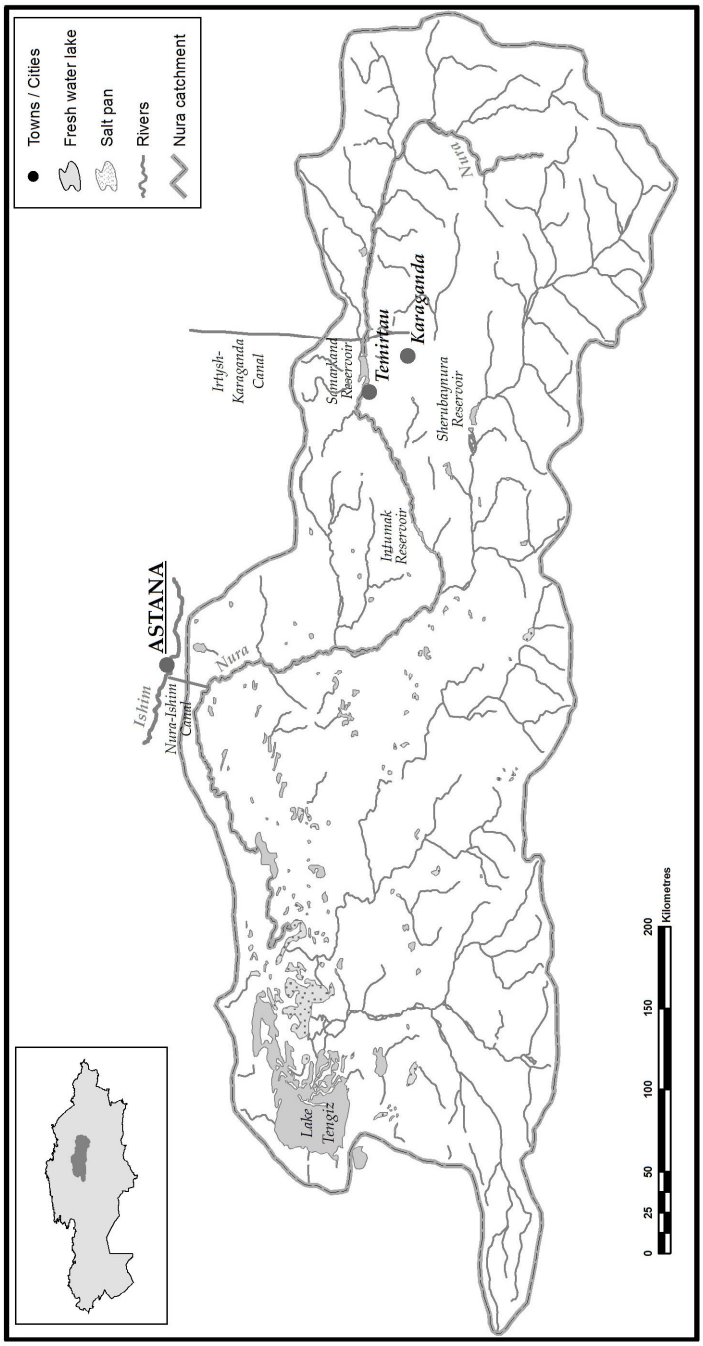
[4] See www.worldbank.org for further information on this project.

The ironic result of this is that the Kurgaldzhino wetlands and Lake Tengiz currently receive adequate water, but this supply would be threatened in the event that the water becomes sufficiently safe to be used for human consumption.

The Samarkand reservoir at Temirtau with an approximate capacity of 254 million m^3 (Tanton et al., 2001) is the main reservoir in the catchment, and is connected to the 458 km long Irtysh-Karaganda canal which lifts water up 416 m from Pavlodar to Karaganda. Although the canal was originally intended to satisfy demand from irrigators, the extremely high cost of water has made it uneconomic to use it for agriculture and it is no longer in general use. The bottom of the canal is used to supply water to a large power station and some water is pumped from the top reservoirs to the Karaganda drinking water works. The Nura and its tributaries now supply nearly all the domestic and industrial water needs of the catchment. But in future it could play a crucial role in the provision of water to Astana (Sievers, 2002).

Four such concerns are linked directly to the Samarkand reservoir. The two largest industrial plants utilising most of the water from the Samarkand reservoir are a vast steel plant and a thermoelectric plant. The infrastructure of the reservoir was owned by the power plant, which had responsibility for the maintenance of the reservoir, although ownership and control of the dam has recently changed hands twice and it is now apparently under the control of the National Water Committee. Through interviews held during the field trip, it was confirmed that this transfer would be broadly welcomed by the users.

As mentioned above, the other potentially major consumer of water from the Nura is the new capital city of Kazakhstan, Astana. Although it lies on the Ishim River rather than the Nura, the



: Figure 4-1 The Nura catchment in central Kazakhstan

two rivers share a flood plain, and a transfer canal exists between them. Astana's population is growing very rapidly. Some sources suggest that the population of Astana will rise from around 600,000 currently to 1.2 million by 2030 (Holley, 2005), and pressure not only to use the water from the Nura for domestic use but also for extensive greening of its environs will grow commensurately (Tanton et al., 2001). However, major withdrawals of water at this point in the river may have devastating effects on the wetlands downstream. The Nura is thus a river that must be carefully managed if the demands of its three major sectoral users are to be balanced in a sustainable way.

4.2.2 Identification of stakeholders and development of communication plan

Stakeholders in the Nura basin identified in WP1 included the following:-

Astana (capital of Kazakhstan):

- Ministry of Environmental Protection
- Ministry of Health
- Committee for Water Resources under Ministry of Agriculture of RK
- Ministry of Agriculture of the Republic of Kazakhstan
- Ministry of the Environment of the Republic of Kazakhstan

City of Karaganda and Karaganda Region:

- Joint-stock company “Ispat-Karmet” (Mittal Steel)
- Joint-stock company “Alash” (formerly Karbid)
- Joint-stock company “KaragandaRezinoTekhnika”
- Vodokanal Karaganda
- Dept. of Management of Nura-Sarysu Basin, Karaganda
- Karaganda Regional Dept. of Environmental Protection
- Karaganda Regional Dept. of Hydrometeorology (Karaganda Hydromet)
- Kurgaldzhino State Nature Reserve

and the World Bank Environmental Division which coordinates the Nura River Clean-up Project. Further stakeholders in the basin include e.g. the power industry, the coal industry, the fishing industry and agricultural enterprises, as well as domestic water consumers.

Various conflicting water use interests were also identified: the steelworks in Temirtau use a major part of the water, leaving only small amounts for irrigation; the population of Astana is continuously expanding and the city will need increasing amounts of water in the future; and the terminal wetlands are in need of sustainable management. Water charges are problematic, since a large part of water-consumers in the basin are agricultural and farmers’ associations which are not capable to pay charges for use water. (In Soviet times they were supplied free of charge). A lot of domestic users also cannot afford to pay their bills.

Furthermore, the Committee for Water Resources (CWR) is currently part of the Ministry of Agriculture which is potentially a conflict of interest as the emphasis might be put on water for irrigation, with other sectors being neglected. The CWR also acts as an operator of water management company (Vodkhoz) and the Irtysh-Karaganda Canal, which constitutes a conflict of interest with their regulatory functions.

The initial communication plan is given in Appendix B-1. The original list of stakeholders was expanded over the course of the project, to include for example the company running the Irtysh-Karaganda Canal, the Forest and Hunting Economy Committee, and various scientific research institutes.

4.2.3 Contacts and interaction with stakeholders

Over the course of the TWINBAS project, AIPET established links and actively collaborated with the following:

- Committee for Water Resources under Ministry of Agriculture of RK
- Department of Watereconomy Management of Nura-Sarysu Basin
- Ministry of Agriculture.
- Regional water distribution authority "KaragandaVodKhoz"
- Canal named after Kanysh Satpaev
- UNDP Project “Integrated Conservation of Priority Globally Significant Migratory Bird

Wetland Habitat"
- Kurgaldzhino State Natural Reserve
- Forest and Hunting Economy Committee
- Kazgidromet
- Scientific research institute of ecology and climate
- Institute Kazgiprovodkhoz
- Research Institute of Water Management

A joint field trip (SOTON, AIPET) of the Nura river basin was carried out in 2004 during which meetings with decision makers in the Committee of Water Resources, Karagandavodchoz, and the Nura-Sarysu Water Basin Authority were held. Additional meetings were held with the basic water users and representatives of the Kurgaldzhinsky State Nature Reserve where the main problems of water use in the Nura river basin were revealed and discussed.

As a consequence, round table discussions with participation of stakeholders were also carried out.

Communication with stakeholders was mainly by telephone, e-mail and mail.

Two meetings with participation of international experts were organized (see below).

AIPET employees also took part in a seminar on questions of water use in the Kurgaldzhinsky State Nature Reserve which was organized by the UNDP project.

4.2.4 Stakeholders' influence on the research within the basin

Significant assistance in the work of the project was rendered by the Ministry of Forestry and Hunting, and employees of the Kurgaldzhinsky reserve, having authorized the carrying out of research works in the reserve. The RBO and Karagandavodhoz have assisted with data acquisition on the Nura river basin.

Co-operation with stakeholders, accepting decisions, end users, and public organisations on the protection of nature and water resources is ongoing.

However, large water-consumers such as Metal Steel Temirtau ignored the organised seminars, and discussions with them had to be carried out separately.

There are several conflicting water use interests: the steelworks use a major part of the water, leaving only small amounts for irrigation; the population of Astana is continuously expanding and the city will need increasing amounts of water in the future; and the terminal wetlands are in need of sustainable management.

Water charges are problematic, since a large part of water-consumers in the basin are agricultural and farmers' associations which are not capable to pay charges for used water. (In Soviet times they were supplied free of charge). A lot of domestic users also cannot afford to pay their bills.

The Committee for Water Resources is currently part of the Ministry of Agriculture which is potentially a conflict of interest as the emphasis might be put on water for irrigation, with other sectors being neglected.

The Committee for Water Resources also acts as an operator of water management company (Vodkhoz) and the Irtysh-Karaganda Canal, which constitutes a conflict of interest with their regulatory functions.

A number of meetings have been held involving many of the stakeholders. It became clear that most of the stakeholders have no or little perception of the competing interests or each other's conflicting plans for use of the water resources. The new Water Code of Kazakhstan

fully encompasses the ethics and aims of the EU Water Framework Directive. Unfortunately, river management in practice is still far divorced from it.

One of the main outcomes was to bring to the attention of all the stakeholders the extent of conflicting stakeholder demands, not least the conflict between abstracting water for Astana and rebuilding the Intumak reservoir and the adverse effect it would have on the terminal wetlands. The project was starting from a very low base, i.e. a non-effective River Basin Authority to manage the water resources, the National Water Committee responsible for the water resources of Kazakhstan which is part of the Department of Agriculture and has conflicting interests, and the complete unawareness of the users of future plans and their implications. As a result, the stakeholder work package very much concentrated on establishing a dialogue between them and developing plans and strategies that could form part of a river basin and national debate on how to move forward in providing a workable framework for sustainable water resource management within the local context.

4.2.5 Workshops

Apart from informal collaboration over the course of the project, stakeholders from the Nura basin had an opportunity to participate in three major events: an international stakeholder meeting held in Sweden in August 2005, a stakeholder workshop in Kazakhstan in October 2005, and a second international stakeholder meeting in Kazakhstan in September 2006.

International Stakeholder Meeting in Sweden, August 2005

This international stakeholder meeting was held following the mid-term review meeting in Stockholm. Several staff members from both SOTON and AIPET were therefore present at the meeting. From the Nura basin, two stakeholders had agreed to participate in the meeting: Bhakhytnaser Danbaev, Head of the Nura-Sarysu River Basin Authority, and Guram Sobolev, Head of the Karaganda Vodkhoz water supply company. All TWINBAS stakeholders were given an opportunity to present their views on the problems and solutions relating to water management in the different river basins (Okavango, Bio Bio, River Nura, River Thames, and Norrström). This was followed by a panel discussion on the water management situation in the individual basins, and how TWINBAS can contribute to water management and stakeholder involvement in the rivers. The public participation work going on in other projects was also discussed.

The main value of the Stockholm meeting was to make the stakeholders more aware of what is happening on a global scale and to realise that there are no fixed approaches that can be applied on an international scale. It was also important in raising their awareness that they are part of a much wider movement to improve the sustainability of water use.

Stakeholder Workshop in Kazakhstan, October 2005

A stakeholder workshop was held in Karaganda, Kazakhstan, in early October 2005. Prior to this, the actual stakeholder position had to established, and investigations had to be carried out to find the best options of effective participation. Because of the legal aspects of establishing effective management of the water resources, a water resources legal expert helped in identifying the way forward and the additional legislation that might be needed.

The workshop was held at the offices of the Department of Natural Resources in Karaganda (organised by AIPET with input from SOTON) to discuss key strategic areas of interest relevant to all key stakeholders within the catchment area. The main objective of the workshop was to identify River Basin Organisation (RBO) and other stakeholders' concerns regarding water management and more importantly, to identify directly what incentives might make key stakeholders choose to participate in the river management process.

Fifteen people attended the workshop. Unfortunately, only one industry representative was present at the workshop, which prevented the group from being adequately represented. The

reason the main industrial players in the catchment are not actively taking part in any RBO stakeholder processes is due to the perception that the organisation does not have any teeth to regulate the water management within the area. It is only an advisory body with no real support from central government. However, we did manage to get individual meetings with KazRosEnergo and Mittal Steel Temirtau for the day following the workshop, during which issues raised at the workshop were discussed. A detailed account of the workshop, including a list of participants, the participatory methods employed to engage the stakeholders, and the content of subsequent individual interviews is given in Appendix B-2.

The workshop generated a great deal of discussion and it is felt that the participants are all aware of the problems inherent in the management of the Nura catchment. However, it was clear that any participatory council would not necessarily have any impact on the management of the system. True integrated water resource management is far in the future and the current Water Code is not currently effective enough to change attitudes in how water is used. The general position of stakeholders is that, unless the RBO gets more power to enforce and implement the Water Code, water management as it is at present will not change.

Meeting the two major industry stakeholders outside the workshop was of great value and it is thought that not as much information would have been obtained from them if they did actually attend the workshop. Meetings were also held with representatives of the UNDP in both Astana and Almaty. In the Astana meeting the significance of the Tengiz-Korgalzhyn lake system to the Nura catchment was discussed, while the Water Resource Management Advisor for the UNDP/GWP project on the *National IWRM and Water Efficiency Plan for Kazakhstan* was interviewed in Almaty, specifically in relation to the drafting and implementation of the new Water Code of 2003.

A visit was also made to one of the pumping stations of the Kanysh Satpaev Canal. Although the construction of the project was clearly a major engineering achievement, it was evident from the visit that the funding needed to maintain the system is not available and that the structure will essential continue to be a monument to the Soviet era's vast irrigation projects.

International Stakeholder Meeting in Kazakhstan, September 2006

A second international stakeholder meeting was held in Kazakhstan in conjunction with the TWINBAS project meeting in September 2006. This high level stakeholder meeting attracted participation of management level attendants from national, regional and local government institutions. Stakeholders from the Nura basin included:

Baikasinov, A. (Territorial management of preservation of the environment)
Sarsenbaeva, Gulshara (Committee for Water Resources, CWR)
Bekenova, D. (Committee of the nature protection control)
Algabaeva, Sholpan (Nura-Sarysy river basin authority)
Sobolev, Guram (Karaganda Vodkhoz water supply company of Karaganda oblast)
Koshkin, Aleksei (Kurgaldzhino State Nature Reserve)
Karanashev, Suleimankul (RGP «Astana Su» water supply company of Astana city)
Kerteshev, Talgat and Makashova, Dariga (UNDP Project "Integrated Conservation of Priority Globally Significant Migratory Bird Wetland Habitat")
Aristanov, Bachit (IBRD - International bank of reconstruction and development)
Vagapov, Ravil (KazNTU)
Kanat Baigarin, Aigul Suleimenova, Saulet Sakenov, Sirym Nurgaliev, Sergei Vasiliev (Climate Change Coordination Centre, Astana)

AIPET presented results from TWINBAS and Prof. Vagapov from the parallel UNDP project "Integrated Conservation of Priority Globally Significant Migratory Bird Wetland Habitat" which has run in parallel and close collaboration with TWINBAS, exchanging data and results. A major result of TWINBAS is that it is now possible to make a realistic estimation of the amount of water needed from the Nura and Kulanotpes rivers to sustain the wetlands and the lakes of the Kurgaldzhino nature reserve. The optimum water level regime of the

Tengiz – Kurgaldzhino lake system can be supported only with coordinated regulation of discharge of water and when the system of regulation of water levels on lakes Kurgaldzhino have been restored. According to our results, to keep the optimal water level on the Tengiz – Kurgaldzhino lake system, about 1100 million m^3 of water (the amount lost by evaporation) is needed per year. The average discharge of the Nura river is 315.8 million m^3, the average discharge of the Kulanotpes is 270.2 million m^3, the sum of precipitation is 394 million m^3, and local runoff is 130.2 million m^3. This is the first time such an estimation based on scientific data has been made. The results constitute an important input to the decision-making process, but it should also be noted that they need to be substantiated by expanded validation data. This is a first step towards determination of the ecological water reserve needed for the terminal wetlands and lakes.

Several of the participants underlined the need to strengthen the role of the Water Resources Committee that currently has the overall responsibility for water management, but is part of the Ministry of Agriculture, which is the at the same time the main user of water (approx. 70%). There are also other government actors with responsibilities in the water sector. Additionally, local authorities have significant impact on water prices and thus on the possibility to cover costs for maintenance of the water supply and treatment facilities. The international experts underlined the importance of giving one authority overall responsibility for water use in all sectors, as well as for water quality and monitoring, with a clear legal mandate, i.e. a River Basin Authority.

The seminar has been widely covered in press and mass media (the first national channel of Kazakhstan, 'HABAR', and the international channel 'World' covering the territory of the former Soviet Union).

4.2.6 Evaluation Report

River basin councils and basin agreements are recognized as important tools in effective water resources management. The first River Basin Council of Kazakhstan has now been formed in the Nura-Sarysu basin. All large water-users and stakeholders are represented on the RBC, and decisions of the basin council will be accepted to performance by the Committee of Water Resources.

A position paper on strategic stakeholder participation in the Nura basin (scientific journal paper) was developed by SOTON and was submitted for publication in the Natural Resources Journal (see Appendix B-3). This paper not only reviewed the situation in the Nura catchment and Kazakhstan, but also included examples in the form of case studies from recent developments in water reform in South Africa, Poland, France and Scotland (Brazil was also analysed, but a decision was made to omit this particular country due to space constraints and also because it did not significantly differ from the experiences in South Africa and Poland.)

It would appear from the approaches taken elsewhere in the world that representative basin bodies are increasingly being used by States anxious to improve the level of public participation in water management. The success, or otherwise, of these efforts is less certain, however. If there is general acceptance of the value of such bodies in principle, assessing the success of their implementation is more difficult, given that most are recent, or planned, innovations. In the Kazakh context, and on the Nura in particular, the problems of implementation, while almost universal, are specific to that region. They result from a number of factors, chiefly including the following:

- Uncertainty caused by vague, contradictory or missing legislative provisions;
- Institutional issues (caused by a mismatch between the powers endowed by legislation and the functions of the institution), or capacity problems;
- Inadequacy and paucity of available information;

- A focus on the RBC as the fundamental means for achieving stakeholder participation;
- Slow acceptance on the part of institutions and stakeholders regarding the involvement of the latter in decision-making

Of these, merely improving the legal regime would be an inappropriate tool to properly address issues relating to physical institutional capacity problems. The others, however, are all capable of being affected by an improved regulatory system, although it is clear that making the legal framework more effective is not the only mechanism that might be utilized.

It must be borne in mind that the governance framework within which the water management regime operates, must establish the credibility and legitimacy of the bodies involved. Without these elements, the respect that will be engendered by organizations will fail rapidly. Credibility and legitimacy must be built upon good governance. It has been argued (ADB, 1999) that four principles underlie the latter:

- Accountability
- Participation
- Predictability
- Transparency

These are considered the "ingredients" of good governance that must be in place if policies are to be successfully implemented. In this case, the policy goal is IWRM. However, if these four "ingredients" of good governance are to be satisfied, the following elements must be in place in the regulatory framework:

1. Clear standards of behaviour / performance;
2. Clearly set out functions and responsibilities;
3. Enforcement capacity, commensurate with rights and responsibilities;
4. Rigorous compliance monitoring;
5. Clearly laid out procedures;
6. Open availability of information;
7. Comprehensive / unambiguous criteria to be applied in decision-making; and
8. Protection of 'silent' interests (for example, ecosystems, gender balance, disadvantaged social groups)

It is important to note that the above four factors cannot be achieved independently of one another. Consequently, participation must be seen in the wider context of good governance if effective participation is the aim. This links well with the principles of IWRM, one of which emphasises the importance of a participatory approach (GWP / TAC, 1999). It also means that River Basin Councils, for example, cannot be seen in isolation from the governance framework within which they have to work.

Uncertainty caused by vague, contradictory or missing legislative provisions

The licensing of water use is tainted by factors such as the fact that licensing is not governed by clear, unambiguous criteria, as is the case for example in South Africa. Ambiguity swathes the procedures for suspension and termination of water use rights, and these problems combine to increase the possibility that the law is perceived as being inconsistently applied.

This is not helped by the uncertainty relating to basin agreements. In addition to the lack of clarity regarding their aims and objectives, there is nothing in the Water Code to refute the idea that basin agreements might be bilateral. It may thus be possible for a single basin to be associated with a number of basin agreements between different users and different regulatory authorities, with no strict requirements as to signatories or priority. This raises serious questions with respect to the way in which RBCs would interact with each basin agreement

grouping, and how a variety of possibly bilateral agreements might best serve the cause of IWRM on any particular basin.

The distinction between primary and secondary users may also be of great importance when identifying stakeholders: are farmers or industrial users who take water from commercially-run canals to be counted as stakeholders for the purposes of River Basin Council (RBC) membership, even though they are not connected to the licensing authority in any direct way? If not, stakeholder involvement has the potential to be under-representative, as only commercial users of water, as primary users, would generally be represented. There appear to be no binding rules regulating the balance of members in RBCs, and it appears that the guideline rules that do exist have been flouted in the context of the Nura. This does nothing to embolden NGOs or individuals to get involved with RBCs, especially as they are unable to participate in the RBC meetings unless expressly invited (UNDP, 2004).

Institutional issues (caused by mismatches between the powers endowed by legislation and the functions of institutions), or capacity

Institutional problems in the water management field have been extensively documented by ADB and UNDP projects in Kazakhstan (ADB, 2005 & UNDP, 2005). Ultimately, too many bodies are involved with the management of Kazakhstan's waters, but none has ultimate managerial responsibility. Ground and surface waters are also not managed in an integrated manner as different organizations have varying responsibilities over each. There are perennial problems with the lack of capacity of the RBO, both in the form of a lack of financial resources and through the absence of staff who are able to monitor and enforce decisions. Consequently, the RBO must rely on the users themselves for the information it needs to monitor compliance, and this leads directly to allegations and suspicions of institutional impotence by users. Its credibility is damaged by both this and the fact that the Committee for Water Resources (CWR) cannot be regarded as wholly impartial and cannot hope to compete with local executive bodies unless it becomes a ministry in its own right.

With respect to the RBC more specifically, its general inability to produce binding recommendations, other than potentially for the basin scheme, must be regarded as being detrimental to its effectiveness. It is true, as the UNDP points out, that the body at this stage is not fully formed, and that it will develop as users become more confident in their ability and desire to get involved (UNDP, 2005), the assumption being presumably that as the stakeholders' voices get louder, the more powers they will be able to assume. However, this will need a robust base in the regulatory framework, with detailed provisions setting out mechanisms for its involvement, something that is currently missing. Its membership should be clearly defined, although without identifying the individual organizations to be represented, such that the appropriate balances between interested parties are set and adhered to. The Scottish system, which will identify stakeholders in the context of each water body, would seem useful in that regard, although the non-binding recommendations regarding balancing members that exists in Kazakhstan already would be far more useful if implemented. This raises the more general question of the role of the RBO in running the RBC – it controls membership to a very large degree, and the RBC is dependent upon the RBO for its financing.

Inadequacy and paucity of available information

The RBOs rely on Kazhydromet (part of the Ministry of Environmental Protection) for data on surface waters, but suffer from the latter's inclination to produce inaccurate information for exorbitant sums. This hampers the ability of the RBO to be able to fulfill even the limited functions it currently has, and thereby lessens still further its standing among stakeholders. This would appear to necessitate an increase in financing for Kazhydromet, to enable it to upgrade its monitoring network and produce more realistically priced data. However, it may be that the culture of the organization needs to change if this is to happen. The question must also be raised as to whether the RBOs should continue to rely on Kazhydromet for data at all

if the latter remains at least semi-commercial in character. Strengthening of the RBO's monitoring capacity would address this to some degree.

More generally, the Kazakh government must adhere to its obligations under the Århus Convention. The Decision of the Compliance Committee found Kazakhstan specifically in breach of arts. 3, 4 and 9 of the Convention, with respect to the availability of environmental information and access to justice and para. 6 in relation to public participation (UNECE, 2005). Although Kazakhstan has had Communications critical of its implementation of the Convention submitted to the Compliance Committee four times, more than any other Party, only two of these have formed the basis of further action (UNECE, 2005). The second meeting of the Parties took place in Almaty, and the next is due within two years of the last one, unless the parties agree otherwise (UNECE, 1998). Interestingly, the rationale behind the Decision of the Parties appears to lie in the practicalities of implementing the existing provisions in Kazakh law that purport to transpose the Århus obligations, and are based on communications passed to the Committee by Kazakh NGOs.[5] It therefore seems that the provisions that exist in Kazakh legislation are going in the right direction, but will rely on further education, and possibly financing, at relevant institutions and courts. It may also be that Kazakhstan would be well advised to implement the Convention in a single cross-cutting instrument, as has been the practice in the European Union. This would be preferable to the current situation of reliance on individual provisions that attempt to safeguard access to information being added to legislation on a case by case basis. It should also be noted that within the context of the Århus Convention, questions have been raised regarding the potential for obstruction to justice for those bringing cases under environmental protection legislation (Mitrofanskaya & Bideldinov, 1999-2000).

Slow acceptance on the part of institutions and stakeholders regarding the involvement of the latter in decision-making

As one of the specific complaints raised by the Århus Convention Compliance Committee, it is hoped that this would be addressed as above, principally through educational means. A process such as this will take time, and will rely on the stakeholders establishing sufficient trust in the system and in the relevant institutions that their legitimacy becomes entrenched. It is the view of the authors that only by making changes in the regulatory framework, such that good governance is clearly in place, will such a process take place.

4.2.7 Conclusions

Given that the River Basin Council system is to some degree novel, more effort might be made by Kazakhstan to ensure that other methods are adopted to ensure stakeholder participation than concentrating so much on establishing RBCs. The South African system, for example, seeks to control the directors of management authorities as well as trying to ensure that stakeholder participation occurs at the implementation level. This approach should be adopted by Kazakhstan as well – this will encourage transparency, and therefore accountability, and lead to an increase in the quality of the governance. By seeking to improve governance, the standing and value of the RBC can only increase.

Whilst it appears that the Republic of Kazakhstan is driving its policies and regulatory framework in the right direction to improve its water management, progress is still being hampered by a number of factors. The solution to overcoming these problems lies partly in institutional reorganisation and improvements to relevant legislation to ensure that Kazakhstan's waters are managed effectively and sustainably by institutions with appropriate powers and commensurate enforcement capacity. It also demands that stakeholder views are incorporated into decision-making as demanded by Kazakhstan's international obligations.

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[5] See http://www.unece.org/env/pp/pubcom.htm for all related documents.

The introduction of River Basin Councils is a step forward in achieving the latter objective, but this in itself will not be the universal cure that some anticipate: it must be accompanied by other enhancements to the governance regime if these organisations are to fulfil their full potential. Institutional inertia and an unwillingness on the part of some stakeholders to accept their new roles will doubtless slow the process down, but the above recommendations would go some way to making sure that the basin councils provide a forceful voice for stakeholders in the context of properly integrated water resource management in Kazakhstan.

4.3 Okavango

4.3.1 Introduction

Following Botswana's accession to the Ramsar Convention in 1997, twelve government departments are cooperating to prepare a management plan for the delta, with international assistance. Stakeholders associated with the planning process include local communities, district institutions, tourist operators, national government and international organisations. A critical issue is that international collaboration is assured, and the upstream countries in the basin share the philosophy behind the management plan, and respect its provisions.

Numerous constraints have been identified: lack of capacity to implement the strategy, lack of mutual understanding among stakeholders and unclear definition of the roles and functions of newly established institutions. Communities need to agree to invest in the long term stewardship of the delta. Unequal opportunities among stakeholders and communities result in political friction and lack of commitment to policies by those who do not directly benefit.

Communication implies the exchange of information leading to mutual enhanced understanding among the stakeholders. Through fully involving all stakeholders, their cooperation, assistance and participation can be assured. There will be significant investment of time and resources in the communication process, which is seen as an essential part of the plan to achieve the environmental objectives.

The Ramsar guidelines give stakeholder involvement in the development and delivery of decision making as a fundamental principle. The stakeholders comprise organisations and communities with interests at the local, national and international level. The interests of the individual stakeholders are potentially conflicting, especially in regard to the upstream-downstream interaction in the basin.

In order to develop a mutual understanding, it is essential to develop and implement a communication and participation strategy encompassing the lateral intersectoral issues, and the vertical community-national-international issues. An important dialogue lies between the technical expertise (in hydrology, biology and sociology), and the indigenous expertise of the local people acquired over many lifetimes living in and interacting with the delta and its natural resources.

The Permanent Okavango River Basin Water Commission (OKACOM) was established in 1994 as a regional, high level committee to ensure the water resources of the Okavango River Basin are managed in appropriate and sustainable ways, and to foster cooperation and coordination among the three Basin states: Angola, Namibia, and Botswana. The OKACOM Project Management Unit is based in Luanda, Angola, while the executive secretariat will be based in Maun, Botswana.

4.3.2 Objective

The objective of communication and participation is through sharing knowledge develop a mutual understanding of the issues affecting all stakeholders, leading to agreement on the

conservation and wise use of the natural resources of the river basin and delta as expressed in an integrated management plan. To this end, the stakeholders must be fully involved in drafting, adopting and implementing the plan.

Among the communication and participation problems foreseen at the outset are:

- Accurately targeting individual stakeholders and communities
- Ensuring the free flow of information among communities, government organisations, non-government organisations, and private organisations, and also among the three basin states
- Access by remote delta communities to communication media

4.3.3 Definitions

In discussing communication issues, the terms public and stakeholders are frequently employed. While the terms may be intentionally vague to allow flexibility in the approach for each river basin, and also as the participation process evolves, definitions are offered here.

The **public** refers to individuals with some limited interest in the river basin. Members of the public include residents of the basin, citizens of the countries with a geographic part of the basin, and citizens of countries who tap the resources of the basin, eg by interbasin water or hydropower transfer.

Stakeholders refers to individuals and organisations with direct interests in the river basin. Stakeholders include poor communities depending on the basin's natural resources for their livelihoods, farmers relying on surface and ground water for irrigation, municipal water suppliers (public and private), industries utilising the basin's natural resources, including hydropower, water and environmental organisations (government and non-government).

Anyone includes persons and organisations interested (as opposed to having a direct interest in) and willing to contribute to the management planning in the basin. Such may be persons and organisations who can contribute experience at all levels from other river basins, educational establishments wishing to draw on the knowledge and experience generated by the management planning process, research establishments wishing to conduct research which may contribute to the planning process, etc.

4.3.4 Strategy

The Communication strategy for the Okavango Delta management explicitly recognises the invaluable contribution that can be made by the local communities to the planning process. Local people are constantly in direct contact with the natural resources of the delta, and most depend upon these resources for their livelihood. They have the most to gain from their proper management, and to loose from their mismanagement. As such local people are well placed to make informed choices in natural resource use and management which meets their present needs and future aspirations.

There is at present a particular lack of dependable information tools and communication mechanisms for the management planning process in the delta. Considerable work is required to develop and implement these. While hydrology is recognised as being fundamental to the behaviour of the delta, it is also necessary to develop a sound understanding of ecological, social and economic conditions, and linkages among these.

A further aspect is the dependence of the delta environment on the natural inflow from the upstream riparian states, Namibia and Angola. Owing to civil strife in these states, little significant water resources development has taken place to date but, as peace settles firstly on Namibia and then on Angola, this will change. It is essential that the upstream basin states

are informed regarding the present state of the delta, and the possible consequences of upstream water resources developments, and engaged in discussion of these issues.

4.3.5 OKACOM

The Permanent Okavango River Basin Commission (OKACOM) was established in September 1994 with a declared political agreement to work towards joint management of the basin. Under the OKACOM Agreement, the riparian countries are working toward the implementation of an integrated management plan for the basin on the basis of an environmental assessment. UNDESA has been providing technical assistance to OKACOM since 1995 in preparing a transboundary diagnostic analysis of the basin and mobilising funding through the Global Environmental Facility (GEF) and other bi-lateral donorsTo date work towards joint management of the basin has been conducted to a degree by three previous basinwide projects, working through OKACOM:

- **Every River Has Its People** – the Kalahari Conservation Society in association with the Namibia Nature Foundation is running an awareness raising project for communities in and around the Delta; both countries have undertaken baseline studies and the next step is to reconcile the findings with possible developments in the river basin, and allow people to be fully informed and consulted about future developments. ODMP anticipates utilising the baseline data as well as cooperating with the efforts of the project to establish effective lines of communication and consultation.
- **Water and Ecosystem Resources in Regional Development (WERRD)** sought to improve and develop scientific methods that will facilitate the monitoring of fluctuations of hydrological and ecosystem variables of the Okavango River Basin; articulate local knowledge and relate this to other dimensions of knowledge; and link the components of the natural resource system to the socio-economic dynamics and to national and international policy.
- **Sharing Water** offered a platform termed collaborative learning, for collective resource inquiry and for negotiation about sharing water and related ecological resources. This approach was designed to build the commitment and knowledge base needed to manage ecological complexity and uncertainty.

This should be furthered by ODMP and TwinBas activities.

4.3.6 Outputs

The following are the basic elements of the communication strategy.

- a communication strategy, widely accepted by all stakeholders and the public
- communication mechanisms: tools, training materials, meeting and workshop schedules and proceedings
- Training and capacity building for all stakeholders, with particular emphasis on the weaker stakeholders so they can participate in the development of the plan as equal partners alongside the more powerful and influential stakeholders
- Informed upstream riparians, understanding the potential impact on the delta of upstream water resources developments, and collaboration in data sharing.

The key specific outputs of the Communication component would be:

(1) The identification of existing organisations and the projects they are undertaking.

(2) An analysis of the stakeholders, including key target groups (local, national and international).

(3) An assessment of stakeholder needs in respect of managing the Okavango Delta, training and capacity building programmes, and the implementation of scheduled activities to meet these needs.

(4) The design, production and dissemination of communication tools: brochures, newsletters, press releases, radio and television programmes, magazine articles, etc.

(5) Increased awareness, learning and participation among stakeholders.

(6) Key linkages with local, national, regional, international networks related to river basin management.

(7) Progress reports on the implementation of the communication strategy.

The extensive planning made for Communication for the Okavango Delta Management Plan depended on external resources, which against expectations did not become available till late 2006, and the ambitious programme could not be realised within the time frame of TwinBas. As reported in the section on Workshops, two rounds of bilateral meetings and two major stakeholder consultation Workshops were held with stakeholders in Botswana.

In many respects, stakeholders in Angola hold the key to the sustainability of the Okavango Delta, in terms of managing the waters flowing in to the delta. A special effort was made by TwinBas to identify the stakeholders in the upstream basin, and assess their views and possible future actions, as reported in Appendix B.

4.3.7 Contacts and interaction with stakeholders

Principles

A starting point to establish the principles for public participation is the lesson learnt from the past: the command and control of natural resources determined by technical experts with generic experience has in some cases led to adverse environmental consequences. It is essential to share the management planning process with the people who depend on these natural resources for their livelihood, and who have corresponding direct local knowledge and experience from the basin. The combination of expert and lay knowledge of the basin leads to a better understanding of the root causes and effects, and thereby a more appropriate management plan.

The purpose of public participation may be stated as improved decision making, based on shared knowledge, experience and scientific evidence among stakeholders, and influenced by the views and experience of those directly affected. This will lead to fewer misunderstandings, particularly between technical and lay persons, a plan that is broadly acceptable to the public and a smooth and effective implementation. The principle of subsidiarity should be adopted, ie the central authority should have a subsidiary function, performing only those tasks which cannot be performed at a more local level.

Participation in the planning process commenced as it should at an early stage, with traditional council (kgotla) meetings held in 33 settlements in and around the delta (further particulars of these sessions are described under Activities below). This early face to face consultation between governmental officials and technical experts, and the local communities and their leaders is intended to engender a spirit of transparency and trust, which should run through the entire participation process.

Not all stakeholders are equal in respect of their power and influence in the planning process. A balanced representation is necessary, where all stakeholders enjoy mutual appreciation and respect. To this end, local communities in particular need to be empowered in respect of access to communication media, and thereby improved knowledge and understanding of the broad environmental context in which decisions are taken. Without educating the local communities, there is a high risk that government organisations and industry dominate, and the local communities loose interest and drop out of the participation process. As part of the education process, as proposed by the Ramsar guidelines, it is necessary to instil a widespread appreciation of the values of wetlands, replacing the previous notion of swampland as areas that had to be drained before they could be productive.

Mechanisms

Communication and collaboration mechanisms need to be established in a consistent and efficient structure to engage all stakeholders fully and equally in the participation process, and to allow open fora for public and international information and consultation.

A key mechanism in the public participation process will be regular progress and completion reporting giving an overview of the process, setting out:

- the communication plan
- who has been reached, their reaction, and overall degree of satisfaction with the process
- the resources expended on public participation, in relation to the overall planning process
- the lessons learnt, as input to future activities

Each river basin and its communities is unique, and there can be no tailor made solutions. It is advantageous if all parties involved can view the exercise as a dynamic learning process, in which all participants are learning about the needs and views of the others, and through mutual trust, respect and overall transparency, learning to appreciate the others' positions, and adapt their stance accordingly.

It is an essential part of the communication process firstly to assess the capacity of the stakeholder groups to engage in the participation process, to identify needs, and to arrange training sessions to educate the stakeholders.

Among the Ramsar guidelines on communication for wetlands are:

- fostering sustained national campaigns to raise community awareness of the ecosystem values of wetlands, both economic and social
- integrating wetland management into regional, national and catchment sectoral policies, strategies, plans and programmes
- communication operating laterally across the concerned sectors, and vertically between stakeholders and the government
- building a well informed decision making public constituency, leading to participatory multi-sectoral stakeholder participation in management
- adopting pilot projects to evaluate the range of approaches to communication: review case studies and existing programmes, document lessons learnt, draw findings and conclusions
- develop a web site open to all, with fora for consultation in the various sectors, and interaction among the various sectors, and incorporating a directory of expertise which participants may consult for additional information

- setting up a wetland educational centre, twinned across catchments and basins, to encourage the exchange of knowledge within the basin, and among river basins; the centre should comprise interpretive exhibits, with links to aquaria, botanic and zoological gardens
- establish systems to monitor the key hydrologic, chemical and biological parameters, involving local communities in the monitoring to the extent possible

4.3.8 Instruments

It is necessary to assemble a balanced set of instruments to address the needs of each stakeholder. The involvement of the stakeholders has to be organised and planned in a series of fora, comprising:

- Bilateral meetings, in which issues of relevance to the individual stakeholders can be separately discussed, and aspects raised which may be too sensitive to raise in fora with wider participation
- Sectoral advisory groups, in which those with wide expertise and local knowledge may come together on a regular basis to review participation progress relevant to the different sectors, and guide further activities in these areas
- Workshops in which all stakeholders come together to be informed on the planning progress, and to provide direct feedback, particular on key issues; workshops may also be designed to generate solutions to problem areas, with definitive measures to be undertaken

The Internet is sufficiently well established worldwide that it must be an essential and fundamental means for communication. Its universality makes it the perfect medium both to inform and receive feedback from stakeholders, the residents of the basin, and the international community.

In developing countries, the local communities cannot be expected to have ready access to the Internet, and this is certainly the case for communities in the inner delta, whose involvement is crucial to the management planning process. Alternative means of communication have to be established, and in this respect existing traditional communication infrastructure should be the first considered.

Basin management planning, and in particular negotiations over water allocation among competing uses has to based on solid data and analysis, accepted by all participants. Existing knowledge of the phenomena governing the hydrologic patterns in the particular basin is often available for the management planning, but frequently this knowledge is expressed in qualitative terms, and open to dispute among stakeholders wishing to emphasise their particular views and opinions.

It is important firstly to establish reliable systematic monitoring of the hydrologic parameters, and build a solid reliable database as the bases of scientifically objective hydrologic analyses. The results which may range from desktop studies to sophisticated integrated hydrologic models can provide indisputable transparently objective data as the basis for crucial negotiations over water allocations. In particular hydrologic models can in addition to representing the present basin state may be employed to predict future states under different scenarios, such as water resource developments, and regional climate changes.

The foundation of the communication process will be stakeholder group meetings, comprising:

(1) consultative meetings to develop national wetlands policy and strategy

(2) technical workshops to compile major environmental threats

(3) traditional community council (kgotla) meetings

(4) Community Based Natural Resource Management (CBNRM), highlighting conflicts among stakeholders

(5) Through the medium of OKACOM, whose secretariat will be established in Maun (the major town within the Ramsar boundary and the same location as the ODMP Secretariat).

(6) A Sociological Survey of the Basin (from Every River)

(7) Stakeholder Workshops to formulate the design of ODMP.

(8) Face to face consultations among communities, NGOs and government departments.

4.3.9 Activities

Activities conducted by the Okavango Delta Management Plan outside TwinBas have been Community Meetings, and a meeting with representatives from the tourism sector. The feedback from the community and tourism sector meetings is incorporated in the following section on Stakeholders Influence.

Community Meetings

The administrative district for the Okavango Delta is Ngamiland. Ninety-seven percent of the district lies within the Ramsar Boundary, with a population of 121,661. Community meetings have been held in and around the delta, in all major settlements with a population greater than 500, and in remote communities with populations less than 500. The aims of the meetings were:

- To inform the communities about ODMP and its planned activities
- To conduct a presentation by the project management, with extensive question and answer sessions
- To identify major issues and potential areas of conflict

The meetings were attended by an average of 1.5% of the population. Traditional leaders expressed dissatisfaction with the low attendance, particularly by the educated youth of the communities, who should have shown a more active interest.

The gender ratio among those attending the meetings was 2:1 men to women. Of those speaking out, women were less than 1%. It has been the tradition that women and young people are neither encouraged to attend such meetings, nor to speak out. This is changing, as demonstrated by the appointment of a woman as Chief of Chiefs (traditional leaders) for the first time in Botswana in 2003.

Nonetheless, it is recognised that in this traditional society those who attend will pass on the information and discussion issues to other members of the community who did not attend. This may be supported by the fact that in the smaller communities the attendance percentage was higher.

Tourism Sector

The tourism sector is particularly important to the economy of the delta, and to the national economy. Tourism generates the second largest income after diamonds (cattle farming is third). Its development is a key component of the government's strategy to lessen the economy's dependence on diamond mining, which has finite reserves.

Tourism in the delta is managed by the Department of Wildlife and National Parks (DWNP), in the Ministry of Environment, Wildlife and Tourism. The main area is the national park, Moremi Wildlife Reserve, covering around one third of the delta area. Other areas are let out to the private sector as concessions. The emphasis is on low volume high value tourisms, based on remote luxury lodges managed in an environmentally sensitive manner, to minimise adverse impacts on the environment.

A particular meeting was held for the tourism sector. One hundred and twenty companies were invited, of which 60 were represented. The meeting had the format of a presentation, followed by a question and answer session.

4.3.10Stakeholders' influence on the research within the basin

General

The provision of government services to the communities of the delta is inadequate. Twelve percent of comments related to shortcomings in the process of communication. Lack of communication and coordination among government departments was frequently observed.

While the plans for the consultation process were welcomed, providing an opportunity to discuss concerns, it was the expectation that opinions would not be taken seriously, there would be no feedback, and no apparent action. (An example cited was the planned hydropower development at Popa Falls in Namibia.) Preconceived plans had already been laid, based on the political aspirations of their proponents.

The government is more interested in the protection of the delta than in the well being of its inhabitants. The natural environment is in good condition, thanks to the role of traditional leaders in safeguarding the natural resource. Conservation regulations are contrary to traditional use. These should be available in Setswana (the main local language for Botswana), and not just English (the language of government in Botswana).

Participation

There was a general appreciation of the of the consultation mechanism that has been initiated. Scepticism was voiced based on the fact that no action had been taken on issues raised previously in such fora. It was also felt that local opinions are not taken seriously by government officers who have already made their decisions, as there has been no feedback from the government departments. There was a clear lack of trust in the government.

Local land users have profound knowledge based on lifelong experience, and as such are better informed than the technical experts, but they do need more information and technical knowledge, through educational workshops, to contribute meaningfully. There is a need for a central data and research institution, focussing on well targeted research, with data and results readily accessible to all stakeholders.

Hydrology

There is a long term decline in flooding in the delta, and upstream dams have already reduced the water inflow to the delta, and the water pollution is increasing. (Both these perceptions are in fact incorrect, so far.) There is less rainfall over the delta. (In fact the rainfall over the basin, and the inflow to the delta, are suggested to have long term cycles. The last ten years have seen less rainfall.

Proper EIAs had not been carried out for the ground water abstraction along the western and southern margins of the delta. The clearance of vegetation blocking the flow of water through the channels of the delta is also a controversial issue among local communities.

Wildlife

Elephants pose the greatest threat to the person and livelihood of the delta's inhabitants. The compensation offered by DWNP for the damage caused by protected species is inadequate.

Vegetation

Natural resources are harvested as an important part of the livelihood of the communities, eg reeds to make traditional baskets. The government wants to stop harvesting. Outsiders are also coming into the area to harvest the resources. There a lack of enforcement by the government to prevent this. To manage the resources better, more responsibility should be given to local leaders.

Fires destroy the vegetation. (Fires are started both naturally and deliberately by man. They are also part of the natural process of regeneration of the vegetation.)

Livestock

Cattle are the main livelihood for people living in and around the delta. It is anticipated that cattle farming will be limited by the management plan. The veterinary fence which rings the inner delta and separates cattle and wildlife (which harbours infectious diseases such as foot and mouth) is a major controversial issue. The fences are damaged (by wildlife and villagers), and maintenance is inadequate. Cattle found inside the fence are shot, and compensation is inadequate. The eradication of tsetse fly by aerial spraying has been good (allowing the existence of cattle and humans in the delta). Boreholes have been drilled in the outer delta areas, drawing water from the vegetation.

Flood recession (molapo) farming is a traditional activity, yet there is a conservation ban on farming within 500m of a watercourse.

Tourism

Tourism creates jobs and is a major income for the inhabitants in and around the delta. The communities should be more involved in its exploitation – there is a lack of transparency and the private companies are seen as removing a large part of the income from the area and the country. (It is reported that only one third of the income from tourism remains in Botswana.) Tourism is operating at its full capacity. Waste management at tourist camps both public and private is inadequate.

Hunting and Fishing

Hunting and fishing rights in the delta are restricted, though boundaries are unclear. (Permit based hunting is permitted in certain areas of the delta – a license to shoot an elephant and remove the trophy costs around USD10,000 – many people believe the area is overpopulated with elephant, though environmentalists may disagree.) There is a conflict between fishing for local subsistence (permitted outside the wildlife reserve) and fishing for sport. There is no proper control, and stocks are being depleted. Poaching is common.

Hydrology and Water Resources Component

Botswana has few sources of surface water, posing a constraint on national development. The largest of these sources is the Okavango Delta. The Department of Water Affairs has the task of addressing the issues relating to the waters of the delta, their occurrence, distribution, state and utilisation. There are two main tasks:

- Set up an improved monitoring programme for the delta
- Set up an Integrated Hydrologic Model of the delta

The basic outputs from the model are grid maps and time series of the surface and ground water levels and flows throughout the delta. Additional outputs include actual evapotranspiration and soil moisture.

The Integrated Hydrologic Model is set up to represent conditions in the delta as they exist at present. The results from the model provide information on the present patterns of flow and water levels, and on the water balance distributed throughout the delta.

The model is then applied to simulate various scenarios for ODMP, among which are:

- Upstream water resources developments: dams, irrigation, water supply in Angola and Namibia
- Surface and ground water abstraction from the delta area
- Clearing choked channels by cutting reeds and dredging new channels
- Regional climate changes
- Other scenarios suggested by stakeholders

For each scenario and combination of scenarios simulated, the model provides the impact in terms of water levels, discharges, etc. Appropriate grid maps and time series of inputs (inflow, precipitation, etc) are prepared by the Hydrology and Water Resources component and applied to the existing state of the delta.

Based on the results of the basic scenarios, a set of scenarios representing the management plan are prepared and through an iterative approach interacting with the stakeholders refined to the proposed plan. An essential part of the process is training stakeholders in understanding the hydrologic processes at work in the delta, the mutual development of interpretation of the model results and the links between hydrology and the ecosystem, communities and biodiversity.

Integration with Other Components

The other six technically oriented components of the management plan use the results of the model to assess the impact of these scenarios on their individual areas of concern. For example, given a scenario with increased abstractions for irrigation in upstream countries, the water levels and flows in the delta will be reduced. The model provides these reduced water levels and flows throughout the delta.

The seven technical components then assess what the impact will be on their particular sectors. The most feared, and perhaps also the most likely, impact of future development in the Okavango River Basin is reduced surface and ground water levels, and extent of the swamp and river system. The results of the model may be used by the individual components to assess the impact, for example:

COMPONENT	POTENTIAL IMPACT
Hydrology and Water Resources	Reduced availability of surface and ground water supplies
Wildlife Management	Reduced availability of surface and ground water may result in fewer wildlife numbers
Vegetation Resources	Reduced water availability may result in increasing desertification in and around the delta
Fisheries Management	Reduced flows and levels may result in fewer breeding grounds and reduced fish stocks and varieties
Sustainable Tourism	Reduction in the flora and fauna numbers and diversity may result in fewer tourists to the delta
Waste Management	Reduced flows may result in reduced dilution of water borne waste products
Livestock Management	Reduced surface and ground water availability may result in fewer livestock numbers and production

The Integrated Hydrologic Model provides the impact of development scenarios on the flow patterns in the delta. It does not provide the impact on wildlife, fisheries, tourism, etc. The impact on these sectors has to be estimated by these individual components.

4.3.11Workshops

Soundings were taken among the stakeholders in the basin regarding convening an international workshop involving stakeholders from all three riparian countries under the TwinBas project. Four basinwide integrated water resources management workshops had been held prior to TwinBas by two related preceding projects.

- **Sharing Water** supported by USAID had conducted preliminary water resources modelling of the upstream basin to assess the potential impact of irrigation and hydropower developments in Angola and Namibia, and interbasin transfer from the Okavango to the Swakop River in Namibia.

- **Water and Ecosystem Resources in Regional Development (WERRD –** EU funding) had set up a hydrologic model of the Okavango River Basin for application to a range of development scenarios. Outflows at Mukwe for input to the delta model for a number of water resources development scenarios, including hydropower in Angola, and climate changes over the basin, were provided and utilised by TwinBas and ODMP.

It was found that a degree of workshop fatigue had set in among the stakeholders, and the response would be limited, so the plans were not carried through. There was no reporting from the WERRD project, and some stakeholders were critical that their efforts providing data and information to the WERRD project had simply been utilised by the project consultants to submit research papers for publication.

Nonetheless, considering the importance of stakeholders' outlooks and potential actions in Angola upstream, a special study was commissioned by TwinBas, as reported in Appendix B.

Given the fundamental importance of water to the environment of the Okavango Delta, two stakeholders' consultation workshops were held in Botswana, in February 2005 and June 2006. The workshops were accompanied by one to one bilateral meetings with each individual stakeholder, to broaden the scope for an effective exchange. The objective of the workshops and bilateral meetings was to foster a close interaction between the hydrology and water resources activities, and the water related needs of the other sectors.

The issues for discussion in the first workshop were:

- Inform project partner institutions and the community about the role of the integrated hydrologic model in management planning
- Afford the project partner institutions and the community the opportunity to comment on the outputs of the model and to suggest ways in which the outputs or result can be made usable by them
- Afford the project partner institutions and the community the opportunity to suggest management scenarios relevant to their respective institutions
- Ensure that this component is community driven or encompasses the views of the majority of the stakeholders from the beginning
- Guarantee ownership, commitment and sustainability of the project
- Minimise risk during implementation of entire management planning

The following conclusions and recommendations are made with regard to the future interaction between hydrology and water resources and the other participants.

(1) While the introductions to the set up and application of the Integrated Hydrologic Model attempted to convey the complexity of the delta hydrology and its computer based representation, further effort needs to be made to present the model and its results in a manner which is fully comprehensible to the Stakeholders, most of whom do not have in depth hydrologic knowledge.

(2) It was originally believed that presentation of the model to Stakeholders in a combined forum would allow the interchange of ideas and knowledge among the Stakeholders regarding hydrology and water resources. The resulting discussion tended to be dominated by those with technical hydrologic knowledge at the expense of those without. The next round of discussions should be on a bilateral basis, such that the discussions can proceed at a level appropriate for the individual Stakeholders, and their needs in respect of hydrology and water resources.

(3) Each stakeholder should identify a suitable person to act as a focal point for liaison with the Department of Water Affairs (DWA). This person would attend all future meetings and Workshops aimed at integrating hydrology into the management plan, thereby providing continuity to the process.

(4) Data Management is crucial to integrating and interpreting information among the partners. A member of the Data Management component should also be involved in discussions to demonstrate how this can be realised in practice.

Given the lessons learned from the first workshop, a second round of bilateral meetings and a workshop was convened fifteen months later. This time, the bilateral meetings preceded the workshop. The more intimate setting of the one to one meetings gave the opportunity to draw out the views and concerns of the stakeholders (more so than in the open forum of the workshop), and also to prepare the stakeholders that they could express their opinions more openly and more meaningfully in the coming workshop, thereby achieving a greater degree of interaction in the workshop.

Objectives of the Meetings and the Workshop

The broad objective of the meetings with the individual stakeholders was the integration of the hydrology and water resources analysis with the activities of the other stakeholders, leading to the formulation of the management plan for the Okavango Delta.

The immediate objective was that the stakeholders have a better understanding of the hydrology of the delta, and that the results from the analysis best meet needs for knowledge of the hydrology as it relates to their specific component.

Format of Bilateral Meetings and Workshop

In the Bilateral Meetings, DWA staff assisted by the consultants presented the hydrologic analysis of the delta in an informal round the table meeting, during which the component's representatives were free to seek explanation and clarification of any issues not fully understood. The discussion then shifted to the needs of the component in respect of knowledge and understanding of the delta hydrology, and how best DWA could meet these through the model application, and through monitoring the delta hydrology.

The Workshop followed a similar format, and in addition to consolidating the outcomes of the bilateral discussions provided the opportunity for dialogue among all components in relation to the hydrology of the Okavango Delta and the basin upstream. Posters (three A0 sized) were used for presentations with meeting attendance averaging eight excluding the presentation team. The same presentation format was adopted for all the meetings.

Who were to attend

The idea was that the individual stakeholders in the Bilateral Meetings and Workshop should be represented by staff with knowledge of the Okavango Delta and their department's role in the management plan, and consultants assisting the component. The representatives were to have studied the report on the Scenario Analysis, and be prepared to make comments and seek further explanation if required. Some understanding of hydrology in general and of the hydrology of the delta in particular was an advantage.

Runoff from the Okavango River Basin upstream is crucial for the survival of the delta. The idea was to also invite other partners from the EU TwinBas project, who are studying the water resources management of the Okavango River Basin as a quin among five river basins in four continents, to present their analyses of the water resources of their respective basins, and participate in the discussion. This was instead conducted in a TwinBas project partners meeting in the basin in February 2006, attended also by key delta stakeholders.

Other institutions and community driven organisations were also invited to the workshop. An extended invitation was also made to spatially sampled councillors for the area, though none attended.

The presentations started with a statement of the development objective with special emphasis on integration of resources and sustainability. With this background, the audience were introduced to the MIKE SHE modelling system's application to the Integrated Hydrologic Model (IHM) for the world's largest wetland. Key hydrologic processes characterizing the dynamic functioning of the delta and on how all the waters in the different phases of the hydrologic cycle are studied in detail were simplified in explanations. Data requirements in terms of inputs and calibration processes were covered.

The model limitations, were explained to the participants. It was emphasized that the setting up of the IHM for the delta is a major advance in hydrological modelling, in particular with the topographic model, full integration of surface and ground waters and detailed representation of the complex evapotranspiration processes. An introduction to the Scenarios development, both upstream and within the delta, was covered.

Following an open discussion, with the aim a stratified discussions, the participants were divided into three groups;

- Physical
- Biological, and
- Social

It was explained to the groups that the discussions are cross-cutting and, in addition to issues within their individual sectors, those outside their respective sectors could also be discussed. The following key questions, neither exhaustive nor restrictive, were given to the groups to spark the discussions:

1. Are the results of analysis understandable?
2. Are the results in the format useful?
3. What are your expectations from the component?
4. How could the Hydrology & Water Resources better address your needs?

Generally, the groups felt that the results of scenario analysis are understandable. A summary of the key issues raised and discussed is presented below. Specific responses are given in italics.

- There was a general consensus that the results of analysis are understandable, and the animation figures and the flooding regimes are easy to understand and use. The outputs can help in understanding fish and wildlife spatial distributions, among others, by correlation with water distribution. The key information that the model can provide is very good.

- There was, however, a feeling that the combination of formats to present the same information could be better, combining images, graphs and tables. Supporting data should also be presented alongside respective images.
- There was a general conclusion that the model should be able to inform other components/sectors (decision making bodies).

  The model is a hydrological one and the other respective components should not expect it to give them any information on vegetation, wildlife, fish, livestock, tourists, etc. The other components should examine the model outputs, consider their own interests and see how best they can utilise the results of the model.
- There was a plea for finer resolution so that applications at smaller scales could be feasible.

  The model has been developed with the 1km resolution to study the delta as a whole and to address the broad management plan objectives. A finer resolution would have led to excessive run times. Finer resolutions have been developed for a few selected areas.
- The outputs should be simplified so that the local community can understand their import. This could help in clarifying the response and adaptation strategies by the community to different scenarios.

  We are trying all our best to present the results in the simplest way possible. In refining the scenarios, we have tried to address the comments of all concerned as far as possible.
- The perceptions that the delta is shrinking should be verified with the observed data.

  We have established the baseline conditions (1987-2002), the condition of the delta as it is now with its current use, with which all the scenarios are compared.
- There was also a concern that there is a missing link. The outputs should not just be restricted to water. There is a need to pose probing questions on implications to other sectors like Land Board for example. Issues like channel blockages clearance and how it affects livelihoods need to be covered.

  We could try incorporating other sectors' areas of interest in presenting the model results, but the respective components should help us in this regard. The sectors could benefit from the model by engaging in a dialogue with the Department of Water Affairs (DWA).
- One other expectation was that the model could help in locating sources of pollution.

  With water quality incorporated, it will be easier to have an idea of the spatial and temporal distribution of the pollutants. Much more resources are required for this than are presently available.

Overall, the second workshop was judged a success by all concerned.

4.3.12Evaluation Report

Application to the hydrologic and water resources analysis has been the primary output from the hydrologic model. In addition to representing present Baseline conditions in the delta, the

model is also applied to several water resources scenarios:

- Water resources developments in the upstream basin – hydropower and irrigation
- Water abstraction from the delta – surface and ground water

- Vegetation encroachment blocking channels, and clearing blocked channels
- Climate change over the basin, including the delta

Among the results of scenario analysis are the impact of irrigation and climate change on the lower envelope of the flooded area (ie the area that remains flooded throughout), and on the decline in soil moisture content.

Under a related activity, the Okavango Delta Information System (ODIS) is being established. This meta-database will allow all components to view information from all sources. A particularly useful feature will allow spatial information to be displayed as layers, for example overlaying animal distribution with water and settlements.

The model is also being used by other stakeholders:

Sustainable Wildlife Management is using the spatial and temporal distribution of water in conjunction with settlements, animals and vegetation to help deal with the conflict between humans and animals. It may be useful to present time series for areas such as Moremi Game Reserve, and within the veterinary (buffalo) fence. It is appreciated that the information is presented in a highly visual manner.

Physical Planning is preparing a development plan for Shakawe in the Panhandle. They would like to know the area liable to flooding. Shakawe has an area of 58.6ha, well below the minimum 1km^2 resolution of the model. At this stage of development, the model can only provide an indication of the water levels and flood extent in the vicinity of Shakawe and other settlements in the delta.

Sustainable Land Management is preparing a land use plan for the delta, and finds the results of the hydrologic model very useful. Limitations with respect to the results may be with respect to delineating flood extents for low probability events (50 and 100 year return). Satellite observations are only available from 1984. Relative flood frequencies comparing baseline and scenario flood frequencies (from 15 year run periods) will be prepared. In terms of ground water, the model can give a general indication of the depth below the delta. For detailed studies, finer grid ground water models of local areas are required, together with detailed borehole information.

Vegetation Resources Management is using the water distribution to predict the vegetation biomass that can be utilised for wildlife, and the soil moisture for the species and distribution of the vegetation. High prolonged floods may limit biodiversity owing to waterlogging. The results may also be used to study the bush encroachment as the delta shrinks, and also the distribution and spreading of fires. Scenarios on blocking and clearing channels will be used in an environmental impact assessment of the proposed deployment of weed clearing machinery. The flow patterns will be useful in assessing the spread of alien invasive species.

Tourism is concerned about the density and distribution of lodges in the delta. The flow patterns for the Baseline and Scenarios overlaid with the location of the lodges will assist in determining the carrying capacity, particularly with respect to pollution from sewage and waste from lodges. Neither surface nor ground water quality is planned to be incorporated in the model in the present stage of development, though the technology is available.

Fisheries will use the animated flow patterns and flood extents to study fish dynamics. Fish inhabit shallow and deep water: flood plains are breeding grounds for fish, and as the water recedes they move back into deeper water. The scenarios on blockages and clearing will also prove useful. Fisheries would also like to see water quality included in the model.

In summary, the response of the stakeholders to the information provided by the model is very positive, and on the whole meets their needs. Some stakeholders would like to see a higher resolution, while others are concerned about water quality. While this is not a constraint of the technology, considerable additional resources will be required to collect

improved hydrologic, water quality and topographic data, and to set up and calibrate a more accurate and detailed model, including water quality.

The model application is presented in more detail in WP7 – Change Effects and Vulnerability Analysis.

4.4 Norrström

4.4.1 Identification of stakeholders and development of communication plan

The stakeholders within each of the Norrströms tributaries were identified in WP1, and those relevant to the pilot area of the two tributaries Sagån and Svartån were then engaged in the stakeholder involvement process, starting with discussions on how to practically carry out the process in 2004. One of the main stakeholders has from the start been the City Council of Västerås City, by far the largest municipality with responsibilities for Sagån-Svartån. Västerås city has been deeply engaged in the TWINBAS stakeholder involvement process, trying to contribute to a long-term relationship between the city stakeholders including different city agencies and the city-owned company providing sanitation, drinking water and energy, on one hand and the farmer community on the other. These are the two main stakeholder groups relevant to efforts reducing Sagåns-Svartåns contribution to eutrophication of Lake Mälaren, which is the major water problem in the area. Västerås City manifested its engagement by funding a parallel project with 50. 000 Euro allowing IVL to improve the details in the water quality status modelling and action cost-efficiency for Svartån-Sagån, and in a later stage to intensify the communication with the farmers.

In collaboration with the management office of Västerås City, the stakeholder involvement process described in the communication plan (Appendix D) was developed. In short, the process includes:

1. Produce a scientifically-based description of the status of the selected sub-basin in terms of water quality, transport of pollutants (i.e. nutrients) and sources to the pollution, by modelling calibrated to measurements.
2. Present the status description to the relevant stakeholders and in particular the farmer community, to form a working group of stakeholders and to identify all relevant actions to reduce nutrient emissions in collaboration with this group
3. To analyse the effects of these actions by scenario modelling, to select a prioritised set of actions in collaboration with the working group, and to present this action set to the full stakeholder community.
4. To analyse in detail the cost-effectiveness of the priotised actions, to present the results to the stakeholders and to try to get acceptance for the suggested actions from farmers and other stakeholders.

This plan was finalised early in 2005, and the other major stakholders were then approached to give input to the process at two meetings, and hopefully endorse the strategy. Full support was given by these stakeholders, i.e. the District Water Authority (DWA), and the County Board who has the practical responsibility for public participation and stakeholder involvement relating to the EU Water Framework Directive (WFD) in the area (delegated by the DWA).

4.4.2 Contacts and interaction with stakeholders

With the above basis and acceptance of the process, two meetings were held with the major stakeholders in the autumn 2005 (17 October and 19 December). This time also a regional representative of the Federation of Swedish Farmers (LRF), to which the vast majority of farmers are associated. Concern was raised by LRF that the level of detail in modelling input data would not be adequate to give modelling results allowing analysis of action effects on local level,, i.e. of interest to the farmer properties. However, Västerås City, the DWA and the County Board supported planning of the first broad meeting with the farmers to inform about the status of the pilot area and the sources to pollution. At these meetings, the DWA also gave a preliminary target for nutrient reductions in Svartån-Sagån, although the process to identify these targets were not finalised. This gave a necessary basis for discussions on measures with the farmers.

DWA and the County Board at this stage found that IVL should not initiate a project-related stakeholder process parallel to the official stakeholder involvement efforts of the DWA and the County Board to come, but that IVL should instead participate in the official process. Thus the County Board, agreed to start the official process for the area earlier than planned, as a first 'operational test', and organised the first broad meeting on 22 March 2006, to which 300 farmers from the pilot area were invited. IVL were to present the status of the Svartån-Sagån water bodies, and initiate discussions on the farmers views on feasible actions to reduce nutrient leaching. To this evening meeting, with representatives from the DWA, County Board, Västerås city and IVL, came only seven farmers. The very low number of attendees made it unfeasible to form a representative working and start the interactive process of evaluating relevant measures with such a working group.

The way forward was re-evaluated during the following month. The reason for the low interest to discuss the status and measures for the 'home' river of the farmers was through communication with some of the farmers and LRF was found to be twofold: 1) The notion that many of them have already implemented a number of measures to reduce leaching of nitrogen and phosphorus but are still seen as environmental 'villains', and 2) the fact that LRF did not entirely support the idea of communication directly with the farmers at this stage, since modelling of the status of the river and the sources to nutrient pollution did not take into account information from each farm, and thus could give misleading results for individual farmers or groups of farmers. In a follow-up meeting the May 17, it was agreed between DWA, the County Board, Västerås city, IVL and LRF, that the stakeholder involvement activities should be revised to address these concerns of LRF as well as individual farmers. At the meeting it was agreed that IVL should collect detailed information on fertiliser use, soil-N and soil-P, soil type, crops and management practices (sowing date, fertilising dates, cultivation/plowing practices etc.) from each farmer in a selected area, re-iterate the modelling with this data and evaluate the results, in comparison with modelling results that only uses statistical regional data on fertiliser use and management practices, soil data from soil maps and soil-N, soil-P data from sparse soil profile data available for the entire Sweden (appr. one soil profile per 50 km^2). Then, with this basis, effects of further measures could be discussed.

IVL thus defined an area of a size that would allow interviews with the majority of the farmers within the budget available. The Lillån stream, a tributary to Sagån, with a catchment size of appr. 200 km^2, dominated by arable land, was selected. Approxmately 20 of the farmers in this area, representing some 70% of the farmers, were visited and interviewed. The fact that 70% accepted a visit and interview was very positive, bearing in mind the low interest for the initial meeting. Each farmer was interviewed for approximately 45 minutes regarding the management practice and soil factors mentioned above.

List of farms interviewed:

Dräggesta	Sösta
Ekeby	Sundby
Frändesta	Tå
Hedensberg	Tillberga by
Igelsta	Tomta
Kittslinge	Tortuna
Kolmsta	Vedby
Mycklinge	Viggby
Nibble	Åbylund
Ramsta	Ösby

List of variables and items for which information was collected from the interviewed farmers.

Amount of fertilizers	Kg / ha
Crop yield	kg / ha
Drainage	Depth from surface and age
Information from soil mapping	Nutrient content
Management dates	Average dates for the last years
Organic content	Percentage
Soil tillage	Type of equipment
Soiltype	
Type of farming	Animal and/or grain farming
Type of fertilizer	Fertilizer of manure

This information was used as input data to SWAT modelling. The modelling effort was carried out in the parallel project funded by Västerås City (Wallenberg and Ekstrand, 2007). The detailed input data provided by individual farmers clearly improved the modelling results, with better accuracy for phosphorus and to some extent nitrogen when compared to validation measurement data. The level of leaching was also significantly reduced, with as much as 30% for phosphorus, clearly showing the necessity of using detailed farm input data in the modelling.

With the detailed input data, the basis for analysing the effect of relevant measures were also significantly better. The results of these cost-effectiveness analyses are presented in WP 9.

The conclusions to be drawn from the stakeholder involvment efforts in Svartån-Sagån have significant bearing for the continued water management process in Sweden. The reluctance of the farmers to participate in discussions on measures to reduce eutrophication, in many cases caused by their feeling of already having carried out measures without getting any credit for

it, makes it difficult to organise large meetings for information dissemination and discussions. Face-to-face interviews do work, if the interviewer is from the area and has a farming background, but is very time-consuming. Information dissemination via Internet, using e.g. the webtool developed and described below, does work since all stakeholders including farmers have Internet access, and are interested in the state of their river and to be updated regarding measures, in spite of the reluctance to discuss measures when the invitation comes from authority stakeholders.

The well-founded conclusion that it is necessary to collect data on management practices and soil characteristics from farmers to reach an accuracy in the modelling results that is high enough to allow analyses of action effects, is very important for the formation of programmes of measures during the years to come, as stipulated by the WFD. These findings have been disseminated to the DWA, the County Board and Västerås City at a meeting the 15 March 2007, and to the DWA and County Board of western Sweden (the country is divided in five water districts) in a meeting the 10 April, 2007.

Webtool

To support future stakeholder involvement a webtool was developed for Norrström. The tool includes information concerning the stakeholder involvement in the pilot study in Svartån and Sagån as well as general information concerning the WFD, a description of the eutrophication problem, important links to other useful information, etc. The website also includes lists of stakeholders and their contact details, and there is a discussion forum which enables contact between users (Figure 4-2).

The integrated map service is an important part of the webtool. Detailed information is shown in maps of Sagån and Svartån, while protected areas such as Natura 2000 areas are shown for the whole Norrström basin.

The maps of Sagån and Svartån show point sources for eutrophication, measurement points and modelled area specific losses of phosphorous and nitrogen (Figure 4-3). There are also graphs showing the relative contribution of nitrogen/phosphorous from different sources.

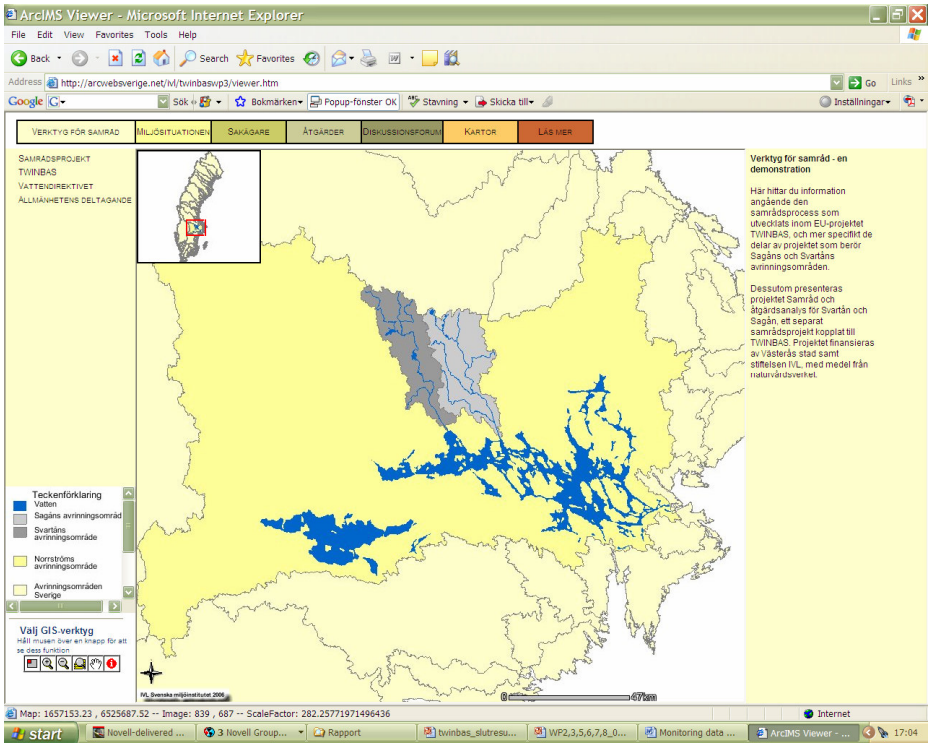

Figure 4-2 Webtool for the stakeholder involvement process.

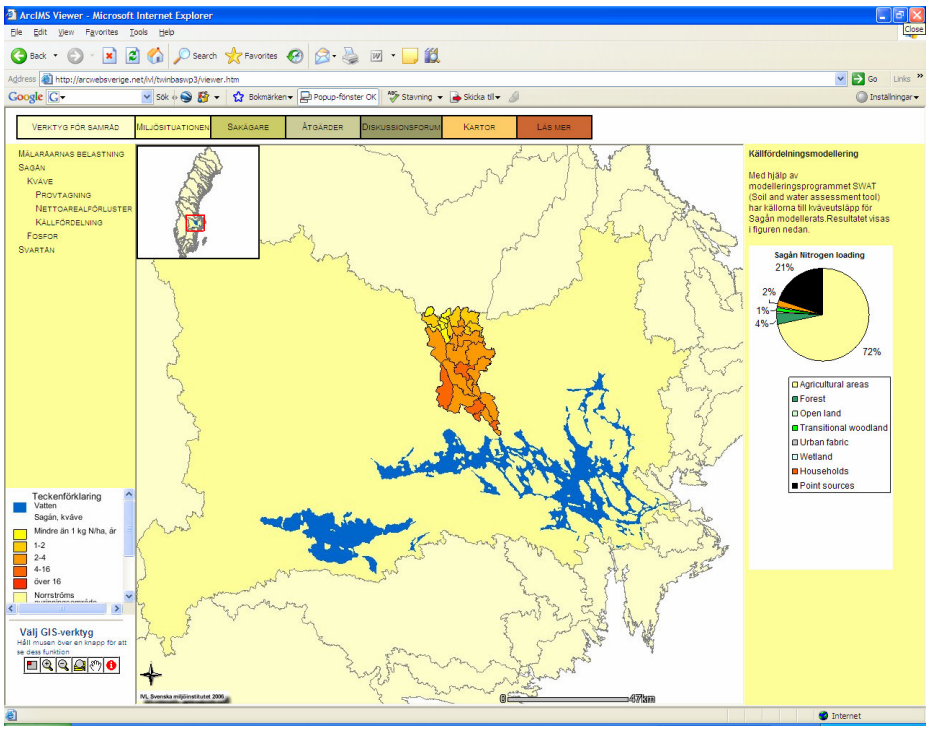

Figure 4-3. The map shows gross area losses of nitrogen and the graph to the right shows source apportionment within the Sagån basin.

4.4.3 Stakeholders' influence on the research within the basin

Apart from the stakeholder involvement relating the development and testing of a stakeholder involvement process described above, in which the authority stakeholders as well as farmers and other stakeholder groups had a vital role and significantly influenced the development work, major stakeholders have also been given the opportunity to influence the other TWINBAS research tasks carried out in Norrström.

In the initial project phase, January to April 2004, meetings were held separately with the DWA and the County Boards of Västmanland, Örebro and Stockholm, and Västerås City, in order to collect views on research priorities relating to the fields covered by TWINBAS, and to acquire local ownership for the research to be carried out. The selection of pilot areas within the Norrström basin as well as the priority given to different research tasks was adapted to the input from these stakeholders. The main pilot areas, Svartån-Sagån was selected in collaboration with these stakeholders. The priorities relating to improvement of hydrological modelling and water quality modelling as well. The shift of resources from ecological status assessment to water quality modelling was realised due to a request from the DWA not to develop methods for and carry out a ecological status assessment that would be parallel to the DWA'a own assessment and thus create confusion. Also, the shift in ambition in WP 9, from development of a full research based river basin management plan to further development of knowledge relating to effects of measures, and more specific suggestions for a programme of measures for Sagån-Svartån, was a result of discussions with DWA, the County Board of Västmanland and Västerås City. Thus, the project has had a sensitive ear to the priorities of the major stakeholders, and also to grass-root stakeholders in parts that involved them, as described above.

The head of the DWA of the region (Water Authority for the Northern Baltic Sea District) Mr. Lennart Sorby accepted to represent the national co-funder of TWINBAS, the Swedish

Environment Protection Agency, in the TWINBAS Project Board. DWA has given significant input to the research process throughout the project.

The results in terms of methods, modelling results and data is being transferred to the main stakeholders mentioned above, providing a significantly improved basis for the pollution pressure analysis, the programmes of measures soon to be fixed, and the river basin management plan which is the responsibility of the DWA.

4.4.4 Evaluation Report

The major authority stakeholders with responsibilites for the pilot area Svartån-Sagån (which was selected in collaboration with the stakeholders) have contributed very positively with time and efforts. This in particular includes Västerås City, the DWA, the County Board of Västmanlandand in parts of the process LRF (The Federation of Swedish Farmers). However, the difficulty to engage farmers at the local level, for reasons described above, made it unfeasible to carry out the stakeholder involvement process outlined in the communication plan, building on iterative meetings with a working group of farmers, with larger meetings at crucial points.

Instead, an approach building on data collection during interviews were carried out, and was successful though time-consuming. The data was used in modelling, and the outcome, that the farmers and LRF were right; local detailed data is required in order to provide accurate modelling results and possibilities to analyse effects of relevant measures (also excluding measures that have already been implemented), is of high importance to the continued work with farmer involvement in the efforts to reduce eutrophication of Swedish lakes as well as the Baltic Sea.

With this basis, the next step could be to actually test the approach initially outlined, to identify and get acceptance for a programme of measures with a iterative communication phase based on working meetings with a working group, with large meetings at crucial points, and a research organisation such as IVL to provide scientifically-based analyses of the effects of the measures discussed at these meetings. However, such a process could not be carried out in the time frame of TWINBAS.

4.5 Thames

4.5.1 Introduction

In the UK, the organisation responsible for implementing the WFD is the Department for Environment, Food and Rural Affairs (defra), through the appropriate competent authorities: the Environment Agency in England and Wales, the Scottish Environmental Protection Agency in Scotland, and the Environment and Heritage Services in Northern Ireland. Hence, in the Thames basin, the main tasks regarding public participation are being carried out by the Environment Agency.

Public participation forms an important element of social learning (i.e. learning though social interaction with others) in that it helps stakeholders to discover a shared purpose, define and articulate what they value, see issues from another perspective, and see through conflicting views to a shared vision for the common good. Social learning is a dynamic process which enables individuals to engage in new ways of thinking together, to address problems such as the unsustainable use of water. The EU guidelines on river basin planning advocate social learning as a valuable approach in implementing the WFD. The role of public participation in social learning is discussed in more detail at the end of this report.

The Environment Agency

The Environment Agency (the Agency) is responsible for the management of the water resources, water quality and flood defence in England and Wales. The Agency also has responsibilities for ecology/conservation and navigation. Much of the main river is navigable through a series of 44 locks, though virtually all boat traffic is recreational. Water management is organised on a catchment/river basis, so the entire Thames basin is covered by one administrative region. The Agency has divided the Thames into 14 subcatchments for which Catchment Abstraction Management Strategies (CAMS) are being developed, for managing abstraction on a local catchment scale. The management of water resources within the Thames basin is important due to both the limited natural supply and the increasing demand of these resources.

The Agency works with other government departments and local authorities with common interests. For example, the Department of the Environment, Food and Rural Affairs covers aspects of water policy in England and Wales including water supply and resources, and the regulatory systems for the water environment and the water industry. Agency work is supported by regional Statutory Committees made up of representatives of a range of interests, including business, local and regional authorities, academics, and environmental NGOs. Their role is to provide advice from different perspectives, to help the Agency initiate and develop new partnerships from their network of contacts, and to monitor and advise the Agency on how well they are delivering. The Agency also has a "Building Trust with Communities" programme to train and support staff around in all its regions to develop stronger relationships with the communities they work in.

In its vision for successful river basin management, called "Water for Life and Livelihoods", the Agency acknowledges that it needs to work with stakeholders, learn from them, influence their actions, and build on existing knowledge. Stakeholders are individuals or groups who use, have an interest in, or are affected by water. These include regulators, public authorities, government agencies, professional bodies, local organisations and members of the public. The Agency plans to ensure that all its diverse stakeholders are able to contribute effectively by helping them understand river systems and how these systems affect their interests, as well as being clear about how and when decisions are made and where their input informs the decision-making process. The Agency plans to engage with stakeholders at four different levels as shown in Table 4.5-1.

Table 4.5-1: **Environment Agency stakeholder engagement levels (source: EA "Water for Life and Livelihoods" in "A Framework for Stakeholder Engagement")**

Level	Stakeholder	Administrative scale	Focus
National	National Stakeholder Group (NSG)	National	NSG comprising many organisations, subjects and areas of expertise, to provide input to policies and procedures developed by Agency and Government, to feed into POM[1].
River basin district	Liaison Panel (co-deliverers)	EU reporting unit	Liaison panel comprising statutory bodies and other interest groups who can help to produce RBPs and deliver the POM[1].
Catchment	Agency-led/Existing networks	Whole river basin or sub-basin for long rivers	Groups who have an interest in or are likely to be affected by RBPs; flexibility to develop working arrangements and plans to meet particular local circumstances.
Community	Existing networks	Individual management unit	Places and communities where risks are greatest and specific local issues.

[1] POM Programme of Measures

Furthermore, the Agency recognises four categories of stakeholders, as set out in Table 4.5-2. The boundaries between the different groups are indistinct, with some overlap e.g. water companies are both co-deliverers and professional stakeholder organisations.

Table 4.5-2 Environment Agency stakeholder categories (source: EA "Water for Life and Livelihoods" in "A Framework for Stakeholder Engagement")

Type	Definition	Explanation
Co-deliverers	Agencies and institutions	All organisations with statutory powers to implement to basic measures needed to deliver RBPs.
Professional stakeholder organisations	Professional organisations	Public and private sector organisations, professional voluntary organisations and NGOs – all those professional organisations or individuals acting in a professional capacity who use the water environment and whose activities impact on it.
Local stakeholder organisations	Local groups: non-professional organised entities, operating at regional/local level	Communities centred on a place e.g. tenants, residents, amenity associations, or centred on an interest e.g. farmers, fishermen, bird watchers.
Members of the public	Individuals representing themselves, not groups or business groups	Individual residents, users, workers in area, business owners, landowners, farmers, visitors from outside area.

The Agency advocates a "toolkit" approach, with a range of methods available to be used as appropriate for the degree of concern in different locations and the breadth of key issues. The Agency has carried out a number of studies investigating processes for public participation, which have led to the development of its framework for stakeholder engagement, "A Framework for Stakeholder Engagement"). With particular regard to the WFD, the Agency proposed its Ribble river basin to be one of 15 Pilot River Basins across Europe used to test elements of the Common Implementation Strategy (CIS) guidance documents for the WFD. The Ribble basin is being used to test the public participation guidance and, at the same time, has influenced the development and testing of the Agency's own public participation guidance. This work, outside the remit of the EU pilot study, will also provide stakeholders with an improved understanding of how the WFD will impact upon their activities.

The process of public participation

Since the WFD specifies that active involvement of stakeholders is to be encouraged, and that consultation with stakeholders and access to background information by stakeholders are to be ensured, it is worth briefly considering the public participation process, and what ensures success or failure. Agency investigations have revealed that people are put off participation by a lack of awareness of participation opportunities, a perception that participation is dominated by certain groups or views, and an assumption that nobody will respond to their views anyway. People are most likely to participate in initiatives which address their stated priorities, where they are mobilised and work through local community leaders, and where they are made to feel that their views are important e.g. by being actively recruited or asked to participate.

Parallel investigations of those organisations or bodies actually conducting the public participation process found a mixed picture of positive and negative perceptions. The advantages of participation included how the process can encourage a greater understanding of problems and possible solutions, can reveal the public's preferences and experiences and, thereby, improve decision making and service delivery, and can help avoid unpopular decisions and shape better informed policy making. However, concerns were raised that the public's expectation may be raised unrealistically, that those who participate may not be representative, that some people see participation as confirming decisions that had already been made, that participation seems to have little impact on operations and decision making, and that the authority's own decision making responsibilities might be usurped.

Recognition of these mixed messages enables a more effective public participation plan to be designed and implemented. The four key stages in developing an effective communication strategy are:

- Improved comprehension – being clear about goals and capable of selecting the most appropriate public participation technique given the circumstances and context;
- Better communication – letting people (inside and outside) know what you are doing and why, including the commitment to public participation and feedback of messages heard;
- Building capacity – recognising the long-term need to build an infrastructure (inside and outside) to sustain public participation;
- Strengthening connections – making a difference in terms of a measurable impact on the decision making process and the way services are delivered and community needs are met.

Before conducting any public participation process, it is worth considering issues such as how much time, money and capacity are available, how large the stakeholder groups are, whether stakeholders need to interact with each other as well as with the project team, and how quickly information and messages will change through the participation process.

4.5.2 The Ribble basin

Background

The Agency's testing of the public participation guidance element of the WFD CIS in the Ribble basin started in March 2003. The testing had two objectives:

1. Contribute to the official Common Implementation Strategy testing process by May 2004 by:

- Taking a systematic approach to designing engagement methods and testing the draft guidance;
- Involving stakeholders in all steps of the work so as to demonstrate active involvement.

2. Prepare a prototype RBM Plan and Programme of Measures (PoM) for the Ribble Basin by May 2007 by:

- Examining how stakeholder engagement at basin (local) and district (regional) level is functioning;
- Working with stakeholders to develop their understanding of how the WFD will impact on their activities and seek their input to possible solutions and the PoM.

Basin description

The Ribble basin lies within the North-West River Basin District and includes the Ribble, Douglas and Crossens catchments (Figure 4-4). The river Ribble flows to the west from its source at Ribblehead in the Yorkshire Dales, through the moorland of the Forest of Bowland, and out to the sea near Lytham St Annes. The rivers Calder, Darwen and Douglas join the Ribble, giving a total catchment area of 2124 km^2. The Ribble basin is rather different from the Thames basin, in the south-east of the UK, and very different from the other TWINBAS basins which are significantly larger basins and, in the case of the Okavango, also transboundary.

The Ribble basin (Figure 4-5) has diverse topography and land uses. There are numerous areas protected for their conservation value and many of the rivers provide good habitats for fish. The basin is predominantly rural and the upper catchment is heavily farmed; hence, diffuse pollution is regarded as one of the main environmental issues. The lower basin includes a number of urban areas, such as Preston, Blackburn, Wigan and Blackpool and the associated industrial areas subject different pressures on the water environment. The basin is home to 1.25M people.

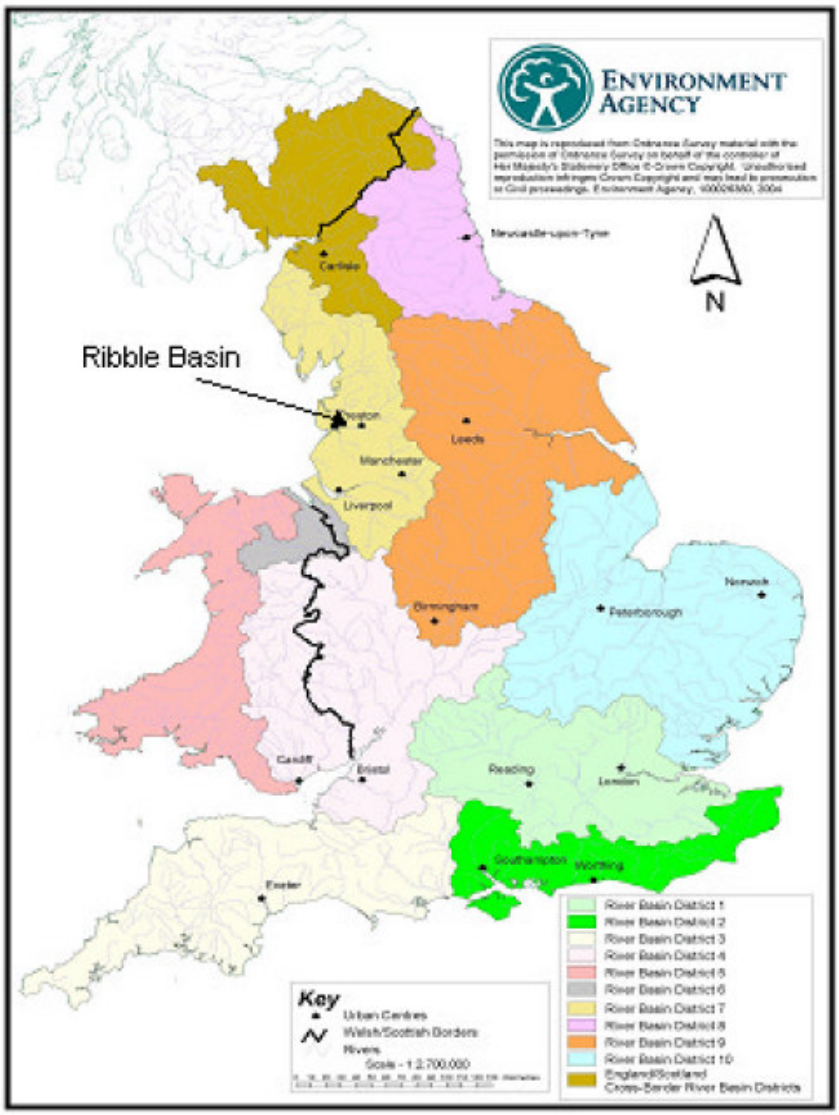

Figure 4-4 England and Wales showing location of Ribble basin (source: EA "Ribble PRB" in "Public Participation and River Basin Planning – Early Experiences")

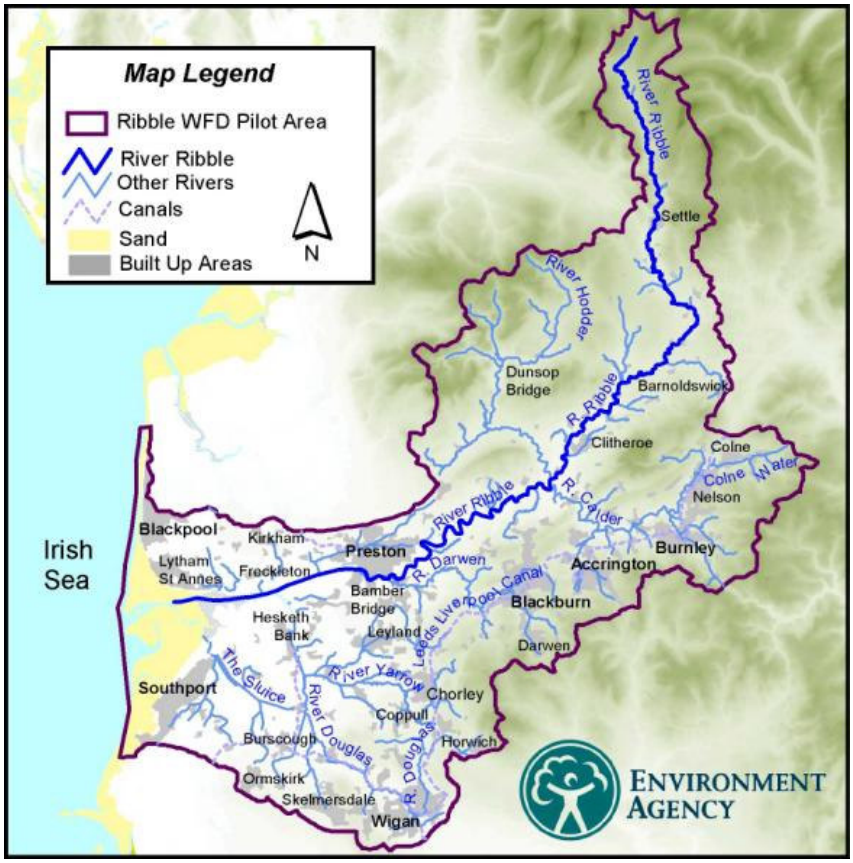

Figure 4-5 Ribble basin (source: EA "Ribble PRB" in "Public Participation and River Basin Planning – Early Experiences")

Approach to public participation

In total, the Agency tested ten different stakeholder participation techniques in the Ribble basin, as summarised in Figure 2.3 and listed below. The letters in brackets refer to whether the techniques are active involvement (Ai), listening (Li), learning (Le), informing (in), or consulting (Co).

- Project team and Testing Group (Ai Li Le)
- Stakeholder mapping (Le Co In)
- Stakeholder Forum (Ai In Li Co)
- Meetings in person (Ai In Li Co)
- Presentations (In)
- Scenario/vision building (Ai In Li Co)
- Expert meetings/workshops (Ai In Li)
- Website (In)
- Electronic newsletter (In)
- Perceptions study – questionnaire survey (Le Li)

In Figure 4-6, the proportion of people in each category is shown by the area occupied by that section of the triangle; their relationship to the project team is shown by their position in the triangle.

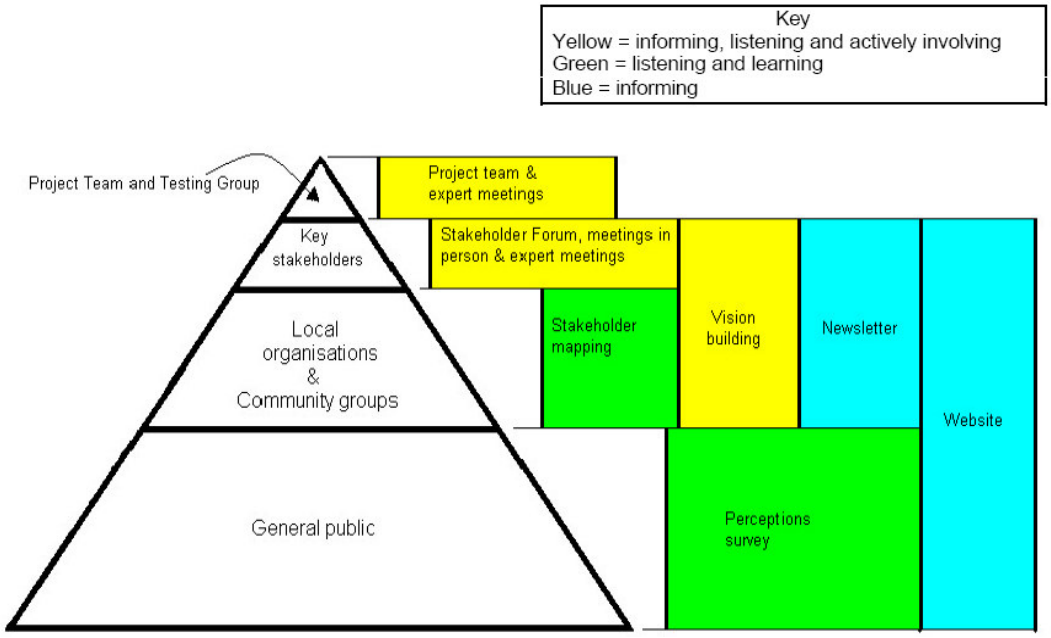

Figure 4-6: Public participation pyramid (source: EA "Ribble PRB" in "Public Participation and River Basin Planning – Early Experiences")

Project team and Testing Group

The Agency's approach to testing was for the Agency project team to have early meetings with key stakeholder groups to identify specialists who could offer support and advice to the testing process. These included the Mersey Basin Campaign because of their expertise in local stakeholder engagement, the World Wide Fund for Nature because of their experience of manageing public participation projects on wetlands, the European HarmoniCOP project which aimed to increase the understanding of participatory RBP in Europe, and EnviroCentre Ltd which is a consultancy with public participation expertise. A Testing Group (i.e. steering committee) chaired by the Agency was formed which included these stakeholders. The Terms of Reference for the Testing Group included tasks such as coordinating the testing work for the project, providing technical input and resources to the testing, helping deliver specific work items, and quality-assuring the final reports.

One of the first activities of the Testing Group was to develop a communication plan. The aim of this was to generate and maintain awareness, interest and enthusiasm in the project, to build support among target audiences, and to ensure the delivery of the project through effective proactive dialogue between interested parties. Principles used in the development of the plan included the use of non-technical language, appropriate routes of communication to reach widest audience, opportunity for stakeholders to edit and comment on reports, and consistent delivery of same key messages in communication material. The key messages in the first year were relatively simple, but ensured that everybody had the same understanding of the project:

- The WFD is a major opportunity to improve the whole water environment and promote the sustainable use of water for the benefit of people and wildlife;
- The EA is carrying out a pilot in the Ribble Basin which will help define how the WFD will be implemented in the UK;
- The Ribble project gives you the opportunity to influence the future management of the water environment of the Ribble Basin;

- The EA will be working hard to ensure that everybody's views are considered and they have an opportunity to get involved.

Various lessons were learned from the communication plan, such as communication planning is an important task requiring cooperation, early communication planning helps ensure clear and consistent messages are used throughout generating awareness and reducing confusion, working with key stakeholders in communication planning helps identify the correct language to communicate with them and demonstrates open communication, and communication planning should be flexible for different audiences to ensure messages specific to certain stakeholder groups are not missed. Good communication also means continuing to communicate throughout the project.

Lessons learned from project team and Testing Group

- Extending membership of project team through the creation of a Testing Group and other technical working groups proved an effective way of making people feel involved;
- It also provided members with an excellent opportunity to exchange views and develop common understandings - personal communication is most effective;
- Building joint working arrangements takes time and terms of reference may aid this process;
- Reliance on contributions from third-party organisations requires trust and understanding;
- Such activities can be the catalyst for other collaborations.

Stakeholder mapping

The testing project could not, and did not attempt, to engage every individual in the basin. Involvement was sought from representatives of all major communities and geographical areas within the basin, in particular stakeholders who:

- Contribute directly to causing impacts on the water environment of the basin e.g. industry;
- Have responsibility for managing and reducing impacts of the water environment of the basin e.g. local authorities;
- Contribute indirectly to causing impacts on the water environment of the basin e.g. water users;
- Have an interest in protecting an improving the water environment of the basin e.g. conservation groups.

Work concentrated on engaging local stakeholder representatives rather than national representatives, and priority was given to working through existing external participation channels. A stakeholder mapping exercise was carried out to supply information on local groups, organisations and initiatives that might have some involvement in the project, and to identify those groups and individuals that need to be involved throughout the project and how those they might wish to participate in the project.

A list of potential stakeholders was generated by drawing on existing contact lists and other sources including various local directories and the internet. Other stakeholders came forward when they heard about the project. All the stakeholders were sent an information leaflet and questionnaire to determine details like their geographical area of interest, size of group, interests, desired level of involvement, preferred communication routes, and any suggestions

for other stakeholders to approach. 370 questionnaires were sent out, of which 128 replies were received, which is a 35% return. The information was stored in a database to facilitate analysis or mapping of the stakeholders.

Lessons learned from stakeholder mapping

- Stakeholder mapping identifies who to involve in project and how they want to be involved, which helps define stakeholders as decision makers, knowers, thinkers or operators;
- Refinement and iteration throughout the process is essential to capture relevant stakeholders at the relevant times;
- Contact information for stakeholders is critical;
- A questionnaire approach to a wide audience is transparent;
- Self-selection and dominance by one interest or issue can occur;
- Stakeholder mapping is a continuous activity throughout the project.

Stakeholder Forum

The Ribble Stakeholder Forum was established as the centrepiece for communication with key stakeholders. Stakeholder Forum members, numbering about 50 local or regional representatives, were the key primary source of contacts with stakeholders and used to represent views of wider groups. The forum played an integral role in the design and operation of the project, contributing to development of the objectives, the process, the terms of reference and the communications plan, advising the Agency about decisions to be made, and learning about the WFD. It is important to manage expectations of such a group through well-defined terms of reference so that they are clear about the objectives and what will happen with the outcomes.

Lesson learned from the Stakeholder Forum

- The forum provided a means of demonstrating to stakeholders, from the early stages, the proposed approach to public participation;
- Terms of Reference should be produced early in the project, with input from forum members;
- The forum provides an early indication as to what are the main issues and what are the key questions stakeholders want answering;
- The forum provides a link to the wider basin – talking to peers outside the forum is an effective way of communicating messages;
- The forum represents interests within the basin, but also represents interests beyond the basin
- Identification of key stakeholders requires careful planning e.g. mapping;
- Representation from some sectors may be low e.g. business, industry;
- Adequate resources are required to run and facilitate the forum effectively.

Meetings in person

Meetings in person are bilateral meetings between the Agency and another organisation or individual stakeholder. The objectives of meetings are to provide and share information, to seek advice and support, to encourage others to offer support and resources, and to improve partnerships. These events took place mainly during the first few months of the project. Meetings should always be minuted to keep a record of what was discussed and what actions and responsibilities were agreed, so there is no misunderstanding.

Lessons learned from meetings in person

- Meetings in person are a successful way to communicate the project effectively and enable good two-way communication;
- Meetings help identify the specific links between the WFD and the organisation, and how it might affect them;
- There are a finite number of meetings that can be undertaken and they are demanding on resources – this is a big issue;
- Prioritise meetings with key representatives who can cascade information through their organisation (snowball effect);
- Use language that stakeholders are comfortable with, with case studies and examples to help stakeholders to fully and clearly understand.

Presentations

Presentations were used to explain the purpose of the WFD and the project to a number of different local, regional and national meetings. The objectives of presentations were to communicate the key messages of the communication plan, and other messages to specific audiences. These events were used to inform stakeholders and encourage them to be involved in the project.

Lessons learned from presentations

- Presentations help increase the project profile and provide a platform to communicate key message and exchange information;
- Presentations are particularly successful to inform specialist groups or organisations e.g. business, industry.

Scenario/vision building

Vision building is the process of establishing the ideal future state for the basin from each organisation's or group's perspective, followed by exploration of benefits and disadvantages of particular outcomes of actions to achieve the ideal state. This leads to a balancing process to achieve the best option tempered by constraints such as natural processes, global process (e.g. climate change), social/cultural considerations, and political/institutional considerations. This, in turn, leads to the identification of actions that can be addressed/delivered within the WFD, can be delivered by the EA, are the responsibility of other parties e.g. local authorities, can be delivered by other parties, require additional powers of funding from central government, or cannot be delivered at all. Vision building involves the development of a plan of action to achieve a common tangible goal.

The vision building process involved a series of facilitated meetings and workshops with small numbers of stakeholders to deepen the insight into perceptions and challenges and to map possible solutions. In this instance, the events were tailored to fit the time, budget and scope of the testing project, but in other cases it would be beneficial to carry out the process over a longer time period for more comprehensive stakeholder input. The procedure used is outlined below:

1. Participatory discussions in which representatives of different interests would be encouraged to share their experiences of how current land and water management practices affect their interests;
2. Participants would be encouraged to identify the contexts that need to be considered in relation to the changes they seek e.g. climate change, economic constraints, etc;
3. Participants would be encouraged to identify the assets they value and how current land and water management practices affects them (positively or negatively) e.g. environmental, social, economic, ways of working etc;

4. Participants would be encouraged to define the outcomes they seek in the short to long term;
5. Participants would be encouraged to identify which practices they value because they contribute to the delivery of outcomes, and what they would like to change;
6. Participants would be encouraged to flag up a range of solutions to potentially deliver the changes they seek, and which could be delivered through the WFD and integrated RBM;
7. Participants were encouraged to identify barriers that could potentially block solutions and opportunities that could catalyse their implementation.

For example, an identified goal of improved water quality would have associated benefits such as enhancing and stimulating tourism, increasing investment in recreational facilities and amenities, improving opportunities for education and quality of life, and diversification of habitats, but would face challenges such as runoff from urban and rural areas, point source pollution by sewage, physical structures in the rivers, and population increases.

The Ribble Vision is owned by the Ribble Stakeholder Forum who are local people with knowledge of and an interest in the Ribble basin. The Ribble Vision provides a long-term direction for managing the Ribble basin and guides the development of the WFD in the Ribble basin. The Ribble Vision contains priorities for future management of the Ribble basin in six main themes (water, the urban environment, the natural environment and biodiversity, enjoyment, working together for the future, and the rural environment) and is the first step in developing a River Basin Management Plan for the Ribble Basin.

Lessons learned from vision building

- Vision building is a powerful way of encouraging active involvement in identifying issues for river basin planning;
- Inviting people to attend vision-building workshops does not always lead to involvement;
- Vision building workshops can be combined with other events to reach wider sections of the community;
- Vision building takes time and should be started early in the project;
- The Ribble exercise was expensive, relative to the number of people involved, but this was partly due to the short time scale – longer planning and operating time should be more economical;
- Any vision should be carefully amalgamated with WFD goals to ensure expectations are met.

Expert meetings/workshops

Expert meetings are meetings of stakeholders with groups of experts to provide an opportunity for specialist input to assist with developing solutions and helping expand stakeholders' understanding of issues. Two sets of expert meetings were organised, firstly, on public participation and, secondly, on the RBM planning process.

Lessons learned from expert meetings

- Meeting participants share knowledge about the river environment;
- Participants gain insights into the concerns and perspectives of others;
- Participants can consider different solutions e.g. measures to deal with pollution;
- Participants can provide energy and enthusiasm to the project;
- Participants feel their opinions are important;
- Not all stakeholders can attend this kind of activity due to lack of resources (time, staff) e.g. community groups, farmers;
- Adequate information needs to be provided to participants before and during meetings;

- Use of a facilitator can clarify what is required and increase effectiveness of discussions.

Website

The Ribble PRB website is under the Environment Agency website on the North-West region pages. The website was developed to focus initial enquiries for advice and to support the understanding of the project. It developed an additional role as a primary route for dissemination of information, meeting dates, etc. The website address is:

http://www.environment-agency.gov.uk/regions/northwest/

The website includes the latest information for up to date news on the project in the form of newsletters and minutes from stakeholders forum meetings and other events, reports on early experiences into public participation and river basin planning, and a draft river basin management planning timetable for the Ribble basin. The average number of site hits since it went live i´s 48 per day, and increasing, with visitors from across the UK and Europe as well as further afield.

Lessons learned from the website

- The Website forms the primary route for information provision and communication;
- The internet has low cost and resource requirements for its use as a communication tool, spans geographical and political boundaries making it the most effective form of information provision, and webpages can be updated quickly and efficiently with diverse material e.g. documents, maps, GIS, etc;
- The website must be updated regularly and people need to access the Website regularly e.g. email notification of new material;
- The Website can help maintain awareness of the project though phases of minimal consultation or active involvement;
- The Website links to the EA webpages and more information about the WFD, and can link to other organisations webpages as appropriate;
- The potential audience is great, and not limited to those who can attend meetings, but the "hitting" the target group is not guaranteed;
- The Website should not be the sole source of information or form of communication as this can increase social inequalities.

2.3.9 Electronic newsletter

The electronic newsletter is summary information of key milestones over ideally 2 sides of A4 paper, updated every 8 weeks. The newsletter is posted on the website and recipients sent an email with the weblink. Current distribution is to around 500 people, though anybody can download it from the website. Printed copies are available for those without internet access.

Lessons learned from the electronic newsletter

- An electronic newsletter is a fast and efficient communication mechanism to keep stakeholders involved;
- It provides a communication tool at regular intervals and in bite-size pieces to ensure main issues are communicated in simple language;
- Email notification directs stakeholders to the project Website, which breeds familiarity with the Website;

- There is a need to ensure that the newsletter is also published as hardcopy to reduce the potential for social inequality of communication.

Perceptions study – questionnaire survey

The perceptions study was market research survey (by telephone) of a random sample of 1001 (out of 1.25M i.e. 0.01%) residents to better understand their views on the environment and the importance of water protection and management, their knowledge and use of their local water environment, their knowledge and understanding of the EA and its planning process, their knowledge of the WFD and how they find out about environmental issues, and their views on how they would like to be involved in planning in the future.

Lessons learned from the perceptions study

- The survey is a quick and easy way of canvassing opinion and providing measurable results
- The communication is one-way and cannot be considered involvement
- The survey has yielded some important messages that can be incorporated into future planning and management of the project:

i. There is a high level of awareness of the basin and 95% of residents have heard of the River Ribble;

ii. Environmental protection is high priority for 77% people (below healthcare, crime reduction and education, but above employment, housing and transport);

iii. Within environmental protection, water protection and management is the greatest concern of 90%;

iv. The majority of residents do not believe there are any major issues with water protection and management (issues cited by 25% were rubbish in waterways, pollution of sea, cleanliness of beaches; non-issues were flooding, streams drying out, wildlife and pollution).

Evaluation

An independent evaluation of the stakeholder participation process was commissioned by the Agency and carried out by the Water Research centre (WRc). The evaluation looked at the success of the whole process and all activities undertaken by the Agency to encourage public participation, being built into the process from the beginning and carried out throughout and after each separate activity. The evaluation involved:

- Interviews with stakeholders from Stakeholder Forum at start and end of process to obtain views about the way in which the EA lead the process, the relationships developed and the extent to which objectives were achieved;
- Real-time observation carried out during planning and vision-building events and Stakeholder Forum meetings to explore the success of the approaches in engaging the public;
- Event specific questionnaires circulated at planning and vision-building events;
- Questionnaires completed by the Testing Group to obtain views on the success of the process from a range of external organisations working alongside the EA in developing the process;
- A comparison of the process adopted with the guidance given in the CIS document.

The evaluation deemed the project very successful and a significant improvement within RBM planning. The project clearly demonstrated that public participation is vital in planning and engaging the public at an early stage of the process, and is also important in gaining their trust and confidence to complete the project. Some weaknesses were noted with recommendations as to where improvements could take place:

- Planning time – the tight deadlines for the testing resulted in considerable effort was needed to organise a limited number of events. With more time, a more diverse range of stakeholders could have been contacted, there would have been better continuity in staff attending events from stakeholder organisations, and schools would have been better able to participate as it could have been scheduled into their timetable;
- Inclusivity – whilst the stakeholder response rate of the project of 30-40% is relatively good for this type of study, it indicates how important it is to contact as many stakeholders as possible. The Stakeholder Forum did not represent bank-side landowners, young people and representatives from education particularly well, and industry and urban community groups (particularly ethnic minorities) were not well-represented as many events;
- Website – the website engaged more people than any other method and could be accessed through computers in libraries and schools, as well as provide a method for business and industry to participate. Farmers were least likely to use the internet. Interactive tools could be extended to an electronic forum or video-conferencing;
- Events – Regional vision building and planning events seemed more successful than equivalent local events and were enhanced by the use of facilitators. Different approaches to engaging the public at a local level may be more appropriate e.g. events in shopping centres or publicity through the media. The Agency has to be involved in events at a senior level to make a statement of commitment to the project, but at the same time should distance itself from group discussions where they might be seen to be leading or influencing the stakeholder engagement process. It is important to allocate the right amount of time for events, neither too little for the agenda, nor too long to deter people from attending;
- Raising interest – Increased marketing and advertising could raise public enthusiasm and desire to be involved, in particular more coverage in local press and television. Similarly, events should be timed for maximum local stakeholder availability e.g. not school holidays or busy time on farms.

As apart of the evaluation, an attempt was made to estimate the costs of each participation method, and determine their success and importance, from which tentative conclusions may be drawn. In terms of cost per stakeholder, the website was the least costly method of engaging the public, whilst the evaluation itself was the most expensive activity. Travel costs of the Testing Group were the most expensive item in the project, though compared to the other TWINBAS basins, including the Thames, the Ribble is not large. The next most expensive items were the vision building events and the Stakeholder Forum. The vision-building events were seen as the most effective way of engaging the public, and the Stakeholder Forum can be used for other activites making it more cost-effective. Use of the websites, telephones for the perceptions survey, and stakeholder mapping were the least expensive items. The stakeholder mapping was considered the third most important method tested.

Dissemination of findings

In October 2004, over 100 delegates from Europe, Africa and North America met in Bolton, near the Ribble basin, to discuss their experiences of, and learn more, about public participation in river basin planning from several EU Pilot River Basins, as well as the Grand

River in Canada and the Mondi Wetlands project in South Africa. Ten recommendations for public participation in river basin planning, known as the Bolton principles, were generated as an outcome from the conference (source: EA "Ribble PRB"):

1. Good involvement takes time – start early.
2. Develop and share a sense of ownership for the river basin.
3. Work to build and maintain trust with your partners.
4. Undertake mapping of stakeholders to find out more about them and their interests.
5. Learning from mistakes is as important as sharing successes.
6. Listening is as important as talking.
7. Be passionate for your cause – passion persuades.
8. Work with each other and build a common vision for your basin, to put the management plan into context.
9. Nobody can do it alone – true partnership leads to shared responsibility and decision making for shared actions.
10. Where cultures and traditions vary, agree key messages and adapt to their needs.

4.5.3 The Thames basin

Background

The Ribble basin is being used to test the public participation guidance and, at the same time, influence the development and testing of the Agency's own public participation guidance. The same framework for public participation is used in all Agency regions in England and Wales, including the Thames basin. A number of factors are important in influencing the management of the environment and monitoring of environmental quality across the regions. Environmental management responsibilities are split between numerous organisations which all have a slightly different environmental focus. Partnership is essential in working towards the common goal of sustainable development, and the Agency works in partnership with a wide range of organisations on issues ranging from housing development, land regeneration and river restoration, to specific social issues such as fly-tipping and awareness of flood risk.

The key stakeholders the Agency liaises with are listed in Appendix E. The list is by no means comprehensive, as in each region there will be local issues and organisations which encompass other stakeholders, as well as the general public. In the Thames region alone, the stakeholders include:

- Greater London Authority
- Thames Regional Development Agency
- Department of Environment, Food and Rural Affairs
- English Nature
- Countryside Agency
- English Heritage
- Local authorities, including 9 county councils, 33 London boroughs, 7 unitary authorities and 38 district councils

- Conservation groups
- Sport and recreation groups
- Landowners
- Developers
- Industry
- Commerce

Pang and Lambourn sub-catchments

The UK Natural Environment Research Council has recently funded an ongoing thematic programme called LOCAR to study key water resource issues in the lowlands of the English chalklands, many of which lie within the Thames basin. LOCAR examines surface and groundwater supplies, changes in water quality and their impacts on fisheries and wetlands in five intensely instrumented catchments, including the Pang and Lambourn tributaries of the Thames (Figure 4-7). Work from these two sub catchments, the Thames as a whole, and other UK basins, can be used to enable the project to consider lessons learned from implementation of the WFD.

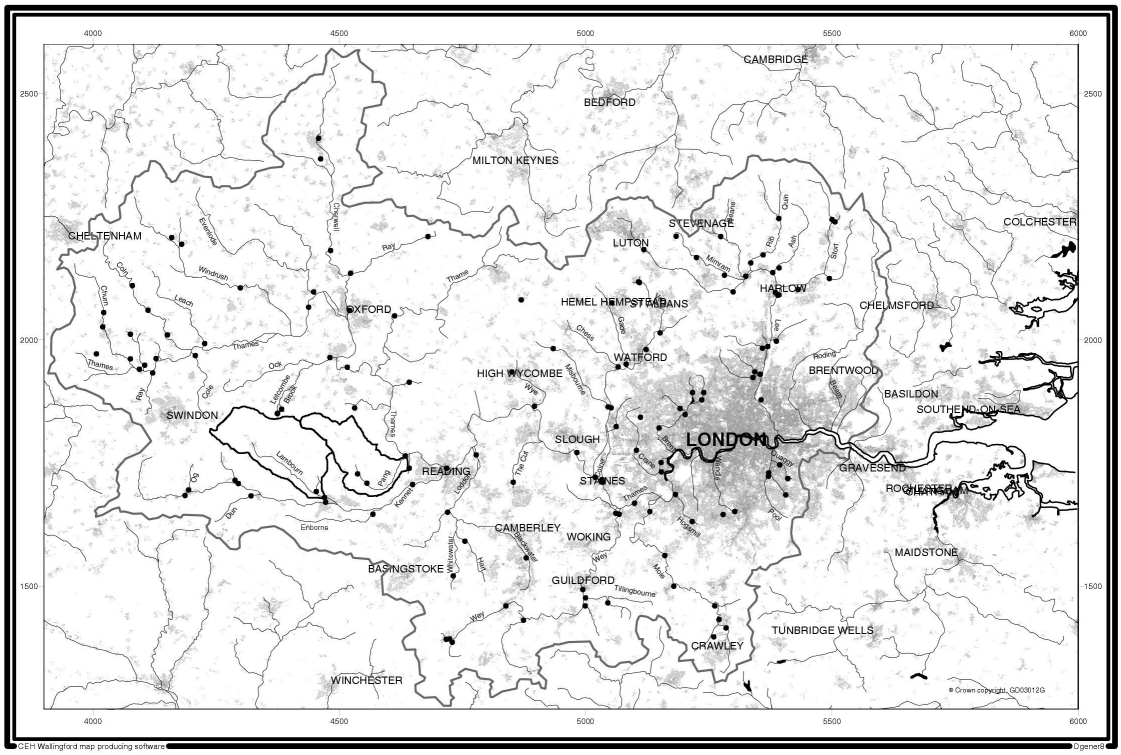

Figure 4-7 Thames basin showing Pang and Lambourn sub-catchments

The Pang (170 km^2) and Lambourn (235 km^2) are adjacent permeable catchments, but very different in character. The upper reaches of the Pang are influenced by groundwater abstraction, and the water quality of the lower is affected by a variety of human activities including pig farming, salmonid fisheries and Christmas-tree growing. There have been problems of increased sediment in the river resulting from surface runoff from arable land and bacterial contamination. In contrast, the Lambourn remains a more natural stream, with much of the channel retaining geomorphological diversity. It has less groundwater abstraction than the Pang; indeed, river flows increase downstream as groundwater enters along the lines of

dry valleys. The Lambourn is one of 462 Sites of Special Scientific Interest in the Thames basin.

The research projects being carried out in the Pang and Lambourn catchments are:

1. How different land uses affect water losses by evaporation and transpiration, and so affect amount of rainfall available for recharge;
2. How large/small areas of woodland/hedgerow affect evaporation;
3. How rainwater and the chemicals it carries mixes with groundwater and subsequently with the river, and affects chemistry of both;
4. How fine sediment and attached chemicals move into rivers;
5. How much groundwater moves slowly though pores or quickly through fissures, and affects how quickly rivers rise after heavy rain;
6. How long dry periods will impact on springs and rivers and contaminant movements in groundwater;
7. How water moves through the fracture network in the groundwater aquifer to the river;
8. How the river and groundwater aquifer interact and low/high flows.

These involve installing additional monitoring equipment in the two catchments, which have amongst the most spatially intensive and highest quality hydrological networks in the UK. This has required engagement with stakeholders to inform them about the work and seek permission to access their property.

Public participation activities

Public participation activities in the LOCAR project have included six of those tested in the Ribble basin:

- **Project team and Testing Group** – CEH staff are on the LOCAR steering committee and head the Catchment Service Team so handle to day-to-day running of the sites and interactions with landowners. This makes them the principal point of contact between the researchers and the stakeholders. The Agency is the primary stakeholder and is represented on the Steering Committee and on each of the Catchment Management Boards.
- **Stakeholder Forum** – A stakeholder forum does not exist in the same way as in the Ribble basin, but meetings are sometimes run in conjunction with the Agency who are the primary stakeholder. Agency staff are actively involved at all stages of the LOCAR programme, including attending the Stakeholder meetings.
- **Meetings in person** – LOCAR staff negotiated land access agreements with all the landowners before equipment was installed and before scientists started walking across their land. Individual projects within LOCAR have made further agreements where they have had to go onto land not involved in the main LOCAR instrumentation. Key stakeholders such as English Nature, National Farmers Union, Country Land and Business Association and Wildlife Trusts were informed of the project before is got underway, but after it had been planned and a Science Co-ordinator had been appointed. Many were visited in person and had the project explained to them. A summary of the results so far was prepared in response to an invitation to talk about the project to Frilsham Parish Council's annual meeting and an article was printed in the parish magazine
- **Presentations** - LOCAR staff held a meeting in a pub for interested landholders in 2003 to inform them of the progress of the work and received good feedback from them. Residents and other stakeholders, including English Nature, the Wildlife

Trusts and other local organisations were invited to a stakeholder meeting at CEH in 2004.

- **Website** – The LOCAR website is at http://www.nerc.ac.uk/funding/thematics/locar/ and contains information about the Pang and Lambourn sub-catchments, and the other three sub-catchments outside the Thames basin.
- **Electronic newsletter** - There is a handout describing the project aimed at the interested general public, though not a regular newsletter.

Working in five separate catchments, LOCAR staff found that many of the issues are specific to each catchment and there is no universal formula for dealing with the issues. Therefore, it is important to listen and learn before starting to speak and then plan the stakeholder information flow and participation. The Steering Committee chairman feels that earlier stakeholder involvement in LOCAR might have improved the relevance and integration of some of the science. However, the project talks to multiple audiences and material has to be tailored to each audience, which takes time and resources.

4.5.4 Evaluation

Perspectives of the success of the LOCAR programme varied between different stakeholder groups. Water researchers saw LOCAR as a model project in which scientists from different disciplines could work together to provide water managers with the knowledge they need. Indeed, the water regulators (e.g. the Environment Agency) found the results to show that the processes controlling water and pollutant movement were far more dynamic than previously thought, providing invaluable scientific underpinning to help develop required regulatory frameworks, whilst the water industry (e.g. Thames Water) found the results to provide sound science on which to base investment decisions in identifying and developing new environmentally sustainable yet cost effective water sources for drought-prone southern England. Other water users (e.g. farmers) could see how an action on part of the catchment can create impacts elsewhere, and that sustainable management of the land and water go together. Local communities felt that the project had given them a new understanding of the significance of their local river. It was felt by the Project Steering Group that earlier stakeholder involvement may have improved the relevance and integration of some of the science.

The LOCAR outcomes directly address key needs of the Environment Agency's Integrated Catchment Science Strategy but, though relevant to policy, but must be translated effectively to be useful in practice, particularly at different scales. However, much of the knowledge gained through LOCAR is generic and widely applicable to large areas of England and other countries.

Dissemination of findings

In September 2006, 140 delegates met in London to hear about results from the LOCAR programme. The 2-day meeting was split so that the first day was devoted to the science carried out and the results obtained, whilst the second day was devoted to the "headline" results and their implications. The reasoning behind this was to provide an appropriate forum for each of the different stakeholder groups involved in the LOCAR programme. This provides a good example of recognition that there may be more than one intended audience, and that content and presentational material must be adapted for different audiences. In this instance, the first day was intended primarily for scientists and researchers interested in the detail of the work (NERC, 2006a), whilst the second day was intended for other stakeholders who would be more interested in the key messages from the research (NERC, 2006b).

Social learning

The public participation activities outlined in the previous sections form an important element of social learning. Social learning is learning from and with others and involves assisting multiple stakeholders to reach deeper levels of understanding which may lead to concerted action. Different stakeholders may see and understand the problem which brings them together very differently. Recognising this and learning from each other to work towards a common vision does not usually happen spontaneously because, when people get together in groups, they generally fall unconsciously into familiar patterns of behaviour, governed by power dynamics, gender issues, cultural differences, strong emotions, etc. Therefore, it is necessary to create supportive institutional conditions or policies conducive to stakeholder engagement in social learning.

Social learning is highlighted as a valuable approach in implementing the WFD in the CIS guidance document on river basin planning. However, such a learning approach can also help develop internal and external stakeholders' capacities and skills, as well as helping stakeholders to understand the interdependencies between different components of the WFD in order to help integrate the different parts. By highlighting confusion and uncertainty, social learning can lead to greater understanding of the nature of the issue or issues, and how it or they might be progressed by concerted action.

An appropriate metaphor for this is a sports team in which each player has a different role or responsibility in which they undertake a different task, with the aim of achieving a mutually desired objective i.e. to win; things go wrong when the players don't have the skills required to play the game competently, or don't know what the objective is, or don't share the objective. In the context of the WFD, the mutually desired objective is river basin planning, and the teams are the multiple stakeholders in each basin. Social learning helps to ensure that the stakeholders understand and share the objective, and have the necessary skills to move towards it together.

Like the stakeholder mapping described earlier, social learning generally starts with an analysis of stakeholders in order to: reveal the different stakes in, the interests and preferences of, and the drivers affecting the behaviour of, the different stakeholders; stimulate understanding among stakeholders; indicate potential conflicts of interest or power that might require negotiation, mediation or conflict resolution; stimulate creative thinking about possible or desirable future scenarios; and provide opportunities for those involved to learn more about the interests of others. However, in social learning, the analysis extends to assess how the individual stakeholders and stakeholder groups themselves question the processes of stakeholding, and the evolution in understanding of each-other's stakes and how these can be transformed over time by the reciprocal influence each exerts on the other as they act in awareness of each other.

Tools for social learning include many of those covered in public participation. In addition, Geographic Information Systems (GIS), traditionally used as a research tool by scientists or by industries, particularly those involved in natural resource management, can be a very useful aid to social learning in that it can help stakeholders better envisage the problem in the wider context of the whole catchment. GIS can offer visual representations, at different scales and over different time periods, of the relationships that are perceived to exist among the biophysical and other aspects of a landscape, human actions and a range of environmental, social and economic outcomes.

5 Conclusions and discussions

In general, the experience from the public participation process is very positive and TWINBAS has by intimate collaboration with the major public stakeholders in each basin and each partner country significantly contributed to the transfer of research results and methods to major stakeholder institutions in the countries of the twinned river basins.

Important conclusions from the work in **Biobío** include:

- The different stakeholder interests are strong and in general a comprehensive knowledge of the river basin concept is weak.
- It is much more viable to approach integrated water management through an initial concrete proposal regarding water use or quality, than to start setting up an administrative framework, different to the existing power structure.
- Pilot experiences of integrated river basin management are more likely to succeed in smaller basins with less strategic importance.
- In the case of Chile the sustained, ongoing effort conducted by various governmental and academic institutions has resulted in a Policy for Integrated River Basin Management that must prove its efficiency during the coming years, and therefore needs the support from the international water community to succeed.

One of the key issues that was widely recognised within work in the **Nura** was the need for structural re-organisation within the public water sector. More effort might be made by Kazakhstan to ensure that other methods are adopted to ensure stakeholder participation than concentrating so much on establishing RBCs. A system that seeks to control the directors of management authorities as well as trying to ensure that stakeholder participation occurs at the implementation level should be adopted. This will encourage transparency, and therefore accountability, and lead to an increase in the quality of the governance. By seeking to improve governance, the standing and value of the RBC can only increase.

There is at present a particular lack of dependable information tools and communication mechanisms for the management planning process in the **Okavango** delta. Considerable work is required to develop and implement these. The provision of government services to the communities of the delta is inadequate due to lack of communication, no action taken on previous raised issues, lack of feed-back from government departments, and consequently little or no influence on decisions from the local communities. There is a need for a central data and research institution, focussing on well targeted research, with data and results readily accessible to all stakeholders.

The main conclusion of the results from **Norrström** is that the involvement of farmers and the Federation of Swedish farmers contributed to better modelling results. The initial approach was revised after discussions with these groups and local detailed data was gathered. The results showed that these data are required in order to provide accurate modelling results and possibilities to analyse effects of relevant measures (also excluding measures that have already been implemented). These findings are highly relevant to the continued work with farmer involvement in the efforts to reduce eutrophication of Swedish lakes as well as the Baltic Sea.

Perspectives of the success of the LOCAR programme carried out in parts of the **Thames** varied between different stakeholder groups. Water researchers saw LOCAR as a model project in which scientists from different disciplines could work together to provide water managers with the knowledge they need. Indeed, the water regulators (e.g. the Environment Agency) found the results to show that the processes controlling water and pollutant movement were far more dynamic than previously thought, providing invaluable scientific

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