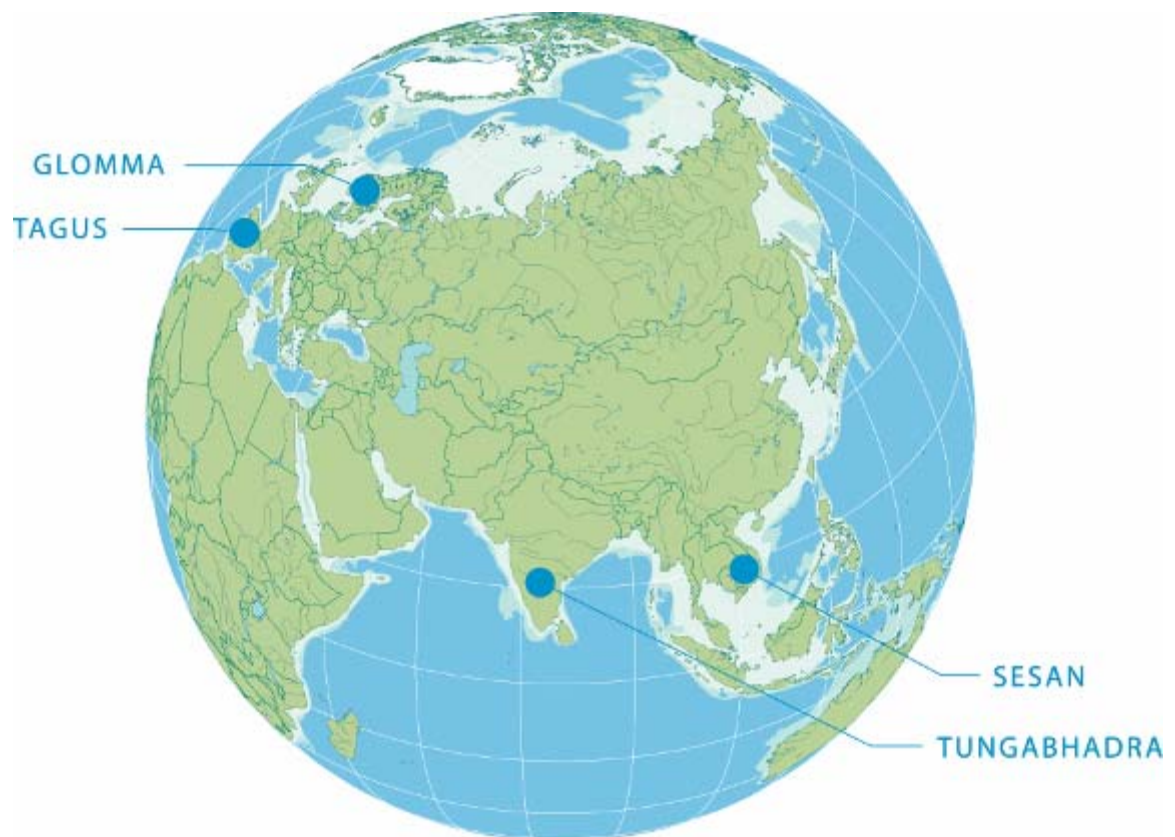




DELIVERABLE D5.1



First IWRM assessment
report for the four case
basins: Glomma, Tagus,
Sesan and Tungabhadra





Strategy and methodology for improved IWRM - An integrated interdisciplinary assessment in four twinning river basins

Title:	The first IWRM assessment report for the four case basins: Glomma, Tagus, Sesan and Tungabhadra
Author(s):	Nesheim, I., McNeill, D., Stålnacke, P., Sekhar, N. U., Grizzetti B., Allen, A. A., Barton D., Beguería-Portugés S., Berge D., Bouraoui F., Campbell D., Deelstra, J., García-Ruiz, J.M., Gooch G. D., Joy K., Lana-Renault, N., Lo Porto, A., Machado M., Manasi S., Nhung D. K., Paranjape S., Portela M. M., Rieu-Clarke A., Saravanan V. S., Thaulow, H., Vicente-Serrano, S.
Report No.	STRIVER Report No. D5.1
ISBN	-
Organisation name of lead contractor for this deliverable	The Centre for Development and The Environment, University of Oslo
No. of pages: main report	71 p.; with annex: 301 p.
Due date of deliverable:	September 2008
Actual date of deliverable:	November 2008
Dissemination level¹	PU
Key words	IWRM assessment in River basins in Asia and Europe, General performance and planning documents

Title of project: *Strategy and methodology for improved IWRM*
- *An integrated interdisciplinary assessment in four twinning river basins (STRIVER)*

Instrument: SUSTDEV-2005-3.II.3.6: Twinning European/third countries river basins.

Contract number: 037141

Start date of project: July 2006 Duration: 36 months

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)

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CO Confidential, only for members of the consortium (including the Commission Services)

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Summary

This report seeks to add to the goal of improved interdisciplinary Integrated Water Resource Management (IWRM) by assessing to what extent IWRM principles in the four STRIVER case basins i.e. Glomma, Sesan, Tagus, and Tungabhadra, have been followed in recent years. There is an aim not only to assess to what degree IWRM components can be found in the basins, but also evaluating the process towards implementing IWRM in the different basins. The assessment of IWRM performance in the basins is undertaken through a comparative analysis, or “twinning” approach, followed by a synthesis of results addressing specific constraints. The comparative IWRM assessment presented in the following chapters is based on two types of basin reports from each basin (Annex 1 and 2). Basin report type I assesses the general IWRM performance of states, and type II assesses the implementation of selected IWRM principles by analysing planning documents in each basin.

The main part of this report, the comparative assessment focuses on the following five selected components of IWRM, which are of particular significance with regard to the overall goal of sustainable development. These five components include: (i) *protection of the catchment and the environment*; (ii) *measures to ensure efficient and equitable use of water*, (iii) *institutional analysis and stakeholder involvement in water management*, (iv) *capacity building*, and (v) *transboundary issues*.

- The socio-economic development is the common driving force in all the STRIVER river basins, although the role played by each sector, varies according to the local conditions. As a consequence, the river basins face in some cases similar pressures and comparable impacts. The common factor in all the conflicts is the depleting of water quantity and quality, as this compromise the different water uses. All the river basins have developed plans or policy actions to protect most of the environmental aspects. However, it is difficult to assess their status of implementation and the effectiveness of the planned measures. In fact, in some cases the basins claim a lack of monitoring and control and a poor implementation of the prescribed actions.
- Generally it can be argued that in areas where water shortage is evident, a pressure exists that pushes toward implementing measures for water saving and reuse.
- All the STRIVER basins do have procedural rules in place for access to information and decision-making which comes through procedures related in particular to environmental impact assessments. Access to information laws also allow stakeholders to access information through public authorities. Whilst a number of conventions and national laws and policy documents provide for stakeholder participation in water management, practice demonstrates that government officials, hydropower, industry and urban interests tend to dominate decision-making, so that interest groups representing environmental concerns and communities tend to have less influence in decision-making despite the procedural rules allowing them access to relevant information and procedures like public inquiries.
- Capacity building is officially stressed and part of many water policies and strategies in Sesan, Tungabhadra and Tagus case study basins, however, it is evident these official statements are seldom operationalised to any larger degree especially for the entire spectra of IWRM themes. Some examples of transparency (e.g., access to information), public participation, information campaign brochures for the public, training programs for certain sectoral groups (especially for local communities, farmers) are initiated by NGOs.
- The case basins represent a full spectrum of alternative transboundary contexts/situations, from within state to international situations. The cases illustrate that the extent of conflict decrease as we move along the continuum from international to local and the extent of conflict varies by type: e.g. competition over quantity of water is more controversial than conflict over quality. Hydropower development is perhaps the most important issue in a transboundary context, as it may potentially have some detrimental effects on the river downstream of the border.

1. Introduction

The aim of the STRIVER project is to contribute to improved integrated water resource management by developing methodologies for Integrated water resources management (IWRM) in an Asian-European context. The project has strong emphasis on local stakeholder involvement, enabling and supporting local capacity development and uptake. Central to the project is a comparative analysis of experience in four case-study basins in Europe and Asia: Glomma, Sesan, Tagus, and Tungabhadra. This report provides an assessment of the extent to which IWRM principles have been followed in the four case basins in recent years. As defined by the technical advisory committee of the Global Water Partnership (GWP), IWRM is “*a process, which promotes the co-ordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.*” This definition draws attention to two respects in which IWRM seeks to ‘integrate’: one is integration between water, land and related resources; the other is between the three dimensions of sustainable development: economics, social and environmental. In addition, this definition makes the important point that IWRM is a process; it is a complex process involving many different actors, with varying interests and perspectives, and this constitutes a major challenge of governance.

This report seeks to add to the goal of improved interdisciplinary IWRM by assessing to what extent IWRM principles in the four case basins have been followed in recent years. We here aim not only to assess to what degree IWRM components can be found in the basins, but also at evaluating the process towards implementing IWRM in the different basins. The assessment of IWRM performance in the basins is undertaken through a comparative analysis, or ‘twinning’ approach, followed by a synthesis of results, addressing specific constraints. More specifically, the causes of the water-related environmental issues and problems of the catchments are analysed; and their impacts – environmental, economic, social assessed. The relative importance of different causes of transboundary problems - physical, sectoral (e.g. economic, industrial, agricultural and forestry activities), political and institutional (governance) - are assessed. This twinned exercise facilitates the identification of weaknesses and strengths of IWRM performance in the basins. The identification of IWRM gaps and strengths are analysed and this information will be used in work package 10, the concluding work package in STRIVER to develop guidance to governments and water management authorities.

The comparative IWRM assessment presented in the following chapters is based on two basin reports from each basin (see Annex 1 and 2). One basin report assesses the general performance of states in relation to transboundary issues and seven selected IWRM principles, which are inspired by the “Dublin principles for water” and the themes and tools identified by the “Global Water Partnership”. The transboundary issue is included as an issue for comparison as the challenge to implement IWRM is particularly marked when rivers cross national boundaries. The second basin report assesses the implementation of the selected principles by analysing planning documents in each basin.² The methodology for assessing these planning documents was developed using elements from, and adapting the strategy for, the IWRM framework approach (D5.1) in STRIVER. As the selected planning documents serves as an example for the implementation of IWRM in the four different basins, and in five different countries, the nature of these planning documents differs substantially. In Glomma, a hydropower regulation plan and also the implementation of the Water Framework Directive were assessed; in Tagus, the Portuguese part, the Tagus/Tejo River Basin Plan and the National Water, the first generation of water plans in Portugal were assessed; in Tagus, Spanish part, The Hydrological Plan of the Tagus basin - the main legal tool for water management was assessed, while in India due to lack of an overall basin plan information from different documents, acts and policies were assessed, and in Sesan, Vietnam part the National Hydropower Plan Study and an Integrated Water use and Water Resource Protection Plan were assessed.

² This report is structured according to four main headings: A. *Main objectives of the plan?* B. *Basin description* C. *Stakeholder involvement in the planning process.* D. *Governance in the planning process.*

The main part of this report, the comparative assessment, focuses on the following five selected components of IWRM, which are of particular significance with regard to the overall goal of sustainable development. The first of these relates primarily to the environmental aspect, the second to the socio-economic, and the third to the institutional dimension. The fourth, capacity building is particularly important in poorer countries; and the fifth, transboundary issues, is included because this is a particular concern of the STRIVER project.

- Protection of the catchment and the environment,
- Measures to ensure efficient use of water
- Institutional analysis and stakeholder involvement – in water management
- Capacity building.
- Transboundary issues

Protection of the catchment and the environment

The four Dublin principles, formulated at the international Conference on Water and Environment in Dublin (1992) and then adopted in the Agenda 21 recommendations (United Nations Conference on Environment and Development, Rio de Janeiro, 1992), are considered the guiding principles underpinning the Integrated Water Resource Management (IWRM). The first principle states that “freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment”. This principle clearly provides the notion of the role of the environment in the conservation of the water resource, as a fundamental aspect, together with the human system, that has to be taken into consideration for the sustainable use of the resource.

The emphasis on this principle is vital, since the well-being of humans depends not only on adequate supplies of good quality water, but also on the many forms of life to which water is home. Disruption of flows has reduced the productivity of many such ecosystems, devastated fisheries, agriculture and grazing, and marginalized the rural communities which rely on these. Various kinds of pollution - often crossing national boundaries - exacerbate these problems, degrade water supplies, require more expensive water treatment, destroy aquatic fauna, and deny recreation opportunities. Protection of the catchment and the environment requires integrated management, including the conservation and protection of aquatic and water related biodiversity resources. An adequate understanding of the terrestrial and aquatic ecosystems is an essential element of resource assessment. Measurement of components and characteristics of the environment affecting surface and groundwater quality and quantity are essential for effective water management.

Measures to ensure efficient use of water

The principle of efficiency means that water should be seen as an economic good. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources. Economic instruments can complement the use of institutional, regulatory, technical and other kinds of tools used in the water sector. In general, economic instruments involve the use of prices and other market-based measures to provide incentives to consumers and all water users to use water carefully, efficiently and safely. Economic instruments may offer some advantages over other tools, such as providing incentives to change behaviour, raising revenue to help finance necessary adjustments, establishing user priorities and achieving overall IWRM management objectives at least overall cost to society. Current patterns of water use involve excessive waste. Combined savings in agriculture, industry and domestic water supplies could significantly defer investment in costly new water-resource development and have enormous impact on the sustainability of future supplies. The original principle of ‘water as an economic good’ was subsequently expanded to include water as a ‘social good’. This reflects the importance of ensuring that all human beings have access to an adequate supply of clean water at an affordable price.

Institutional analysis and stakeholder involvement – in water management

This issue refers to three related elements, (i) institutions and water law, (ii) stakeholder involvement, (iii) gender. Effective and equitable governance is crucial for the implementation of IWRM plans. The role of water laws is to implement and enforce policy and provide the necessary administrative and regulatory mechanisms at appropriate levels. Inter-sectoral integration is a critically important element of IWRM. To

secure the coordination of water management efforts across water related sectors, and throughout entire water basins, formal mechanisms and means of co-operation and informal exchange need to be established. Such co-ordination mechanisms should be created at the highest political level and put in place in all relevant levels of water management.

Stakeholder participation is also very important. Citizens and communities know the environment in which they live and by sharing information decision makers can both be better informed, and take account of differing interests and perspectives. Furthermore, the public are more likely to understand and accept decisions if know the competing interests at stake and the basis for decisions taken.

The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects. Active stakeholder involvement is key to providing feedback on any stage in the management of the process cycle. There are specific gender issues to be addressed by the work covered in STRIVER. These include the inclusion of women in the water policy-making process, and studying gender aspects of access to water.

Capacity building.

The relevance of this issue will vary in different countries according to the general state of knowledge / education and the extent to which the people interact with public officials. In order for instruments of policy, the legal framework, financing systems and organisational frameworks to function effectively, the different parties involved need to possess sufficient information and expertise, as well as incentives to function effectively.. To achieve this, capacity building may be needed at many levels: for water professionals in all areas - both public and private water organisations, local and central government, water management organisations and in regulatory organisations, as well as capacity building and empowerment activities in civil society.

In addition to human resources, capacity building may also involve enhancing a whole range of physical resources – for example, monitoring equipment, a computer or a vehicle to enable regulators to visit sites for inspection.

Transboundary issues

Almost half the world's land area is situated in transboundary river basins, and STRIVER has chosen this issue as an important focus in the project. New co-operation arrangements for transboundary water systems are emerging. The management of transboundary waters has always been a difficult issue in which national legislation and international conventions meet each other within complex institutional contexts. While such agreements are made at the regional level, the actual policy changes, reforms and implementation of reforms need to happen at the national level. Experience shows that the IWRM implementation processes are facilitated by exchange of knowledge and experience between countries at various stages of the process.

2. Comparative analysis of IWRM status in the four basins

2.1 Protection of the water resource and the environment

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This section analyses on the status of implementation of IWRM in the four STRIVER river basins with focus on the environmental aspects. The analysis is conducted comparing how the protection of the water resource and the environment is performed in the river basins.

The analysis was carried out on the basis of assessment documents provided by the river basin partners of the STRIVER project, consisting of a description of the general status of IWRM in the river basin (Annex I), including a deeper analysis of a selected planning document (Annex II).

Some underlying criteria to evaluate the level of environment protection and IWRM implementation in the river basins were selected and the comparison was organised accordingly. The criteria were structured according to four main sequential topics:

1. Water pressures and impacts
2. Environmental strategies and plans
3. Implementation of relevant environmental management instruments
4. Management and integration of the different environmental aspects

According to this structure, in this section, (1) first the principal pressures affecting the river basins and the related impacts on water and the environment are considered. Then (2) an overview of the plans available to protect the water resources is provided and (3) the implementation of relevant environmental management instruments is analysed, including water resource assessment, monitoring, standards and guidelines, environmental impact assessment, risk assessment and management, and communication of environmental information. Finally, (4) some indications are given on how the different environmental aspects are managed in the river basin and their level of integration.

The analysis proposed in this section has not the ambition to cover exhaustively all the aspects involved in IWRM for the environmental protection, neither to evaluate the river basins in terms of performance. The scope here is more to provide an overview on what happens for water and environment management in the four river basins, highlight which mechanisms are effective or fails and in which context, and find out where possible lessons and suggestions through the comparison.

2.1.1 Water pressures and impacts

Agriculture, industry and hydropower production, and in general the socio-economic development, are the common driving forces in the four river basins, although the role played by each sector varies according to the local conditions (Table 2.1.1).

In water rich river basins, such as the Glomma and the Sesan, the hydropower development occupies a dominant position. The regulation of the natural water flow regime and the construction of dams impact the aquatic ecosystem, the surrounding landscape and the quantity of water available for other uses. Nevertheless, in these basins, some other pressures are present, especially due to agricultural activities. In the Sesan, the shift to wet rice cultivation has raised the water demand, and in Glomma, the loss of fertilizers and the release of point source of pollution (domestic and industry) have contributed to eutrophication of Lake Mjøsa.

In the Tagus and in the Tungabhadra river basins, different sectors compete for the water resource. In the Tagus, equally in Spain and in Portugal, water abstraction for irrigation, urban supplies and industrial discharges impact the water quantity, while in the Tungabhadra, both water quantity and quality are

threatened by the competing sectors. In fact, in Tungabhadra, the mining activities decrease the water depth and produce local iron contamination. The industries and corporations impair the water resource through consistent abstractions from surface and ground water bodies and local discharges of polluted effluents. And finally, agriculture alters water quantity and quality through irrigation and violation of cropping patterns, which produces phenomena of salinity, alkalinity and water logging. Hence, although in different context, the four river basins face in some cases similar pressures and comparable impacts.

Table 2.1.1 – Scheme of the main Drivers-Pressures-Impacts in the four river basins

	Drivers	Pressures	Main impacts
Glomma	Hydropower	Pressures are related to hydropower development Regulation of the water flow regime	Reduction of the water flow regime Change in quality and quantity of fish
	Agriculture	Diffuse sources of pollution (use of fertilisers)	Pollution of the Lake Mjøsa
	Urban areas	Point sources of pollution	Pollution of the Lake Mjøsa
Tungabhadra	Mining activities	Water abstractions and effluent discharges	Decrease of water depth Increase of water siltation Water contamination by iron
	Industry and corporations	Water abstractions and effluent discharges	Contamination of surface and groundwater Reduced groundwater resource
	Agriculture	Violation of cropping pattern	Salinity, alkalinity and water logging
Tagus (ES)	Agriculture	Water abstraction for irrigation Water transfer system Tagus-Segura	Reduced water quantity
	Industry	Water abstraction for refrigeration nuclear plant	Reduced water quantity and quality (temperature)
	Hydropower	Regulation of the water flow regime	
	Urban areas	Water abstractions for drinking water supply	Reduced water quantity
Tagus (PT)	Agriculture	Water abstraction for irrigation	Decrease of water quantity and quality
	Industry	Water abstractions and effluent discharges	Decrease of water quantity and quality
	Hydropower	Regulation of the water flow regime	Change in the flow regime
	Urban areas	Water abstractions for drinking water supply, effluent discharges	Decrease of water quantity and quality
Sesan (VT)	Hydropower	Regulation of the water flow regime	Reduced aquatic biodiversity, reduced fish production
	Agriculture	Increase water demand for wet rice cultivation	Reduced water quantity

The pressures and impacts shape the conflicts between different water uses in the river basins (Table 2.1.2). In fact, in Glomma and Sesan the conflicts are related mainly to hydropower development and concern the water flow regimes and the environmental impacts. In Tagus, both in Spain and in Portugal, conflicts are related principally to water quantity availability for the different sectors, especially because of the contrasting interests between agriculture and urban water supplies. In Tungabhadra, both water quantity and quality create reason of conflicts in the inter-sector allocation. Moreover, the regulation between upstream

and downstream part of the river basin and the consequent livelihood of 1000 fishing families create an additional reason of conflicts.

In Tagus, the regulation between the upstream and downstream part (corresponding to the Spanish and the Portuguese parts, respectively) is governed by the Albufeira Convention, while similar transboundary issues present at the Vietnamese and Cambodian border are under the Mekong River Commission.

The common factor in all the conflicts is the depleting of water quantity and quality, as this impact the terrestrial and aquatic ecosystem and compromise the different water uses.

Table 2.1.2 - Major water use conflicts

	Type of conflicts
Glomma	<ul style="list-style-type: none"> Conflicts are related to hydropower plants development and concern the water flow regime and the environmental impact Eutrophication of large lakes
Tungabhadra	<ul style="list-style-type: none"> Inter-sector allocation of water Pollution originated from agriculture and industry Downstream flow Livelihood of 10000 fishing families
Tagus (ES)	<ul style="list-style-type: none"> Water transfer Tagus-Segura Water uses (irrigation/urban supply; nuclear plants) Transboundary reservoir management (Alcantare reservoir)
Tagus (PT)	<ul style="list-style-type: none"> Inter-sectorial water allocation Potential transboundary conflict (Albufeira Convention)
Sesan (VT)	<ul style="list-style-type: none"> Hydropower development/agriculture (The hydropower reservoir development will inundate agricultural land and forest fundamental for the local livelihood) Hydropower development/fishery (the dam will assure relatively fixed water level, allowing fishing also during the rainy season but it will prevent migratory species to move downstream and will reduce the diversity of fish community) Hydropower development/biodiversity (impacts on forest, flora, fauna, aquatic life)

2.1.2 Environmental strategies and plans

To protect the water resource and cope with the source of pressures in the river basin, the competent authorities have developed specific plans or policies. Two types of planning documents were considered in this study: the river basin management plan (or policy) and the hydropower plan (Table 2.1.3).

For the Tagus basin, Portugal has developed a river basin plan (Tagus River Basin Water Plan, 2001) and Spain has adopted a hydrological river basin plan (Hydrological Plan of the Tagus Basin, 1999 focused on hydrological aspects).

In the European Union (EU), since the year 2000, the enforcement of the Water Framework Directive (WFD, 2000/60/EC) has enhanced the implementation of such types of plans. Norway, which is not part of the EU but has an extensive collaboration with the EU concerning environmental policy, as of January 1st. 2007 Norway adopted the WFD, with an adjusted implementation schedule of the river basin management plan schemes.

Similarly, under the positive influence of the Mekong River Commission, Vietnam is developing the Integrated Water Use and Water Resource Protection Plan of Sesan River Basin.

In Tungabhadra, a river basin management plan is still missing, but the national (National Water Policy, 2002) and state policy (Karnataka State Water Policy, 2002) already include IWRM principles.

The Sesan and the Glomma river basins have National hydropower plans (National Hydropower Plan Study in Vietnam and The Master Plan for Water Resources in Norway).

In general, all the planning documents aim at enhancing sustainable development and protecting the environment and the water resource, which is a fundamental principle in IWRM, and included socio-economic and environmental aspects. However, in some cases doubts were expressed about the effective application of the principles stated in the documents and the level of integration of the contrasting goals (Table 2.1.4).

Table 2.1.3 - Overview of existing planning documents in the four river basins

Basin	Level of planning	Planning document*
Glomma	Superior planning	The Master Plan for Water Resources in Norway The Protection Plan Water Framework Directive
	Planning initiative	The Øvre Otta Hydropower Regulation Hunnselva water resource management plan as part of the WFD
Tungabhadra	Superior planning	National Water Policy (2002) Karnataka State Water Policy (2002)
	Planning initiative	
Tagus (ES)	Superior planning	National Hydrological Plan Water Framework Directive AGUA Programme (Actions for the Management and Use of Water) Albufeira Convention (2000)
	Planning initiative	The Hydrological Plan of the Tagus Basin (1999) New Hydrological Plan of the Tagus Basin (under development)
Tagus (PT)	Superior planning	National Water Plan (2002) Decree-Law Water Law (2005) (transposing the WFD and requiring River Basin Management Plans to be approved by 2009)
	Planning initiative	Tagus River Basin Water Plan (2001) Regulatory Decree
Sesan (VT)	Superior planning	National Hydropower Plan Study (2001) Integrated Water Use and Water Resource Protection Plan of Sesan River Basin (under development)
	Planning initiative	

- The planning document marked in bold were analysed in more details by the basin partners, while the others were described only in general terms.

Table 2.1.4 - Main objectives of the planning documents

	Planning document	Main objectives (or relevant points)
Glomma	The Upper Otta project	Generate as much hydropower as possible at the lowest environmental costs. Provide income for the municipalities, generate employment and increase the economic activity in the area
	The Master Plan for Water Resources in Norway	The main objective is to achieve a nationwide collective management of the river basins based on a set of economic, social and environmental considerations. The master plan states which projects should be considered first for a licence when development is necessary.
	The Water course Protection plan	Presently 341 river systems are now protected against further hydropower development (some of these rivers had developed hydropower by the time the protection plan was accepted, such power plants and reservoirs could continue to run and be maintained.
	The Water Framework Directive	The objectives for the implementation of the WFD in Hunnselva is minimum good ecological and chemical status, this is the overall objective of the plan. Minimum means that those water bodies that have a higher standard shall not have reduced standard as a result of future actions or management.
Tungabhadra	National Water Policy (2002)	In the planning implementation and operation of a project and the preservation of the quality of the environment should be a primary consideration
	Environmental Protection Act (1987)	The central government lies down standards for - the quality of environment - emission or discharge of environmental pollutants
	Karnataka State Water Policy (2002)	Water resources planning and management should be done adopting an integrated approach for a hydrological unit (such as river basin) Irrigation projects should have a study of the likely impacts
Tagus (ES)	Hydrological Plan of the Tagus Basin	Ensure present and future water demand Implement efficient water management Protect water resource and the environment Ensure water quality Protect from hydrological extreme events Protect cultural and recreation uses
Tagus (PT)	Tagus River Basin Plan	Provides the general framing, the strategies and the programmatic targets for the future water resources planning activities
Sesan	National Hydropower Plan Study	Assess and rank potential hydropower projects in Vietnam, including cross-sectoral approach and a developing plan with long term objectives (power demand up to year 2020)
	Integrated water use and water resource Protection plan of the Sesan River Basin	Generate irrigations works, set up water resource plan (water supply), EIA, establish the river basin organisation

In Europe and in Vietnam new initiatives to protect the environment originated from the government, apply to all the river basin and include public participation and access to information. In India, new initiatives started from individuals, NGO and local departments and are more related to local projects (Table 2.1.5).

In Spain, some initiatives were recently put in place to protect the environment, such as the National Strategy for River Restoration, the National Plan of Water Quality: water treatment 2007-2015, the Action Plan for 0 Sewage, the Plan of Priority Actions for Hydrological and forestry restoration and the Nature Net 2000, for the protection of natural sites according to the Nature 2000 Directive (Table 2.1.5). The latter applies in Portugal as well.

In Vietnam, a law for Environmental Protection was promulgated in 2005 and, concerning more specifically the water management, the recent National Strategy on Water Resources until 2020 has set the framework objectives for the development of the New Water Law, which is now under editing (Table 2.1.5).

In Europe, the enforcement of the WFD has played a leading role in promoting new environmental policies, moving all countries towards sustainable management of the water resource. The reception of the WFD has resulted in a New Water Law (58/2005) in Portugal and, together with the AGUA Programme (Actions for the Management and Use of Water) will lead to the preparation of the New Hydrological Plan for the Tagus river basin in Spain. Similarly, a river basin plan will be produced in Glomma on the basis of the directive (Tale 5).

Table 2.1.5 - New initiatives to protect the basin environment and water

	Initiatives
Glomma	<p>At national level:</p> <ul style="list-style-type: none"> the European Water Framework Directive will enter into force in Norway, 7 pilot areas have been established to test the implementation of the WFD
Tungabhadra	<p>Some initiatives at local level, promoted by individuals, NGO, departments in co-ordination with religious institutions:</p> <ul style="list-style-type: none"> Four fish sanctuaries (prohibited location for fishing along the river Tunga) Bhadra Wild life sanctuary (about 500 km²) Dr. Prafulla Chandra - innovative farmer (sustainable agriculture and water use)
Tagus (ES)	<p>At national level:</p> <ul style="list-style-type: none"> AGUA Programme National Strategy for River Restoration National Plan of Water Quality: water treatment 2007-2015 Action Plan for 0 Sewage Plan of Priority Actions for Hydrological and forestry restoration Nature Net 2000 Modification of the National Hydrological Plan (law 53/2002, law 62/2003, royal decree-law 2/2004, law 11/2005) New Hydrological Plan for the Tagus Basin, which results from the AGUA Programme and the WFD
Tagus (PT)	<p>At national level:</p> <ul style="list-style-type: none"> Natura 2000 New Water Law 58/2005 which Transposes the EU Directive 2000/60/EC (WFD) Decree-law 226A/2007 which rules the concession for water use Decree-law 197/2005 which establishes the frame for EIA (transposes the EU Directive 2003/35/EC)
Sesan (VT)	<p>A number of initiatives at national level, promoted by the government:</p> <ul style="list-style-type: none"> Law on Water Resources (1998) Development of a National Water Resources Strategy Establishment of a National Water Resources Council Decree on International River Basin Management Law on Environmental Protection (2005) The state management function of the Ministry of Agriculture and Rural Development is transferring to MoNRE National Strategy on Water Resources until 2020 (2006) The new law on Water Resources is under development

2.1.3 Management instruments

Within the management instruments recommended by the Global Water Partnership for IWRM (TAC paper N.4), those that have a direct link with the protection of the environment and the water resource were considered in this section. In particular, the existence and implementation of the following management instruments has been evaluated for the four river basins:

- Water resource assessment
- Monitoring
- Controls, standards and guidelines
- Risk assessment and management
- Environmental Impact Assessment for new initiatives
- Communication and access to environmental information

The estimation of the water resource available, the comprehension of the status of the resource and the main pressures threatening is fundamental before adopting any planning or taking any action. This knowledge is then fed through monitoring, which should control the impacts of existing pressures, check the effect of mitigation measures and reveal the occurrence of new threats.

To protect the environment and the water resource, quality standards should be set for ecosystems and water bodies and for specific water uses. In addition, restricting quality standards need to be imposed for effluents discharging in water bodies. The effective implementation of such quality standards requires clear definitions in binding regulations, inventorying and licensing procedures and a system of controls and sanctions for not compliant cases.

In IWRM, the assessment of potential risks, linked mainly to natural causes, such as floods, droughts, water shortages or extreme climate events, has to be considered together with plans to manage the events and measures to mitigate their effects. Similarly, the impact produced by new human initiatives, such as hydropower plans, new industrial settlement, etc., should be submitted before approval to a specific procedure, called Environmental Impact Assessment (EIA), to evaluate all the possible impacts on the environmental and social systems and provide compensation measures or alternative options to avoid or reduce negative effects.

Finally, for an effective IWRM all the aspects described should be conducted according to the criteria of transparency. The public should be informed about all initiatives and should have access to all environmental information.

(Technology standards for water use efficiency will be addressed in a following section).

Water resource assessment

In their river basin plans, Spain and Portugal have evaluated the surface and ground water resources of the Tagus river basin. For example, Portugal has performed an assessment based on 50 years data observations (from 1940 to 1990) and has estimated the water consumption by sector, describing withdrawals from surface and groundwater sources. The same type of assessment will be performed in the future in Sesan and in Glomma, through the implementation of the Sesan Water Plan and the EU WFD, respectively. In Tungabhadra some information is available in separate agencies, but for the moment it is not integrated and it is not available for the public.

Significant variations in the flow volume have been registered in the river basins affected by reservoirs (Table 2.1.6). In Glomma, most of the hydropower dams were constructed more than 20 years ago, and since that time the minimum water discharge and flood peaks have been regulated by the hydropower regime according to licences taking environmental issues into consideration. In Tagus and in Sesan, it seems that not significant changes have been taking place during the last two decades (Table 2.1.6). In Tungabhadra, three

regions with different flow regime can be identified (Table 6). The typical flow regime depends on the seasonal rainfall and on the location along the upstream-downstream direction (Table 2.1.7)

Table 2.1 6 - Variations of flow volume during the last 10-20 years

Glomma	Major changes in water flow took place more than 20 years ago, during the most intensive hydropower development period. Minimum water discharge and flood peaks are regulated by the hydropower water discharge regime.
Tungabhadra	3 regions: Region of Surplus Controlled Flow Deficit region
Tagus (ES)	Not significant
Tagus (PT)	No available information
Sesan (VT)	Not significant

Table 2.1.7 - Water flow regime in the Tungabhadra river basin, according to different locations

Water flow station	Monsoon period (Jun-Sept)	Non monsoon period (Oct-May)
Badra reservoir	Moderate flow (Regulated flow)	Low flow (regulated)
Tunga Anicut	Excellent flow (Surplus water flow)	Low flow only during May.
TB reservoir	Moderate flow (Deficit region)	Poor flow (May-June)

Monitoring

Systematic monitoring activities are taking place in all the four river basins, as shown in Table 8. However, for an effective monitoring the parameters controlled and the spatial and temporal frequency of samples should be adequate to the sources of pressure present in the river basin. This seems to be the case in Tungabhadra, where the parameters controlled and the monthly sampling foreseen in the KSPCB's program cover the main water pressures identified in the basin (Table 2.1.1), that is iron contamination, high withdraws, salinity and alkalinity.

In Tagus, in the Spanish part, in order to protect the population, the monitoring system is designed to check the water quality each 15 minutes, since the water is used for drinking purpose (Table 2.1.8). Lower monitoring frequencies, such as one sample per month, are adequate to control water for irrigation or industrial purposes and for evaluating the status of the aquatic system, as the resource is submitted to seasonal variability. However, even a sample per year, if taken systematically and in a strategic location could contribute to long term evaluation of the aquatic environment and the water resource. This is the case for example of one monitoring program running in Sesan by DoNRE (Table 2.1.8). Therefore, each monitoring program should be evaluated according to the targeted objectives, considering the actual and potential pressures, the samples temporal resolution and spatial locations.

Table 2.1.8 – Water quantity and quality monitoring

	Type of monitoring	Responsible institution
Glomma	<p>Multiple water quality stations.</p> <p>Monitoring is oriented towards the design of measures</p> <p>Access to water quality information as required by the EU WFD (through web site)</p>	<p>Quality is monitored by Norwegian Pollution Control authority (SFT), the County Governor, municipalities. Monitoring data available on line through AQUAMONITOR; and Glommen's and Laagen's Water Management Association through their measure grid (målnett)</p>
Tungabhadra	<p>Laboratories at Davanagere and Raichur to provide scientific support.</p> <p>Monitoring programmes:</p> <ul style="list-style-type: none"> • Global Environmental Monitoring system (GEMS), 2 locations in TB • Monitoring of Inland Natural Aquatic Resources (MINARS), 6 locations in TB • KSPCB programme, 8 locations in TB <p>KSPCB is responsible for testing water quality (26 parameters) every month in 11 locations in the TB</p>	Karnataka State Pollution Control Board (KSPCB)
Tagus (ES)	<ul style="list-style-type: none"> • The Automatic System of Water quality Information (SAICA network) continuously (15 minute time resolution) controls surface water quality parameters (about 23 locations) • Monitoring network of the underground water (more than 100 locations) 	Tagus Basin Administration Office
Tagus (PT)	<ul style="list-style-type: none"> • Regular water quality monitoring in more than 100 locations (39 parameters) • 179 surface water quantity monitoring stations • 287 groundwater monitoring stations 	<p>Water Institute (INAG), at the national level.</p> <p>Administrations of the Hydrographic Regions (ARH) at the regional level.</p>
Sesan (VT)	<ul style="list-style-type: none"> • Hydro-stations belonging to the National hydrometeorological network (Kon Tum station, 16 parameters, 1 sample per month) • Surface and underground water quality monitoring by DoNRE (parameters related to the Vietnamese standards, one sample per year, for 5 years) 	<p>National hydrometeorological network</p> <p>DoNRE</p>

Controls, standards and guidelines

Without a clear indication of standards, monitoring is useless to control the status of the water resource and the environmental system. Therefore, the condition of water bodies, aquatic ecosystems, or the characteristic of water intended for a specific use are evaluated with respect to appropriate quality standards.

For example, quality standards for drinking water are present in all the river basins and are enforced by national regulations (Table 9). In Tungabhadra, water bodies have been classified according to their quality and their consequent use. In Sesan, quality standards have been set for surface and ground water, irrigation and protection of the aquatic life.

Table 2.1. 9 - Quality standards for water bodies and water uses

	Field/targets	Regulation	Authority
Glomma	Drinking water standards accords to EU. Ecological goals accords to WDF adjusted to Norwegian conditions Good ecological status of WDF. .	WDF standards and guidelines, EU adjusted national guidelines	The Norwegian Pollution Control Authority (SFT) and Directorate for Nature Management (DN) - water quality; and Norwegian water resources and energy directorate (NVE) are responsible for the water flow.
Tungabhadra	Drinking water standards	IS 10500:1991 (valid for India)	
	Water bodies classification: Class A: drinking water (disinfection) Class B: outdoor bathing Class C: drinking water (treated and disinfected) Class D: propagation of wild life Class E: Irrigation, industrial cooling, waste disposal		Karnataka State Pollution Control Board (KSPCB)
Tagus (ES)	Water quality standards for river and for lakes/reservoirs	Hydrological Plan of the Tagus Basin (Chapter V – Water quality and effluent discharges)	
Tagus (PT)	Water bodies classification	WFD standards	
Sesan (VT)	Water quality standards for surface and ground water	TVCN 5942-1995 TVCN 5944-1995	
	Water quality guidelines for irrigation and protection of aquatic life	TVCN 6773-2000 TVCN 6774-2000	

Besides the quality standards to protect the water resource and the ecosystem and to assure the different water uses, specific quality standards need be established together with a licence system to control the discharges of polluted effluents into water. The pollution can be punctual, when it is discharged in a specific and localised point, or diffuse, when it is released by multiple sources on a large area and reaches the water body from infinite pathways. Point pollution, typically discharges from industries and waste water treatment plants, is normally controlled by a system of licences and quality standards limits, while actions to control and reduce diffuse pollution are much more difficult.

Quality standards for effluent discharged into water are present in all river basins and cover essentially punctual industrial and domestic water discharges (Table 2.1.10). Restrictions can be based on the characteristics and the volume of the effluent or on the basis of conditions of the receiving water body. The first type of approach is used in Vietnam, Spain, Portugal and India. In countries with the Water Framework Directive such as Norway (Spain and Portugal), both applies (the first and the second type): the Waste Water Directive; licences to discharge effluents, and also the ecological standards of the Water framework directive (Table 2.1.11).

Table 2.1.10 - Quality standards for effluent discharged into water

	Field/targets	Regulation and responsible authorities
Glomma	Water quality standards for industrial and waste water plants discharges EU waste water directive	Norwegian Pollution Control Authority (SFT), under the Ministry of Environment. Regional (county) and local level (municipalities).
Tungabhadra	Water quality standards for effluent discharges	
Tagus (ES)	Water quality standards for river and for lakes/reservoirs	Hydrological Plan of the Tagus Basin (Chapter V – Water quality and effluent discharges)
Tagus (PT)	Water quality standards	Decree-Law 236/98 and 152/97 regulates licences of effluent discharges Water Institute and Administrations of the Hydrographic Regions
Sesan (VT)	Industrial and domestic water discharge standards Water quality standards for industrial effluents discharged into rivers and lakes designated to different uses	TVCN 5945-1995 TVCN 6772-2000 TVCN 6980 6981 6982 6983 6984 6985-2001

Table 2.1.11 - Licence system and effluents control (continue in the next page)

	Mechanism to licence the effluent discharges	Laws and responsible bodies
Glomma	The standards for waste water treatment plants are set on the basis of effort regulations and conditions in receiving water bodies and the quantity of waste water discharged.	The aim of the Pollution Control Act No.6 (1981, amended in 1996) is to protect the environment against pollution and to reduce the existing pollution and promote a better waste management. EU Urban Waste Water Directive (91/271/EEC)
	Regulations to reduce point source pollution from manure and silage storage Regulation and grant schemes to reduce excessive nutrient inputs to water and groundwater	National laws and decrees EU Nitrate Directive (91/676/EEC)
Tungabhadra		Pursuant to the Water (Prevention and Control of Pollution) Act (1974) the Government of Karnataka constituted the Karnataka State Pollution Control Board (KSPCB) for Prevention and Control of Water Pollution. The KSPCB enforces: <ul style="list-style-type: none"> the Water (Prevention and Control of Pollution) Act the Environment (Protection) Act, concerning: <ul style="list-style-type: none"> - hazardous waste - EIA notification - bio-medical waste - recycled plastics manufacture - municipal solid wastes - ozone depleting substances The Central Office is responsible for making general policies, which is then implemented through the regional offices, located in Davanagere, Raichur, Shimoga, Bellary, Koppal and Chickmagalur. The KSPCB is responsible for the water quality monitoring programme. The board is performing well but he has failed to create its identity in the community, it is not dealing with the community directly.
Tagus (ES)	There is an inventory of effluent points, including owner, location, characteristics of effluent discharge, authorised volume	
Tagus (PT)	There is an inventory of the effluent points, which includes the	Decree-Law 236/98 and 152/97 regulates licences of effluent

	Mechanism to licence the effluent discharges	Laws and responsible bodies
	identification of the owner, the location, the characteristics of the effluent discharge, and the authorised effluent volume	discharges
Sesan (VT)	The issuance of permits for water use and discharges of waste water must be based on the Law on Water Resources and the river basin plan, waste water standards and the water sources; capability of accommodating waste water (Art.5)	Decree No.149/2004/ND-CP regulate the issuance of permits for water resources exploitation and discharges of waste water into water sources (guidelines in the Circular No. 02/2005/TT-BTNMT). The Ministry of Natural Resources and Environment and the provincial-level People's Committees have the competence to issue the permits, for substantial (quantities are specified in the law) or local uses, respectively (Art.13). The dossiers are managed by the Department for Water Resources Management and the provincial/municipal Services of Natural Resources and Environment, respectively (Art.14). These two agencies are also responsible of inspecting the permit owners (Art.16). The permit owners have to pay fees for the issuance of permits (Art.18).

Risk assessment and management

Flood risk is included in the water and land management in all the river basins (Table 2.1.12), although in different ways. Flood risk is part of the river basin plan in Tagus (Spanish part) and in Sesan, it is included in a detail project of the Water Resource Department in Tungabhadra, it is regulated by the EU Directive 2007/60/EC in Tagus (Portuguese part), and finally it is part in hydropower project plans in Sesan and in Glomma.

Flood hazard mapping systems are present in Glomma and Tagus (Table 2.1.13). Measures to manage the flood risk are planned in all the four river basins. However, Tungabhadra and Sesan claim that the actual response is weak.

(In general, the information was not sufficient to evaluate how the various risks are handled in the river basins)

Table 2.1.12 - Flood risk taken into account in land-water assessment

	Water and land management	Regulation or plan
Glomma	Flood hazard mapping by the Norwegian water resources and energy directorate (NVE) provides this information to the municipalities.	NVE, municipal planning. The municipalities use the flood hazard mapping by NVE in their land use planning (new plan every fifth year).
Tungabhadra	Yes	Detailed Project report of the Water Resources Department
Tagus (ES)	Yes	Hydrological Plan
Tagus (PT)	Yes	EU Directive 2007/60/EC on the assessment and management of flood risks
Sesan (VT)	Yes, including irrigation development	Integrated Water Use Water Resource Protection Plan of the Sesan River Basin National Hydropower Plan

Table 2.1.13 - Alleviation measures for risk management

		Comments by river basin
Glomma	Flood hazard mapping	NVE provides maps for municipal planning.
Tungabhadra		Response is there but is not very effective
Tagus (ES)	National System for Mapping Flood Areas National observatory of droughts	
Tagus (PT)	Civil Protection National Authority (Floods, drought, fires, pollution accidents, dam break accidents)	The response system is fairly efficient.
Sesan (VT)	Water Law (Chapter V)	The response system is weak

Environmental Impact Assessment for new initiatives

Environmental Impact Assessment (EIA) consists of the ensemble of activities designed to identify and predict the impact of a new initiative on the environment and on the human health and well-being (SCOPE 5). EIA is required when projects are likely to have significant effects on the environment. It occupies an integral part of the planning process, especially for IWRM, requiring the integration of different sectors and different actors, such as project developers, decision-makers and the public.

The EIA is commonly implemented in all the four river basins for new projects. Table 2.1.14 resumes the information reported by the Glomma and the Sesan river basins on their EIA for hydropower project developments.

According to the European Council Directive 85/337/EEC, the EIA shall identify, describe and assess the direct and indirect effects of a project on:

- human being, fauna and flora
- soil, water, air, climate and landscape
- material assets and cultural heritage

and on the interaction between these factors.

In the Glomma and Sesan cases, these points are partially or totally covered, although with different level of deepening, according to the characteristics of the planned initiative and the local environmental and social concerns.

Both assessments included mid-term prediction of impacts, suggest mitigation measures and involved public consultation.

A specific case where EIA is required is in transboundary conditions. This is the case in Sesan and Tagus river basins, while in Tungabhadra, the transboundary canal project responsible for water conflicts date from before the age of EIA (Table 2.1.15).

Table 2.1.14 – Impacts described in the EIA for hydropower project in Glomma and Sesan

Impacts on	Glomma The Øvre Otta Hydropower Regulation	Sesan (VT) National Hydropower Plan Study
Alluvial and terrestrial vegetation	Slight impact on wild life and fresh water biology Phytoplankton societies	Mapped and listed
Botanical species	no	Yes, identified
Birds	Increase mortality	Registered and the impacts described
Benthic fauna and phytoplankton	Present species will likely be reduced, while other species will increase	Registered and the impacts described
Mammals	Registered. The pasture for moose will be reduced	Registered and the impacts described
Reptiles	No information	Registered and the impacts described
Fishes	Changes in habitat for larger fishes	Registered and the impacts described
Different ecosystems	Yes. It has been evaluated	No, not evaluated
Registered vulnerable or threatened species	Not registered	Registered
Geology, soils	Will not impact essential geologic values	No
Landscape	Power lines will be visible over large areas	No description
Hydrology, hydro-morphology		
River water flow	Target for environmental flow has been determined	Target for environmental flow has not been determined
River banks	Works has been described	
Sedimentation and erosion patterns	Minimal risk for erosion and land slide	The potential erosion has been described, and the impacts as well
Temperature changes	The present situation is studied	no
Ground water	The reduced water flow will have a local impact on the level of the groundwater (possible impact on agriculture)	no
Wells and springs	No springs in the area	no
Climate	described	Not in this plan but in another
Water quality	The recipient pollution capacity in river stretches will be reduced	Positive impacts are expected
Point sources	No point sources	no
Diffuse sources	Approached in general terms	Approached in general
Flood	No report on the flood, however the regulation will have a flood reducing effect	Flood events were described

Table 2.1.15 - Water protection and EIA under transboundary conditions

	Transboundary conditions	EIA in transboundary initiative	Exchange of information
Tungabhadra	<p>Distribution of the Tungabhadra reservoir waters to the two states of Karnataka and Andhra Pradesh.</p> <p>The Krishna Water Disputes Tribunal resolved the water allocation pattern (in early 1970s and reviewed in 2000).</p> <p>The guardian of the agreement is the Tungabhadra Board (composed by engineers from both states). The Tribunal allocated the quantum of water but not the rules governing the distribution. It is a static allocation system which does not deal with scarcity conditions, neglects the relationship between surface and ground water and does not mention the relative share of different uses.</p>	The projects/canals date from before the age of EIA	Each state has the obligation to notify and consult each other of planned measures. However, when requested by the Tribunal, states tend to produce contradicting/non-matching sets of data. In general, there is no statutory requirement for states to exchange data and information.
Tagus (ES)/ Tagus (PT)	<p>Albufeira Convention (signed in 1998, entered into force in 2000):</p> <p>Control hydroelectric use of the shared rivers (Duero, Miño, Limia, Tagus, Guadiana)</p> <p>Allocate to each country 50% of the benefits</p> <p>Ensure minimum discharge during dry periods and water quality</p>	The evaluation of transboundary impacts is included (Art.8 and Art.9 of Albufeira Convention)	<p>The Albufeira Convention includes the exchange of data, transboundary impacts queries, communication, alerts and emergency systems, water uses and floods.</p> <p>Moreover, there is a Information Exchange Work Group</p>
Sesan (VT)/ Sesan (CA)	<p>Management of the hydropower reservoirs at the Vietnam border with Cambodia (release of hydropower dams in Ratanakiri and Stung Treng Provinces in north-eastern Cambodia)</p> <p>Sesan is a tributary of the Mekong River</p> <p>The Sesan hydropower development Vietnam is now based on the agreement on Cooperation for sustainable development of the Mekong river basin (1995 Mekong Agreement legal framework for hydropower development in the region)</p> <p>Vietnam and Cambodia have also set up the Sesan Water Management Committee</p>	In the Vietnamese National Hydropower Plan EIA is an important part and includes the activities on transboundary waters	The two parties have established mechanisms of exchanges of information (flow regime, emergency alerts, operating processes, river water quality control)

Communication and access to environmental information

In principle, all the river basins (but no information provided for Tungabhadra) ensure the public participation to EIA processes and the public access to environmental information, although Sesan claims that not all the information is shown to the public (Table 2.1.16).

Table 2.1.16 - Public access to environmental information

	Regulation	Concerning EIA	To what extent?
Glomma	Act of 9 May 2003 No.31 on the right to environmental information and public participation in decision making processes related to the environment	Participation in EIA	All information in principle
Tungabhadra			
Tagus (ES)	Law 38/1995 defines the rights to access the environmental information		
Tagus (PT)	Decree-law 197/2005 defines the rights of access to environmental information	Participation in EIA	
Sesan (VT)	Decree no 162/2003/ND-CP regulation on collecting, managing, exploiting and using data and information of water resources	Public consultation in EIA, National Hydrological Plan	Most of information is not shown to the public. However, public consultation on EIA have just started few years ago

2.1.4 Management and integration of the different environmental aspects

The management of the different environmental aspect in the four river basins has been analysed according to the following items:

- Natural ecosystems and biodiversity
- Soil, water, air, climate and landscape
- Integration of the different environmental aspects

Natural ecosystems and biodiversity

The four river basins present different levels of protection for riparian zones and the associated ecosystems (Table 2.1.17). They range from conservative solutions, such as the case of Portugal, where all the fluvial corridors (50 m from the shoreline) are considered protected areas, to the protection of relevant water related ecosystems, such as the Laguna de Los Llanos de Peñalara in Spain or the inland delta area of the lake Øyern in Glomma, to the protection of specific sites, promoted by local groups or authorities in Tungabhadra, and finally to the absence to any sort of plan or protection, as it happens in the Sesan river basin (Table 2.1.17).

All the river basins have natural parks and protected areas to preserve the ecosystem habitat and biodiversity (Table 2.1.18). However their presence may not be sufficient if these areas represent a small fraction of the river basin and elsewhere the resources are managed in a non sustainable way.

Table 2.1.17 – Protection and restoration of water related ecosystems

Glomma	The lake Øyern is a protected site under the RAMSAR convection
Tungabhadra	In the basin there are four fish sanctuaries, promoted by religious organisation, NGO and local authorities
Tagus (ES)	The Laguna de Los Llanos de Peñalara is a protected site under the RAMSAR convection. The National strategy for River Restoration defines conservation measures and promote volunteering work to involve the population in the river conservation
Tagus (PT)	The fluvial corridors (the river reach plus the adjacent area 50 m wider along each river side) are considered as protected areas and all the initiatives in the protected areas are subjected to EIA. This assures the protection of this ecosystem.
Sesan (VT)	There is not any water related ecosystem protected.

Table 2.1.18 - Natural parks

Glomma	Jotunheimen National Park, Rondane National Park part of Dovre National Park some smaller protected areas
Tungabhadra	Kudremukh National Park (2002), evergreen and semi-evergreen forest Kuvempu bio-diversity Park (2003), biodiversity conservation
Tagus (ES)	Nature Net 2000 LICs (Areas of Community Interest) ZEPAs (Areas of special protection for Birds) Aquatic Habitats
Tagus (PT)	International Tagus River Reach Natural Park Special protected areas (according to directive 79/409/CEE) Natura 2000 Sites (according to directive 92/43/CEE)
Sesan (VT)	Protected Areas (managed at provincial level): Chu Mo Ray, 486 km ² Kon Tum (tropical eco-landscape, big size mammals) Ngoc Linh, 510 km ² Kon Tum (mountains timbers, endemic birds) Kon Ka King, 280 km ² Gia Lai (mountain eco-landscape and timbers) Kon Cha R'ng, 160 km ² Gia Lai (mammals and precious flora) Dalag forest in Kon Tum (precious wood species)

Soil, water, air, climate and landscape

As illustrated in the previous sections, the river basins have already implemented or are on the way to developed integrated plans for managing the river basin resources and in particular the water resource. A river basin plan has been already adopted in Tagus, both in the Spanish and the Portuguese part, while in Sesan and in Glomma, the plan is under preparation. In Tungabhadra there is the policy but not yet a plan. In addition to the actions for water resource, in Sesan, Tungabhadra, and Tagus (Spanish part), specific plans or policy objectives have been set to protect other aspects of the environment. For example, actions for hydrological and forestry restoration have been planned in Tagus (Spanish part), a project for forest conservation has been developed in Sesan, and measures for afforestation have been foreseen in Tungabhadra (Table 2.1.19).

Table 2.1.19 - Soil and water conservation projects in the river basins

Glomma	HYDRA project to prepare government and local authorities to cope with future floods. A Commission on Flood Protection Measures
Tungabhadra	<p>Watershed development approach (implemented in Karnataka) consists of:</p> <ul style="list-style-type: none"> • Human resources development • Soil and land management • Water management • Afforestation • Pasture/fodder development • Livestock development • Farm and non-farm value addition activities <p>Objectives of the Watershed Programmes:</p> <ul style="list-style-type: none"> • sustainable management of natural resources • enhancement of agricultural productivity • restoration of rainfed ecosystem • reduction of disparity between irrigated and rainfed areas • creation of employment opportunities for the rural communities
Tagus (ES)	<p>Plan of Priority Actions for hydrological and forestry restoration</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Improve the protective role of forests • Control soil erosion • Improve the hydrological regime <p>Priority actions:</p> <ul style="list-style-type: none"> • Replant with forest cover • Convert cultivate land into forest • Replant shrub and/or grass cover • River restoration
Tagus (PT)	Protected areas are under a special status
Sesan (VT)	<p>Integrated Water Use and Water Resource Plan of Sesan River Basin (MARD), not published yet</p> <p>Project Forest conservation and development (JICA)</p>

Forest restoration and similar initiatives contribute to limit the decreasing in forest and natural land cover observed in some cases, such as in Tagus and in Sesan (Table 2.1.20), and act as effective measures to reduce soil erosions, together with the monitoring of sediment in rivers and reservoirs (Table 2.1.21).

Finally, an example of different environmental aspects included in the river basin plans for Tagus and in the policies for Tungabhadra is provided in Table 2.1.22.

In general, from the technical point of view, all the river basins have developed plans or policy actions to protect several aspects of the environment. However, less is known on their status of implementation and on the effectiveness of the planned measures. A way forward would be to use environmental indicators of status and trends.

Table 2.1.20 - Forest cover changes

Glomma	No major changes
Tungabhadra	No information provided
Tagus (ES)	Not very much in surface cover
Tagus (PT)	From 1985 to 2000 the forest area was reduced of about 1100 km ²
Sesan (VT)	Forest in Kon Tum province has decreased of about 0.3% from 2002 to 2005

Table 2.1.21 - Erosion control and sediment monitoring

	Action	Responsible authority
Glomma	Suspended solids are regularly monitored in the quality monitoring programme	Norwegian Pollution Control authority (SFT). NIVA does contract work of monitoring (6 stations)
Tungabhadra	Sedimentation is monitored annually in the reservoir but not along the basin	Water Resources Department
Tagus (ES)	No	
Tagus (PT)	The monitoring system includes the sediments	Water Institute (26 stations)
Sesan (VT)	There is no erosion and sedimentation monitored on regular basis	

Table 2.1.22 - Assessment of impacts on different environmental aspects according to the river basins plan or policy

Impacts on	Tagus (ES) The Hydrological Plan of the Tagus Basin (1999)	Tagus (PT) Tagus River Basin Water Plan (2001)	Tungabhadra Different policy and plan
Alluvial and terrestrial vegetation	Some relevant hydrological maps provided	Vegetation zone not differentiated, but some relevant vegetation maps provided	No
Botanical species	No	Listed	No
Birds	No	No	No
Benthic fauna and phytoplankton	No	No	No
Mammals	No	No	No
Reptiles	No	No	No
Fishes	River reaches with fishing interests	No	No
Different ecosystems			No
Registered vulnerable or threatened species	No	No	No
Geology, soils	No	The characterisation was done, but the plan does not include the impact assessment	Available in some agencies for some parts
Landscape	No	The characterisation was done, but the plan does not include the impact assessment	Available in some agencies for some parts
Hydrology, hydromorphology	No	The characterisation of the more relevant hydrologic variable is done, but the plan does not include the impact assessment	No
River water flow	No	Same	No
River banks	No		
Sedimentation and erosion patterns	No	The areas more prone to erosion are identified and included in the REN (National Ecologic Reserve) protected area.	Only sediment level in the reservoir
Temperature changes	No		No
Ground water	No	The identification of the water origins for urban supply, irrigation and industry was performed, but no impact assessment evaluation was carried out	The Karnataka Groundwater regulation and control bill, 1996
Wells and springs	No	Same as previous	
Climate	No	Included	
Water quality	No	Included, but no impact assessment	
Point sources	No	Identified	
Diffuse sources	No	Identified	
Flood	No	The characterisation of the more relevant hydrologic variable is done, but the plan does not include the impact assessment	

Level of integration of the different environmental aspects

To implement IWRM, the Global Water Partnership (TAC no.4) recommends considering the integration in the following aspects:

- the freshwater management and coastal zone management
- land and water management
- green water (for biomass production) and blue waters (water flowing in rivers and aquifers)
- surface and groundwater management
- quantity and quality in water resources management
- upstream and downstream water-related interests

These aspects should then be further integrated with the social aspects and the human system.

The STRIVER river basin partners were asked to provide a quality assessment of the actual level of integration between the different environmental aspects. Their answers are presented in Table 2.1.23.

Table 2.1.23 - Qualitative assessment of the level of integration in different environmental aspects in the four river basins.

Level of integration in:	Glomma	Tagus (ES)	Tagus (PT)	Tungabhadra	Sesan (VT)
Freshwater management and coastal zone management	MEDIUM	MEDIUM	MEDIUM	LOW	-
Land and water management	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW
Green water (for biomass production) and blue waters (water flowing in rivers and aquifers)	LOW	MEDIUM	-	LOW	LOW
Surface and groundwater management	LOW	HIGH	MEDIUM	LOW	LOW
Quantity and quality in water resources management	HIGH	MEDIUM	MEDIUM	LOW	LOW ¹
Upstream and downstream water-related interests	MEDIUM	LOW	MEDIUM	LOW	LOW

1) Signs of improvement is visible with initiatives for transboundary water committees and activities by MRC

An example of what happens in practices can be illustrated by the management of surface and ground water. In all the river basins the legislation related to water requires the integration between surface and ground water resource management (Table 2.1.24). However the level of implementation then greatly depends on the specific basin situation. The integration is a pre-requisite for hydropower concessions, in Glomma and Sesan, while it is not implemented in practices in Tungabhadra. A pragmatic solution to improve the integration could be the example of Portugal, where the surface water and ground water are under the supervision of the same institute.

Table 2.1.24 - Details on the integration between surface and ground water management.

Glomma	It is one of the factors included in the hydropower concession It will be considered under the WFD
Tungabhadra	The Karnataka Water Policy states that the water resource planning, development and management has to be carried out adopting an integrated approach for a hydrological unit such as river basin, conjunctly for surface and ground water incorporating quantity, quality and environmental consideration. However, at the moment implementation is not happening in a basin prospective.
Tagus (ES)	The Hydrological Plan of the Basin states that the management of surface and groundwater must be coordinated.
Tagus (PT)	Surface and groundwater waters are under the supervision of the Water Institute, therefore an integrated policy for water management is expected.
Sesan (VT)	It is one of the factors included in the hydropower concession It is mentioned by the National Water Resources Strategy

2.1.5 Conclusions

The socio-economic development is the common driving force in all the STRIVER river basins, although the role played by each sector, varies according to the local conditions. As a consequence, the river basins face in some cases similar pressures and comparable impacts. The common factor in all the conflicts is the depleting of water quantity and quality, as this compromise the different water uses.

River basin plans or policies and plans focusing on specific environmental aspects exist in all the river basins. In general, they promote the integrated management of the water resource and the respect the overriding criteria of environmental and ecological sustainability.

Most of the relevant environmental management instruments are implemented in the river basins, including water resource assessment, monitoring, quality standards and controls, risk assessment and management, Environmental Impact Assessment, and communication and access to environmental information.

From the technical point of view, all the river basins have developed plans or policy actions to protect most of the environmental aspects. However, it is difficult to assess their status of implementation and the effectiveness of the planned measures. In fact, in some cases the basins claim a lack of monitoring and control and a poor implementation of the prescribed actions.

A way forward to check the effectiveness of mitigation measures and the sustainability of policies would be to implement environmental indicators to assess the status and the actual trends of environment and water resource conditions.

To promote the sustainable use of the resources long-term environment objectives should be developed together with the mid-term objectives. The active role of international organisations, such as The Mekong River Commission and the European Union, in promoting IWRM, would be beneficial also in this direction.

Finally, enhancing the environmental education would in the long term arise awareness in the society and develop more sustainable behaviours.

2.2 Measure to ensure efficient and equitable use of water

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Two subjects dealing with such theme were present in the assessment reports compiled by basin partners, namely regarding measures undertaken to improve the efficient use of water and to spread the perception of water as having social and economic value.

Analytical assessment

Initiative taken to improve efficiency

Sesan	National Hydropower Plan includes new hydropower developments; EIA and mitigation provisions present
Tagus.PT	Water Law: utilization must be efficient; cost based on polluter-payer and user-payer
Tagus.SP	Priority to uses and new allocations with water technologies for water saving; promoting sewage reutilisation; modernisation of water transport; incentives for crop variety requiring less or desalted/recycled water; National plan for reutilisation being elaborated
Tungabhadra	No formalized info; rainfall harvesting and water conservation encouraged (Karnataka); shift to payment on the basis of water use
Glomma	Hydropower producers are increasing water use efficiency through replacement of older generation turbines. All municipal water is charged for on a cost recovery basis. Good examples of multi-user assessments in fixing hydropower concessions (example Øyeren)

The Tagus Basin in both countries (Spain and Portugal) has clearly the most developed initiatives undergoing to improve water use efficiency: the highlights are the polluter/user – payer approach (in the Portuguese side) and set of incentives for new water-saving technologies and efficient transport, and for not water-intensive crops and cultivars (in the Spanish side). To be noted that in the Tungabhadra catchment the user-payer approach is under implementation that is similar the one in use in the Tagus area. In the Glomma domestic water pricing, increasing technical efficiency of hydropower use and multi-user environmental flow planning are all part of water management.

Effectiveness of initiative

Sesan	No info
Tagus.PT	No info
Tagus.SP	Implementation very recent
TungaBhadra	No info
Glomma	“Not yet optimal”

Very few information is available in this context, suggesting however a not outstanding performance in the four case studies, except maybe for the rather developed Spanish approach for which an appropriate evaluation requires more time

Measures for the re-use

Sesan	None
Tagus.PT	None
Tagus.SP	National plan for reutilisation being elaborated
TungaBhadra	No formalized info; ground water recharge
Glomma	Not applicable

Little information is made available. Generally it can be argued that in areas where water shortage is evident, a pressure exists that pushes toward implementing measures for water saving and re-use. The Spanish situation

seems to be the most developed one, while in the Tungabhadra catchment, even if not reported in the documents, some ground water recharge policy is currently being developed. In the Norwegian catchment re-use is not applicable as there is not shortage of water and thus no real need for water recycling, neither in municipal supply nor irrigation (which is limited). Water could be regarded as re-used for hydropower in a cascade of hydropower plants along the length of the Glomma, but this is not the traditional meaning of re-use.

Coordination between departments

Sesan	Two ministries involved; no info on coordination
Tagus.PT	No info
Tagus.SP	Two ministries involved; no info on coordination
TungaBhadra	No info
Glomma	Coordination of institutions within the implementation of WFD

It seems that the concurrent involvement and overlap of different departments is a quite common feature. The way and the extent in which coordination is achieved are not known. In the Glomma catchment, due to the advanced stage reached by the WFD implementation, a coordination of institutions has been achieved. Even if no information has been reported by partners from the Tagus basin (both countries) it is quite reasonable that a certain level of integration must have been reached also in the respective countries.

Monitoring devices/systems to record and control water use

Sesan	None
Tagus.PT	All uses monitored
Tagus.SP	Users install meters to report
TungaBhadra	No formalized info; because of the shift of payment system, devices to be installed
Glomma	Some initiatives

Also in this context, water shortage pushes toward the adoption of strategies to minimize excess use and to gain on the efficiency. In fact both in the Tagus (two countries) and in the Tungabhadra a water metering system is already in place or it is under development, as a consequence also of the adoption of the policy in which water payment is based on the used volumes and not a flat basis. No information is available for the Sesan basin. In Glomma, public drinking water use is included as an annual fee per year at household level regardless of consumption. Some initiatives in certain municipalities to install meters at single households. Water use in hydropower plants is continuously monitored

Initiatives to treat water as an economic and social good

Sesan	Hydropower production but recognition to other uses (fisheries)
Tagus.PT	In national law: water cost must be socially acceptable; utilisation must be efficient and cost recovered on the basis polluter-payer and user-payer
Tagus.SP	Plans emphasize both aspects; end-users perceive water only as a right
TungaBhadra	Principally social good
Glomma	Adoption of plans that consider not only hydropower potential but also other environmental / social uses; hydropower an asset for municipalities

The double value of water resources to be considered as a good having both an economic and a social value seems to be well recognized in all the four basins. The adopted policies in all the cases aim to sustain this view, even if the strategies can be different in terms of approach and strength. In general the perception of the social relevance of water resource leads to the adoption of strategies to preserve the environmental value of the river, as opposed to the economic value that is all the time and everywhere well understood. In some case (Sesan) the environmental concern about fish protection has also a direct link to economy (fishery) and livelihood for poor communities and minorities

Human and animal health monitoring

Sesan	None
Tagus.PT	Indirect; water quality monitored
Tagus.SP	Indirect; water quality monitored
TungaBhadra	On a general state-wide basis; records kept
Glomma	No; general health monitoring

In all the studied basins, a formalized policy about health monitoring due to the water availability and quality is not existing, while almost everywhere (and probably also in the Sesan, even if not reported) general country-wide monitoring is done by the health and welfare administrations.

Effectiveness of emergency alleviation and response system, and
Existence of an emergency alleviation and response system

Sesan	Weak
Tagus.PT	No info; Civil Protection in charge for all emergencies
Tagus.SP	Not possible; plans under development; some provisions for droughts
TungaBhadra	Not that effective; disaster management strategy for flood and drought to be formulated (Karnataka law)
Glomma	Flood risk monitoring and information; no info on effectiveness

A country-wide activity in the field of emergency alleviation and response system is in place in all the countries, as a part of the wider duties of the Civil Protection System. In the Glomma basin, a rather evolved system exists based on risk mapping, early warning and public information. The need for specific risk management plans is perceived also in the Spanish Tagus and in the Tungabhadra (at least in Karnataka) where plans are under development. Information on the effectiveness of such system is widely missing.

Pricing of water

Sesan	None
Tagus.PT	Close to implementation; tax =A+E+I+O+U
Tagus.SP	Actual costs low; new programme to fix pricing according to real costs and benefit
TungaBhadra	Exist for irrigation, drinking and industries
Glomma	Public can review efficiency of municipal W&S cost recovery rates

Except for the Sesan area (where water is reported not having any price), pricing policies exist in all the basins. The approach can vary from the likely simple system adopted in the Tungabhadra to the evolved approach existing in the Tagus (both countries) based on real costs and gained benefit. . In the Glomma basin, household can also review the efficiency of cost recovery rates at a municipal level through the internet (KOSTRA web-site)

Who pays

Sesan	Farmers and household pay low; in urban areas drinking water has to be paid
Tagus.PT	All (for excepted users see next question)
Tagus.SP	Irrigation has political price to help farmers
TungaBhadra	Farmers pays but irregular; households pay on flat rates; no meters; cost not recovered
Glomma	Farmer pay if use water from municipal supply; households pay W&S

Categories exempted from paying

Sesan	Poor and minorities
Tagus.PT	Minor users; abstractors less than 5HP
Tagus.SP	No
TungaBhadra	Slums served with public taps and do not pay
Glomma	No

A rather inefficient practice seems to be applied in the Tungabhadra where users pay irregularly or on a flat basis, as a consequence of the lack so far of a metering system. In all the other cases, almost all the uses require a fee. Local political priorities are implemented in terms of different price levels imposed to certain user categories or according to the average welfare level of the concerned society. So it happens that in the Sesan, Tagus and Tungabhadra policies give irrigation a special consideration, since required fees are more or less “political” fees to sustain the agricultural sector. In the water rich area of the Glomma basin, fees for water use are set by regulation at cost recovery levels by municipalities. Special provisions exist everywhere (there is no need in the Glomma area) for a special favourable treatment for the less rich and developed communities.

Traditional water uses allowed

Sesan	Yes
Tagus.PT	No info
Tagus.SP	No info
TungaBhadra	Yes
Glomma	Not applicable

European technological and “developed” countries seem to have lost links to their roots since previously existent traditional uses of water are actually no more existent. The opposite happens in the two Asian catchment, probably due to the peculiar average consideration given to “spiritual” needs.

2.3 Institutional analysis and stakeholder participation

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A slightly artificial distinction will be made here between institutional integration and coordination, and integration of allocation frameworks. In the ideal situation, decisions with an impact on water resources should take that effect into account. This means that decisions involving for example land management or development on a flood plain should be informed by the potential impact on flood mitigation and pollution control, and requires that water be “mainstreamed” into the decision-making processes of all relevant authorities. This would normally be expected to include ministries or departments responsible for sectoral uses (irrigation, hydropower, industrial and domestic supply for instance) and for environmental protection. Hydrological co-ordination would also demand that groundwater and surface water are managed together, preferably by one organisation alone, and that upstream uses take account of downstream impacts and vice versa. Ideally again, this would demand management at the basin level rather than on the basis of political boundaries, although administrative boundaries can be bridged to a large degree by successful coordination and management practices. Institutional integration therefore demands close coordination between relevant organisations (i.e. the decisions of which affect the quantity, quality or flow of water resources and dependent ecosystems) and preferably a basin approach to management. National (and associated basin) water and flood management policies or strategies, coupled with accurate flood risk maps are also crucial, as are effective implementation efforts.

An analysis of the allocation frameworks used in the context of IWRM must assess the criteria used and the institutional environment surrounding the allocation of water use permits, whether relating to surface or ground waters, and consumptive or non-consumptive uses. IWRM requires that institutionally these decisions are made at the basin level,³ but from the key IWRM perspectives of equity and participation it would also require that allocation decisions are made using transparent criteria and that these take account of economic, social and environmental factors. In the context of more extreme hydrological events, the allocation framework should also accommodate methods for ensuring that the burden of sharing the burden of drought is equitable, and crucially in the context of climate change, these frameworks should also set out the circumstances in which use rights may be varied or suspended. The following sections will set out an overview of the positions in all four case study basins and will attempt to identify particular areas of concern in each. This will be followed by a series of organograms indicating the institutional structure in place in each basin.

2.3.1 Institutional Integration

In the EU⁴ (and EFTA⁵) context, art.3 of the Water Framework Directive demands that river basin districts are established. Spain, Portugal and Norway are therefore bound to set up an administrative system for water management based on hydrological basin boundaries.

In **Norway** responsibility for Water Management is at three levels, national, regional and local with ministries, counties and municipalities as responsible. Water Management can be divided in Water Resources Management (quantity) and Water Quality Management (quality). The Ministry of Oil and Energy has the overall responsibility for Water Quantity Management, while the Ministry of Environment has the overall responsibility for Water Quality Management. The Ministry of Environment has the overall IWRM responsibility as it is responsible for the implementation of EUs Water Framework Directive (WFD). In Glomma the County Governor in the county of Østfold on behalf of the other 5 counties was until recently

³ See [hydrological co-ordination] section below.

⁴ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, *Official Journal L 327*, 22/12/2000 P. 0001 – 0073.

⁵ Agreement on the European Economic Area (OJ No L 1, 3.1.1994, p. 3; and EFTA States' official gazettes), Annex XX, para.13ca, as amended by Decision No 125/2007 (OJ No L 047, 21.2.2008, p. 53 and EEA Supplement No 9, 21.2.2008, p. 41). Available at <http://www.efta.int/>.

responsible for the implementation of the WFD; however this responsibility is in the process of being transferred the County Council.

As to IWRM, the Norwegian Ministry of the Environment (MD) is the major actor at the national level, but the MD works in close cooperation with other ministries such as the Ministry of Petroleum and Energy, the Ministry of Fisheries and Coastal Affairs, Ministry of Health and Care Services, Ministry of Agriculture and Food, and the Ministry of Transport and Communication. At the county level the County Governor/County Council coordinates work with the implementation of the EU Water Framework Directive (WFD). Hunnselva is one of the sub-basins in Glomma in which STRIVER is collaborating closely with the River Basin District working Committee. At the regional level there is also the River Basin District Committee (VRU) which collaborates with the river basin district authority (the county governor) to implement the WFD. The River Basin District Committee consists of representatives from sectoral authorities, county authorities, municipalities and is led by the river basin district authority (the county governor). The River Basin District Working Group is a group which provides input to the work to develop the management plan – action plan on regional level. To sum up, water management in Glomma is partly divided between different sectoral ministries, and partly integrated through the implementation of the WFD. The GLB Water Association is responsible for the operation of reservoirs and flow management on the river.

The systems present in **Spain and Portugal** are in some ways more complex, but are in many ways similar to each other. Each has a basin plan in place, with each having a separate basin authority responsible for the management of the water resources in the basin (in Portugal, the Tejo Hydrographic Region Administration, and in Spain, the Tagus Basin Authority). In addition, both countries have established basin plans for their respective sections of the catchment, prepared in a collaborative and consensual way through the Tejo Basin Council (Portugal) and the Tagus Council of Users (Spain). These bodies are stakeholder-led, and work within the general national strategies prepared by their respective National Water Councils (again stakeholder-led, but representative of national as opposed to basin interests - in Portugal this body serves as an advisory board to the Government). In Portugal, the national Water Institute is responsible for the implementation of the basin plan, with the basin authority taking this function in Spain. At the national level in Spain, water resources management is controlled by the Water Authority, which works under the auspices of the Ministry of the Environment, and the Rural and Maritime Environment. The Water Institute in Portugal which is responsible the Ministry for Environment, Spatial Planning and Regional Development serves a similar function at the ministerial level in both countries, there is no specific coordinating body. However, the constitution of the National Water Councils in both countries goes some way to alleviating this potential difficulty – both are made up of representatives from all relevant ministries, sectoral users, NGOs, regional authorities and technical bodies [In Portugal, the basin councils are composed by representatives from (Law 58/2005, article 12) the ministries, the municipalities, the main water users (either consumptive or not) technical, scientific and non-governmental organizations related with the water users in the basin]. Finally at the supra-national level, both countries have obligations with respect to water policy and information provision under the Albufeira Convention, which has established the Conference of the Parts to coordinate transboundary cooperation over the river, this organization is quite effective.

The Sesan in **Vietnam** is controlled primarily within the regime of the Ministry of Natural Resources and the Environment (MoNRE), with more local control being exercised by the ministry's local Departments (DoNRE) and relevant provincial Peoples' Committees. While the National Water Resource Strategy calls for both ground and surface waters to be managed together, the reality falls short of this integration. Flood management considerations are incorporated into wider land use management, but only insofar as hydropower production interfaces with irrigation. An Integrated Water Use and Water Resource Protection Plan of the Sesan River Basin is due for publication, although it is interesting to note that the Ministry of Agriculture and Rural Development (MARD) is responsible for it – the fact that MARD rather than the MoNRE is linked to the document may suggests that the integration of use being addressed relates mainly to irrigation rather than basin-wide utilisation. Institutional coordination with respect to water management is regarded as poor, with ill-defined roles and functions causing additional problems. A profusion of organisations at different levels is unlikely to help this situation, and it is noteworthy that many of the organisations involved with water resource management at the local or district level are irrigation or hydropower linked.

Finally with respect to **India**, the Tungabhadra, the pollution control is separated institutionally from abstraction management. In Karnataka, the State Pollution Control Board for Prevention and Control of

Water Pollution is responsible for the development of pollution management policy, and its regional offices are charged with implementation of pollution control. Water abstraction is controlled by the state Department of Water Resources at the first instance, although this body is responsible for approving (or not) applications for water use from relevant sectoral ministerial departments. It is worth noting that this Department exists only in Karnataka thus far, although this replaced the former Department of Irrigation. This name change has not yet occurred in Andhra Pradesh, but questions must be raised as to whether or not departments responsible for irrigation can change quickly into departments responsible for all aspects of water use in the context of IWRM without favouring agriculture at least initially. The Tungabhadra Board, which reports to the union-level Ministry of Water Resources, controls water allocations and power output from the Tungabhadra dam to the basin states, but it is not a licensing body. Water management is therefore done not at the basin level, but at state level.⁶⁷ Questions have been raised about the effectiveness of the State Pollution Control Boards and their lack of contact with users. This raises concerns that the environmental component required of IWRM is perhaps less effectively managed in the Tungabhadra context as it might be.

Allocation networks:

In the context of the Glomma, both surface and ground waters are regulated under the Water Resources Act 2001. Licensing of the use of both resources is provided for in sections 10 and 44-45 respectively,⁸ and must take account (subject to certain exceptions for minimal use⁹) of water levels, the value of the water to flora and fauna, water quality and groundwater levels.¹⁰ Licences for water use can only be granted “*if the benefits of the measure outweigh the harm and nuisances to public and private interests affected in the river system or catchment area*”,¹¹ public interests being taken to include “*nature conservation, outdoor recreation, the landscape, fish stocks, economic activity and local communities*”.¹²

While abstraction and impoundment of water resources is controlled by the Ministry of Petroleum and Energy with NVE as the key executive institution, pollution control falls within the remit of the Ministry of the Environment, with Pollution Control Authority and the County Governors as key actors. Formally there is an effective split between the legal and institutional arrangements for qualitative and quantitative aspects of water management. However both in laws, actual planning and licensing procedures close coordination and interactions between quantity and quality water management is built in. The organisational structures and procedures for implementation of the WDF is a good example of such coordination.

In the Tagus, Spain’s Water Law demands that a particular hierarchy of uses be respected in the context of a drought – supply to population; agricultural uses; electricity generation; industrial uses; aquaculture; recreational uses; navigation and aquatic transport; and other uses.¹³ Interestingly, environmental requirements are not covered in this prioritization list. Portugal’s administrative right of use system is organized at both the national and the basin level, with licenses being issued by the Water Institute and the hydrographic basin authorities. The priorities for water use, which apply in periods of scarcity, are public distribution, followed by agricultural and industrial uses.

With respect to the Tungabhadra, pollution is controlled by the State Pollution Control Boards at state level. Water abstractions are administered in the first instance by sectoral departments at the state level, subject to the approval of the state Water Resources Department. Sitting geographically above this is the Tungabhadra Board, which is responsible for the inter-state allocation of water for major irrigation projects and power generation from the dam to Karnataka and Andhra Pradesh. The existing allocation system at this level fails to provide for variation in allocations to take account of changing climatic or resource availability, especially

⁶ reference

⁷ Though see National Water Policy, paras.3.3 and 4.2, which envisage basin management when the policy is finally implemented in full.

⁸ And under s.8 generally.

⁹ Water resources Act, ss.15 and 45 for surface and ground waters respectively.

¹⁰ Water Resources Act, s.10.

¹¹ Water Resources Act, s.25.

¹² As per Norway Water Resources Framework Facts, para.10.4.2.

¹³ Water Law, art.60.

in the context of droughts, and ignores connections between ground and surface waters. The National Water Policy of 2002¹⁴ sets out water use priorities as follows: Drinking water; Irrigation; Hydro-power; Ecology; Agro-industries and non-agricultural industries; and Navigation and other uses.¹⁵ It does not, however, set out the criteria to be used by licensing authorities when allocating water use rights. As regards groundwater use, it appears that a state authority for Water, Land and Trees has been constituted in Andhra Pradesh,¹⁶ the remit of which includes the regulation of “*the exploitation of ground and surface water in the State*”.¹⁷ Beyond this, a further authority, the Groundwater Department, determines whether or not groundwater is sufficiently available to allow tahsildars to allow well drilling.¹⁸ The Water, Land and Trees Authority have the power to ban drilling in areas of groundwater over-exploitation,¹⁹ although the focus of the Act is on quantity rather than water quality or environmental protection.

In the Sesan, permits for pollution must be obtained according to the law,²⁰ with thresholds being determined by the capacity of the receiving waters.²¹ Hydropower dominates use allocation, but in periods of water shortage, priority is given to water needed for human consumption. It is not clear, however, how licences for use in such circumstances can be varied, as the power of amendment lies with Peoples’ Committees²² to be used in undefined scenarios. Neither is it clear how decisions relating to allocation are taken in the first instance as the criteria are unspecified. In the event that decisions (for example, with respect to allocation or variation) are challenged, disputes are settled by the agency responsible for the initial decision,²³ which is less than perfect from the perspective of user equity. As regards control of pollution, users are required to report to the Department of Natural Resources and the Environment on their emissions, but the harm caused to ecosystem and human health in basins (whether by point-source or diffuse pollution) are not monitored.

Conclusions:

The first impression from these overviews is that the implementation of IWRM in most basins is at a fairly early stage and that the many layers of integration required are more often than not happening in practice. Strategies and basin plans are generally either recent innovations or currently in preparation, although it is disappointing that India’s water policy has yet to be implemented in any form despite having been in place for six years. It is also interesting to note the extent to which overall water resources management in the basins is connected to the administration responsible for the principal water uses. Water resources/quantity management in Norway is broadly the responsibility of the Ministry of Petroleum and Energy, which is also responsible for hydropower; in India, water resources are managed by renamed Departments of Irrigation; and lower level water management agencies in Vietnam are associated with irrigation and hydropower management. This is in itself not necessarily inimitable to the implementation of IWRM, but the absence of a legal framework that puts IWRM in place will mean that the dominant water user is more likely to be able to control and skew water resource management in its favour. Institutional coordination is problematic in almost all basins, exacerbated by the multitude of bodies involved, patchy definition of roles and functions and no doubt a lack of financial capacity.

It is also apparent from the examples that the criteria used in the processes for allocating water use rights are either vaguely defined or left to the discretion of the issuing authority. This is also the case with respect to the variation of use rights: climate change and changing use patterns will demand that water rights be variable, in order to adjust to changing circumstances. Even in the best cases listed above (Norway, for

¹⁴ Available at <http://wrmin.nic.in/>.

¹⁵ *Id.*, para.5. The schedule of priorities is changeable however, in the light of local circumstances (*id.*).

¹⁶ An Act to Promote Water Conservation, and Tree Cover and Regulate the Exploitation and Use of Ground and Surface Water for Protection and Conservation of Water Sources, Land and Environment and Matters, Connected Therewith or Incidental Thereto Act No. 10 of 2002, available at <http://www.ielrc.org/content/e0202.pdf>, s.3.

¹⁷ *Id.*, s.6.

¹⁸ See Note on the salient features of the Andhra Pradesh Water, Land and Trees Act 2002, 2, at <http://www.portal.ap.gov.in/Acts%20%20Policies/APWalta%20Act.pdf>.

¹⁹ Andhra Pradesh Water, Land and Trees Act 2002, ss.9-11.

²⁰ [Insert source provision]

²¹ Water Law, art.5.

²² Water Law, art.13.

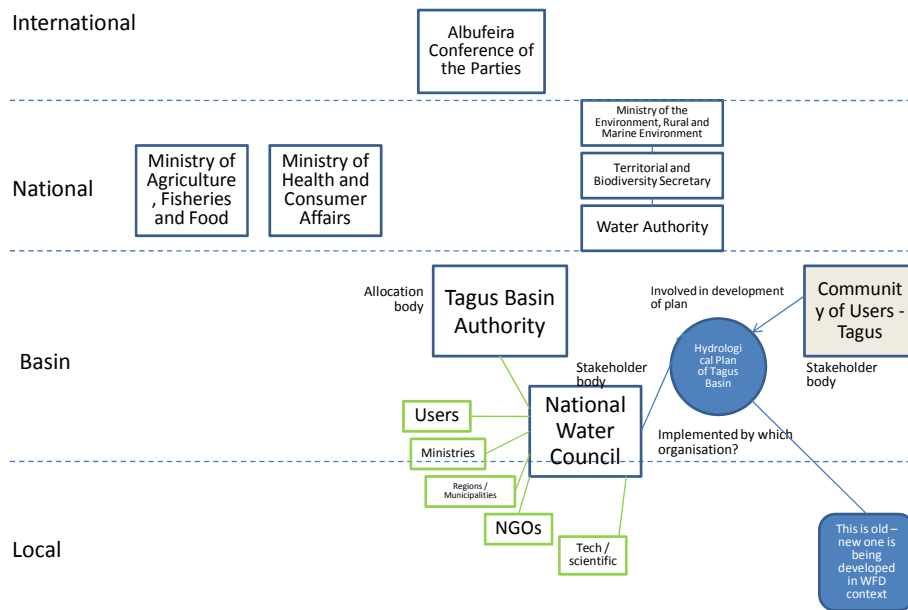
²³ Water Law, art.62.

example), the circumstances in which use rights may be amended are not definitively listed. The result of this lack of specificity is a higher risk of arbitrary decision-making, which when compounded with a poor environment for stakeholder participation, is detrimental to the equity sought by IWRM.

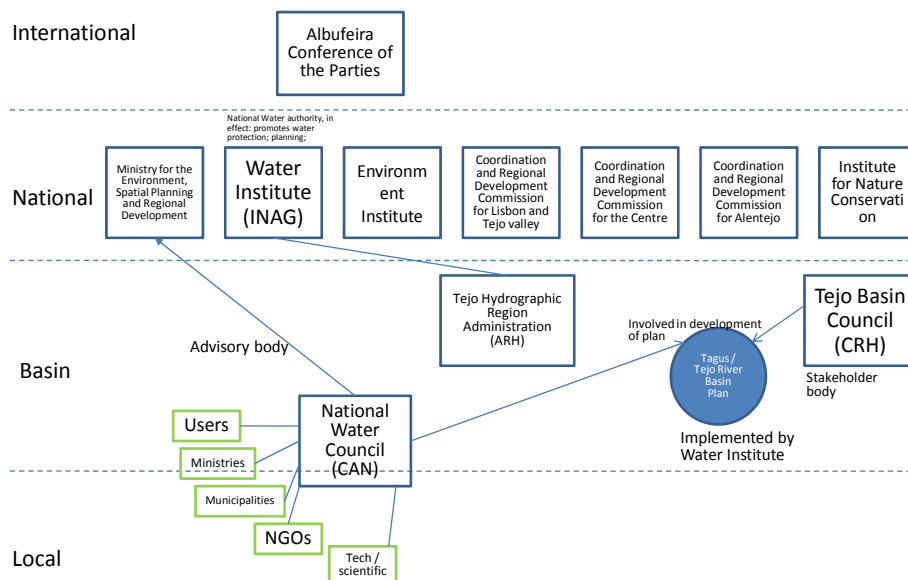
2.3.2 Institutional Structure

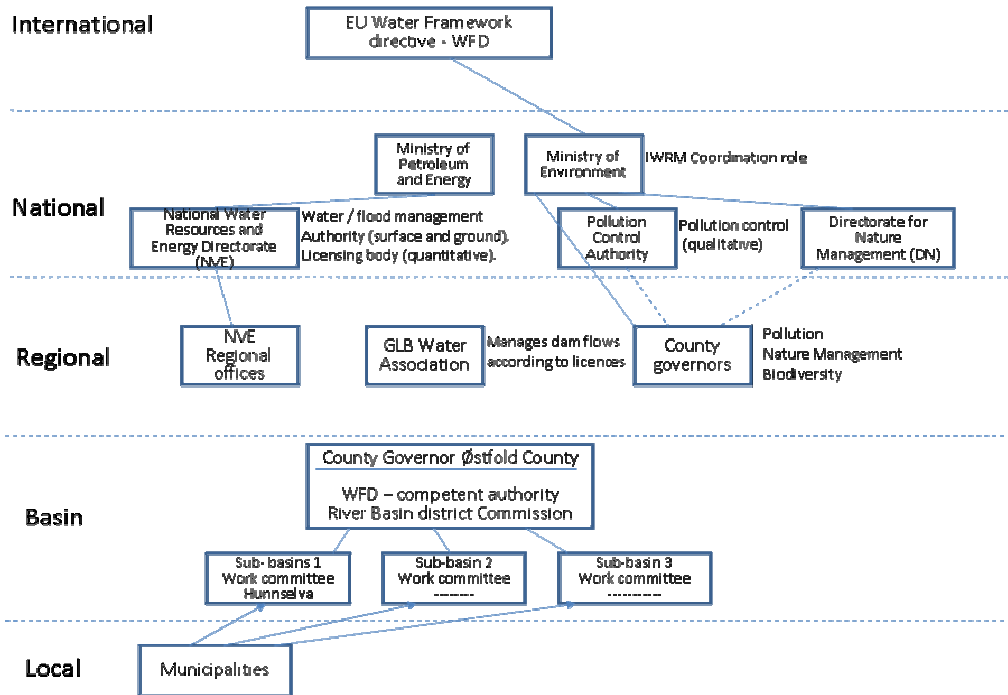
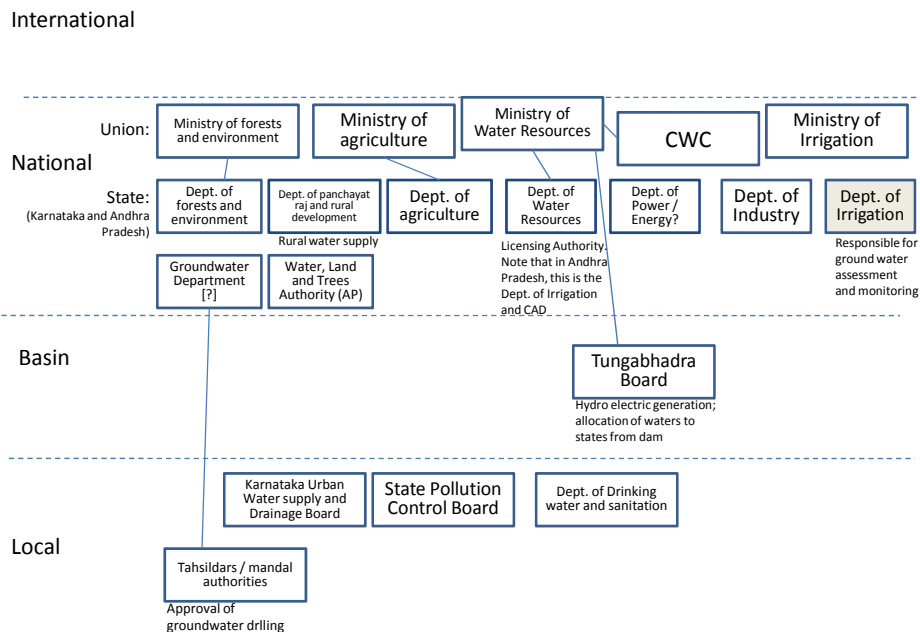
The following organograms give an outline of the institutional structure in place for water management in the four basins, with indications as to roles where relevant. These are not intended to be exhaustive.

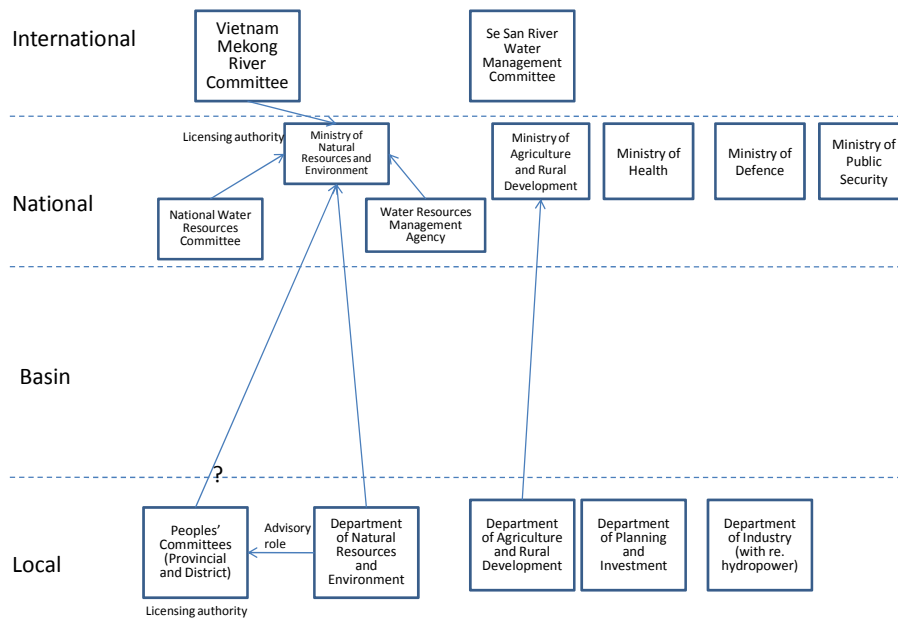
Tagus (Spain):



Tejo (Portugal):



Glomma:**Tungabhadra:**

Sesan:**2.3.3 Comparative Stakeholder Analysis**

The four basins in the STRIVER project are quite different in terms of their civil society traditions and have achieved varying levels of public participation in water management. Although there are provisions for public participation in both legislation and policy documents, there has been a degree of regulatory capture particularly by hydropower and in the case of India, irrigation interests. Decision-making on the surface may appear transparent in most of the countries with procedures in place for access to information and public hearings for environmental impact assessments, but a number of respondents to the questionnaire indicated that decision-making is done mainly by government officials and those with influence in the hydropower and irrigation sectors. Increasing urban and industrial demand is also creating increasing conflicts over water use in the Tagus, Tungabhadra and Se San basins. Whilst information is available to the public on websites and through procedures like public hearings for hydropower projects, stakeholder influence on decision-making remains minimal according to the respondents who compiled the basin profiles. The comparative analysis looks at two main points for stakeholder participation in IWRM, access to information and access to decision-making by detailing these aspects in each basin. Access to justice will be discussed briefly in the conclusion, but it was not a part of the questionnaire which was the basis of the basin profiles.

The Tungabhadra River Basin**Access to information**

As the Tungabhadra does not have a basin-wide plan, interest groups have to rely on the detailed project reports (DPRs) of individual projects which mainly outlines project design, cost estimates and planned water use. These documents do not usually include governance issues including stakeholder involvement. Very often people do not get access to data and information and making data available to different stakeholders in an understandable form has been generally weak. Often there is no consistency in data sets maintained by different agencies, which causes difficulties in negotiations concerning interstate rivers, as states use different data sets. A commonly agreed data set is key for stakeholder involvement as well. The Karnataka State Water Policy, 2002, states that a data information centre would be set up and data protocols developed

to remedy the situation. The situation has also slightly improved with the Right to Information Act now in place in most of the states.

Decision-making

In general decision-making is dominated by public officials in particular engineers and multi-stakeholder fora are not in place although through water user associations, Water Development Committees and self help groups there are some opportunities for civil society participation and financial support is provided for their attendance at meetings. But they play very limited role, as the officers of the respective departments take most of the decisions, which are also often taken with political interests in mind. Issues related to a particular WUA are discussed at a local level, but issues of policy etc are discussed at the state capital.

The public is not involved in problem identification and although public hearings are compulsory for clearing projects with environmental and displacement related impacts), the experience of many stakeholders and civil society organisations has not been encouraging because these public hearings are often manipulated to suit the interests of the proponents of the project and the hearings often do not make any significance on the final outcome.

Water policy documents and legislation do contain clauses to support stakeholder participation like the Participatory Irrigation Management Act and The National Water Policy, 2002, which mentions stakeholders under clause 6.8 of the section “Planning”²⁴ and in clause 12 of the section on “Participatory Approach to Water Resources Management”²⁵ In the Karnataka State Water Policy, 2002, the word stakeholder appears in the context of participatory irrigation management and water users’ associations to manage irrigation water.²⁶ Though the National Water Policy, 2002 and the Karnataka State Water Policy (Andhra Pradesh has not yet come out with its water policy) do mention stakeholder involvement, not much has been done on the ground according to the partner institute SOPPECOM. The only area where involvement of the stakeholders is sought is in the area of irrigation water management as part of the sectoral reforms, thus almost all documents mention about water user participation for irrigation water.²⁷ In the drinking water sector efforts are being made to involve users in the management of drinking water schemes, both in the urban areas and rural areas. Micro-watershed development is a major programme in the rural areas, funded by the Ministry of Rural Development, the Ministry of Agriculture and multi-lateral and bi-lateral agencies. With guidelines for community participation in programme implementation, institutions such as village councils, a Watershed Development Committee and Self Help Groups have been set up and include the poor and women.

Thus in all the three major sectors – irrigation, drinking water and watershed development – efforts are being made to bring in participation. Various studies indicate that there is a large gap between the official/policy rhetoric and practice on the ground. There is no consultation amongst the different stakeholders on the question of inter-sectoral water allocation. Allocation is done at the level of the government departments.

²⁴ “The involvement and participation of beneficiaries and other stakeholders should be encouraged right from the project planning stage itself.” (p. 5).

²⁵ “Management of the water resources for diverse uses should incorporate a participatory approach; by involving not only the various governmental agencies but also the users and other stakeholders, in an effective and decisive manner, in various aspects of planning, design, development and management of the water resources schemes. Necessary legal and institutional changes should be made at various levels for the purpose, duly ensuring appropriate role for women. Water Users’ Associations and the local bodies such as municipalities and *gram panchayats* should particularly be involved in the operation, maintenance and management of water infrastructures / facilities at appropriate levels progressively, with a view to eventually transfer the management of such facilities to the user groups / local bodies.” (p. 6).

²⁶ “Mobilize community and stakeholder participation through Users Organizations, empower them, provide training, technical support and create public awareness. Form and empower Water Users Co-Operative Societies and Federations for Participatory Irrigation Management. (page 11)

²⁷ In Andhra Pradesh the state government has passed a legislative act: *Andhra Pradesh Farmers’ Management of Irrigation Systems Act*, 1997, making participatory management of irrigation water as part of the official policy of the government. It also established more than 10,000 WUAs immediately after this Act. Although no such act exists in Karnataka, the state did encourage setting up WUAs on a voluntary basis and made suitable amendments to the Karnataka Irrigation Act, 1965, in 2000 and 2002.

With increasing demands from industry and urban areas for water, conflicts are arising between uses like agriculture vs. industry and privatisation is also an issue.

The National Water Policy of 2002 does provide for the establishment of river basin organisations for the development and management of a river basin as a whole or sub-basins, wherever necessary. Special multi-disciplinary units should be set up to prepare plans taking into account not only the needs of irrigation, but also harmonising other water uses, so that water resources are determined taking into account existing agreements or awards of Tribunals under the relevant laws. The scope and powers of the river basin organisations shall be decided by the basin states themselves.

The Tagus River Basin

Spain and Portugal have ratified three UNECE conventions which have provisions for access to information and public participation:

- Convention on Environmental Impact Assessment in a Transboundary Context, 1991 (Espoo, Convention)
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes, 1992
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention)

Additionally Article 6, “Public Information” of the Convention about the cooperation for the protection and sustainable use of the waters of Portuguese-Spanish hydrological basins and additional protocol (Albufeira Convention) states that all information related to the Convention must be available for any reasonable request.

The EU Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council – Establishing a framework for Community Action in the field of Water Policy) also provides for access to information and public participation.

Despite these conventions and national legislation generally stakeholder and public participation have been relatively limited in terms of decision-making although the river basin plans required under the WFD will open up the decision-making more to the regions and diversify the perspectives offered by various interest groups from the traditionally dominant groups of the past such as the sectors of hydropower and industry.

Access to information - Portugal

Although the stakeholders have been involved in the planning process of the Tagus River Basin Plan, the plan was subjected to a public discussion process from November 1, 2000 until January 15, 2001, during which several public meetings took place in Lisbon and other cities around the basin to discuss studies and methodologies. Documents related to the Tagus River Basin studies were presented to participants in the meeting and were sometimes also accessible to the general public via websites, promoted by the Water Institute. After the public discussion period, the Water National Council issued a favourable opinion about the plan (15th February 2001). During formulation of the plan, a stakeholder forum was provided through the creation of a National Water Council in 1994 (*Conselho Nacional da Água, CAN*),²⁸ as well as through the Tagus Basin Council where key sectors were represented and strategic decisions discussed. The National Water Council holds meetings regarding national water issues. Both organisations received information regarding the stakeholders meetings being of their responsibility to inform the *fora* they represented.

Public participation is ensured through each environmental impact assessment (EIA) process. This process includes a public inquiry phase during which all the available information is displayed. This is established in

²⁸ The National Water Council includes representatives from more than 20 agencies belonging to five different Ministries (Environment, Spatial Planning and Regional Development; Economy and Innovation; Public Works, Transport and Communications; Agriculture, Rural Development and Fisheries; and Health), as well as representatives of local municipalities and the main water sectors (electricity production, water supply, irrigation, fishery, industry), and then members of NGOs and technical-scientific associations.

the Decree-Law 197/2005, 8th November, which partially transposes into the Portuguese context Directive n.º 2003/35/CE from the European Parliament and Council, 26th May.

Access to Decision-making: Portugal

During the elaboration of the Tagus River Basin Plan, the law in force was the Decree-Law n.º 45/94, from February 22, which imposed a framework for integrated water resources management, also ensuring public participation in the decision of the basin process.

According to the Regulatory Decree n.º 18/2001, from December 7, that approved Tagus River Basin Plan, the elaboration of such plan was closely followed by the Water National Council and by the Tagus Basin Council, the latter in the function as a mechanism for water resources management at a regional level where all the state agencies related to water utilization, as well as all the water users were represented. Although the elaboration of the Tagus River basin Plan involved the main actors and stakeholders and the legislation provides for public participation, it should be noted that public sessions related to the plan mainly had participants from those sectors such as agriculture and industry with a strong interest in the outcome of any decisions. The general public is not usually aware of the importance of involvement in questions related to water use and conservation. No financial support was provided to ensure the participation of the stakeholders in the meetings.

Access to Information: Spain

The European Water Framework Directive and the A.G.U.A. (Actions for the Management and Use of Water) Programme require the elaboration of a new Hydrological Plan for the Tagus basin. The elaboration of the new plan involves a greater participation of the regions and also more public participation. By doing this, the plan will consider all the concerned parties which amongst others include a National Water Council, and representatives from municipalities and the sectors of energy, agriculture, business associations, consumer and fishing associations and NGOs. More than 1000 invitations have been sent to different actors listed in the table below. In April 2008, some meetings were held in separate groups, including: water managers, social network, private companies/industry, end users and institutions. Since most meetings were held in Madrid travel and accommodation expenses were paid. Information was provided to stakeholders through a website as well as through brochures and information offices in Aranjuez, Cáceres, Guadalajara, Plasencia, Talavera and Toledo:

<http://nuevoplan.chtajo.es:8080/CHTAJO/infopublica3.htm>

Participants are continuously informed about each step of the process, relevant activities, etc. For instance, several documents related to the initial steps of the planning process were uploaded with free access in <http://nuevoplan.chtajo.es:8080/CHTAJO/publica.htm>

The A.G.U.A Programme promotes public/social participation in the elaboration of hydrological plans: <http://www.mma.es/secciones/agua/programa/quees.htm>.

Access to decision-making: Spain

Until now, urban use and the hydroelectric power stations played a main role in water decisions. The new conception of the new plan elaboration should avoid unbalance situations as discrepancies in allocation are perceived among stakeholders in terms of water scarcity and the balance between urban and irrigation consumption as well as problems like inefficiency of irrigation systems which leads to overestimating water availability. In Spain for the elaboration of the new Hydrological Plan, local end users, local environmental organizations and independent water experts will form the planning body. Traditionally, the agricultural sector and, especially, irrigation communities had a very important role in the social structure and organisation of local communities. The Hydrological Plan of The Tagus Basin respects the historical rights that are still preserved in some private irrigation systems. Water allocation is not especially using local knowledge, but traditionally or pre-existent water rights are respected, as they play an important role in the social structure and organisation of local communities. Only pre-existing water rights must be respected, regardless to whom they may concern (from a very small farmer to a large electricity production company). All the new water utilizations require appropriated permission/concessions licences.

Glomma

In terms of European legislation, Norway has ratified the UNECE *Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters* (the Aarhus Convention) and is also implementing the Water Framework Directive, both of which provide for public participation in water management.

Access to Information

The Freedom of Information Act of 19 June 1970 is the implementation of freedom of information legislation in Norway on a national level providing the rules and principles of access to public documents. There is a specific Act on access to environmental information: Act of 9 May 2003 No. 31 relating to the right to environmental information and public participation in decision-making processes relating to the environment. The purpose of this Act is to ensure public access to environmental information and thus make it easier for individuals to contribute to the protection of the environment, to protect themselves against injury to health and environmental damage, and to influence public and private decision-makers in environmental matters. The Act is also intended to promote public participation in decision-making processes of significance relating to the environment (ref 4.1a).

The environment means the external environment, including archaeological and architectural monuments and sites and cultural environments. Any information held by authorities in principal is open for all citizens (§ 8. Duty of administrative agencies to hold environmental information and make it accessible to the public). More specifically administrative agencies shall hold general environmental information relevant to their areas of responsibility and functions, and make this information accessible to the public. The Ministry of the Environment and the Norwegian Pollution Control Authority (SFT) also publish IWRM related data on the web. The new web-site for issues related to the EU Water Framework Directive also makes IWRM-relevant data available and the public can follow this work online for the Glomma Region.

<http://www.vannportalen.no/infogag.aspx?m=36286>

All Acts in Norway imply that facts and analysis prepared by the authorities in planning documents should be available for the public. For example, data included in environmental impact assessments should be made available by the authorities.

Access to decision-making

Traditionally, any initiative taken, being it related to hydropower, construction or road/railway building has to be presented to the general public by the executing organization, which then can submit their objections/present modification. In Norway public participation in planning processes has a long tradition and is regulated by Planning and Building Act. It is stated that municipal planning authorities shall inform the public about preparing municipal or zoning plans at an early stage of the planning. Active participation in the planning process should be available for affected citizens and institutions. Before the preparation of zoning plan, it is necessary to announce it in two newspapers.

The implementation of the WFD will not lead to any major changes in this, also requiring the full participation of all users in the watershed. Water allocation is not based on local knowledge as such but is based instead on (local) expert knowledge, i.e. minimum flow requirement, maximum storage capacity and other factors.

Given the experience with public hearings and that public participation is a requirement by law, it can be said that the system is transparent (any official document is accessible by the citizens), especially at the local municipal level, however it has also been claimed by Gorczyca and Kotuła that investors are not interested in involving local inhabitants in the planning process, and solely discuss their proposals only with planning

authorities, often before starting the official planning procedure.²⁹ The real and inside decision making process is generally not described to the public except a description of the legal and formal process.

Generally the plans and project proposals are made available to the public with clearly defined processes including public hearings. This applies both to overall planning processes such as WFD, as well as licensing procedures for hydropower, discharge permits for point pollution sources etc.

Se San

All Lower Mekong Basin governments have overarching environment frameworks or action plans and often the processes leading up to these documents have been largely donor driven and in response to international initiatives such as Agenda 21. National Development Plans (NDPs) are key instruments for guiding social and development and are typically produced by a central planning and investment ministry in partnership with other sectoral ministries. The NDPs are typically focused on pursuing economic growth and provide a framework for guiding national and international investments.³⁰

Access to Information

The flow of information from the centre to local authorities and local communities downstream in Cambodia and Vietnam is irregular and generally not always effective, as was seen in the case of the Yali Falls Dam. Information is provided to stakeholders in procedures related to environmental impact assessments (see comments on EIAs in the section on decision-making below).

In the development of the National Hydropower Plan Study, four Central Stakeholder Meetings were held from 1999-2001 in Hanoi, mainly for representatives from ministries, state agencies and mass organisations. The experiences from the stakeholder participation process during the early stages of the Study indicated that stakeholder participation dialogue should be extended to also directly involve local stakeholders in the affected river basins. Therefore, the stakeholder component was extended to also include stakeholder workshops in three of the five river basins (Da, Se San and Dong Nai River basins) covered by the NHP Study and one summary workshop in Hanoi.

The river basin workshops took place during October 2000, and the fourth workshop in Hanoi in May 2001. Information about the project was not given in advance to stakeholders. The objective was to develop suitable tools that can be used in the procedure to involve the stakeholders in early, as well as in later, stages of the planning and implementation processes of hydropower projects. The workshops also described the framework for involving stakeholders of the affected areas in the future studies on hydropower projects.

Access to Decision-making

The Law on Environmental Protection³¹ provides for public consultation, mandatory environmental impact studies. Stakeholder workshops were held for each hydropower project.

In the National Hydropower Plan equity aspects have not been described and conflicts have also not been described there. Hydropower exploitation involves relocation for those living in the areas that will be submerged by the dams and reservoirs. Other stakeholders include electricity consumers, fishing communities, irrigation users and decision makers in parliament and government institutions in Hanoi. Given that all these groups of stakeholders have 'stakes' (negative or positive) in hydropower exploitation, there is a need for consultation to influence decisions made during the process.

²⁹ Gorczyca, K and Kotula, L. 2006. Land-use planning and public participation in Norway and Poland. Comparative study. Institute of Urban Development, Kraków, Poland,

³⁰ *Environmental Governance in the Mekong, Hydropower Site Selection Processes in the Se San and Srepok Basins*, Joakim Ojendal, Vikrom Mathur and Mak Sithirith, SEI/REPSI Report Series No. 4, p. 31, 32

³¹ Law on National Environmental Protection passed 27 December 1993 by the National Assembly of the Socialist Republic of Vietnam, 9th Legislature, at its 4th Session and promulgated by the President by Order No. 29L/CTN, 10 January 1994

An interdisciplinary study was carried out by a study team consisting of key personnel from the joint venture companies SWECO International, Statkraft engineering and Norplan in close cooperation with the following local consultants and institutions:

- Institute of Water Resources Planning (IWRP)
- Power Engineering Consulting Company No.1 (PECC1)
- Power Engineering Consulting Company No.2 (PECC2)
- Institute of Geology (IG)
- National Institute of Agriculture Planning and Projection (NIAPP)
- Institute of Ethnology (IE)
- Institute of Energy

Ethnic groups and women have been involved. The informants have been cadres, women union members, youth union members and heads of households from the hamlets. One third of informants have been women. Local meetings were arranged to facilitate their participation in the Study.

The problem identification related to the hydropower development of the basin reflects the water user interests in the basin through the hearing consultations of all parties of concern. The discussions between the state corporation Electricity of Vietnam (EVN), the consultant (SWECO) and local consultants were established to identify the interested/affected parties. Stakeholders can present their opinions in the meetings and workshops. Usually in the meetings or workshops the stakeholders do not make conclusion on water allocation as well as other issues. They present their opinions and the EVN or consultants make the final decisions themselves.

Environmental Impact Assessment (EIA) is the most prevalent tool for assessing and mitigating the impact of project activities and although Vietnam has a formal process in place, implementation is not always optimal, which is related to the effectiveness of the EIA system generally. EIA is often treated as a formal step in a project planning system, rather than as for decision support, and has varying degrees of quality. This is partly due to the continuing perception of EIA as being an impediment or at least a hindrance to the development planners, who are a more powerful lobby than the environmentalists. Others argue that the process is inherently flawed since EIAs come very late in the project planning process and is a static one-off exercise. The level and effectiveness of public involvement during EIA has also come under serious criticism in several cases.³²

Water allocations for other water user categories, such as abstraction of water for irrigation upstream of the projects and reservoir provisions for flood control, are reflected in the operating rules of the reservoirs and thus accounted for as restrictions in hydropower generations.

2.3.4 Conclusion

All the STRIVER basins do have procedural rules in place for access to information and decision-making which comes through procedures related in particular to environmental impact assessments. Additionally there is public participation in the development of river basin plans in the case of all basins except the Tungabhadra which does not have a basin-wide plan; however most of the basin profiles mentioned the dominance of certain interest groups like the hydropower sector or the agricultural sector. Access to information laws also allow stakeholders to access information through public authorities. Whilst a number of conventions and national laws and policy documents provide for stakeholder participation in water management, practice demonstrates that government officials, hydropower, industry and urban interests tend to dominate decision-making, so that interest groups representing environmental concerns and communities tend to have less influence in decision-making despite the procedural rules allowing them access to relevant information and procedures like public inquiries. Gender, minority groups and exclusion of the poor are

³² REPSI Report, p. 33

issues affecting the Tungabhadra and the Se San river basins, but not the Glomma and the Tagus and these groups generally have less influence on decision-making.

Traditions of civil society participation also influence the effectiveness of the implementation of legislation regarding stakeholder participation and here public education as well as capacity-building in the implementation of procedural rules is crucial, but in general quite absent. However the implementation of the Water Framework Directive and the opportunity it provides for public participation in development of the European basin plans is a unique opportunity to open up decision-making and a broader representation of regional and stakeholder interests.

Access to justice more difficult in the basins due to certain obstacles like legal standing for non-state stakeholders and the costs of obtaining the legal and technical advice to bring a case to court. In the case of the European basins, the Aarhus Convention has eased some of these restrictions, but implementation mechanisms will take some time to mature, especially in the Tagus basin which does not have a strong tradition of civil society participation in decision-making. In the transboundary basins differences in legal systems also pose a barrier to some degree.

The absence of a river basin organisation for non-state actors to meet with the governmental boards and councils governing a river basin also plays an important role, as a river basin organisation allows stakeholders to interact on a regular basis before conflicts may escalate and also allow stakeholders access to information which will improve their capacity to implement IWRM. Such organisations can help to prevent conflicts between upstream and downstream users and to provide a communications platform to help fulfil legal requirements for stakeholder access to information and decision-making in river basin management.

2.4 Capacity building

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Geoffrey Gooch Linköpings University, Sweden*

According to the GWP, capacity building is the process of development and strengthening of the abilities of people, institutions and societies to perform functions, solve problems, and set and achieve objectives. In this way, a community equips itself to undertake the necessary functions of governance and service provision in a sustainable fashion. With changes leading to decentralization in the water management sector, it becomes necessary for water managers and local communities to get used to their new roles and develop capacity as per the needs. Effective IWRM requires an enabling environment and conscious and competent actors.

Capacity building can take place at different levels:

- Central political Central Political institutions
- Central Governmental institutions and Departments
- Regional Government organizations and Departments
- NGO's and Civil Society
- Farmers, fishermen, small businesses etc.

Whether or not, capacity building is treated as part of the integrated water management initiatives in the river basin, it can be assessed by looking at the initiatives at these different levels. The following indicators were used in this assessment:

- Is capacity building specified as an essential component in the water policy document?
- Is budget allocated specifically for capacity building at different levels?
- Is there an agency identified and given the mandate for capacity building towards IWRM in the basin?
- Type of training programs that are implemented in the basin at different levels including meetings, workshops, public hearings etc to build IWRM capacity?

2.4.1 Summary findings

Although capacity building is officially stressed and part of many water policies and strategies in Sesan, Tungabhadra and Tagus case study basins, it is evident these official statements are seldom operationalised to any larger degree especially for the entire spectra of IWRM themes. Some examples of transparency (e.g., access to information), public participation, information campaign brochures for the public, training programs for certain sectoral groups (especially for local communities, farmers) are though noted particularly initiated by NGOs.

In Cambodia, most training and capacity building programmes in the Sesan River basin are run by foreign donors due to financial restrictions by the domestic authorities. The Department of Fisheries does however contribute to capacity building through information concerning sustainable fishing techniques and fish farming. In Vietnam, regional and local authorities are active with projects connected with the reallocation of people who have had to move because of the HEP reservoirs. These resettlement projects, organized by among others the Ministry of Agriculture and Rural Development (MARD) aim at helping local people (often ethnic minorities) adjust to their new housing and villages. In Tungabhadra, budget is allocated specifically for capacity building but it is mainly farmers that undergo various training programs.

In Tagus, the type of capacity building that is mostly to be found is the kind of information provided by environmental NGO's and aimed at increasing knowledge of environmental problems. There is also to certain extent information provided by the Spanish and Portuguese water authorities that aim at: decreasing the negative impacts of excessive and often unnecessary use of water in agriculture (e.g. for irrigating olive groves) or even for personal hygiene, teaching the young people the main concepts related with the water cycle and with water resources preservation, and so on. Next figure illustrates the main web page of the Portuguese Water Institute in September 2008, showing the link to the web site designed for the young people (*INAG Jovem*). Also an inquiry (*Inquérito*) was then going on related with water saving and teeth

brush. Special information regarding the on going public inquiries (*Aviso – Discussão Pública*) or droughts (*Secas*) and the protection of the coastal areas (*Arribas*) was also provided



Figure 2.4.1. Examples of capacity building improvement in the main web page of the Portuguese Water Institute in September 2008 (www.inag.pt).

In the most ‘developed’ case basin, the Glomma River basin, capacity building is seldom mentioned in policy documents and legislation but still show a high degree of capacity building projects and activities in practice as well as a governance and institutional structure that have high capacity for water management. This is shown by IWRM, water and environmental training programs, seminars for water managers at municipality and regional level. The implementation of the Water Framework Directive has also resulted in a high interest from Norwegian water managers (mainly local and regional) to participate in various training courses and seminars organised by competent authorities, water-related associations and academic institutes. In the following sections more details about capacity building status in the four basins is presented.

Sesan

In Vietnam, the Ministry of Natural Resources and Environment (MONRE) is responsible for water management, together with the Department of Water Resources Management (DWRM). They are the competent authorities for capacity building of institutions and departments at the central, regional and local levels. A training needs assessment was carried out by a joint Task Force that led to a training plan and approved by MONRE (<http://www.isgmard.org.vn/>). The government does not have adequate funds to support the training needs, and therefore seeks external donor support from time to time. The joint task force report identified many training options, such as “twinning programs” with one or more parallel water resource management agencies in neighbouring countries.

National Water Policy documents and MONRE in Vietnam do emphasize on capacity building for IWRM. This was seen as an essential component at the time of transition of water management functions from MARD to MONRE in 2003. It was evident from the Final report in June 2003, that capacity building at different levels including the National Water Resources Council, the DWRM personnel and regional water management agencies was considered an important criterion to assist in the transition of water management.

The Vietnam Water Resources Management Assistance Project (VWRMAP) and the Danida Water SPS project were some of the first initiatives focusing on capacity building of water organizations and departments at different levels. In the VWRMAP project (Component 1), the focus is on “Capacity Building in the National Water Resources Council” and its objective is “to develop increased understanding of integrated water resource management” (AusAID, “Water Resources Management Assistance Project, Final Project Design Document”, February 2001, p.33). Special budgets (1.47 million Australian dollars) were allocated specifically for IWRM capacity building in the project. The aim was to conduct high level workshops in IWRM approach, study visits, and training modules for NWRC, advisors to councils, key decisions makers in national ministries and agencies, key decision makers at the provincial level, women and

others. MONRE allocates budget each year for competence building in water management within the national and provincial level institutions. The National Strategy for Agriculture and Water (2007) has specified the budget need for five programs identified (350 million USD), and one of the program Nr.5 is the Agricultural and Water Resources research, education and extension program (50 million USD over a five year period). It is though less clear if Sesan was a target for this training money.

In Cambodia, the National Strategy for Agriculture and Water (2007) states the need for training human resources, especially officials responsible for implementing water management, farmers and fishermen, Farmer Water User Communities, Commune Councils and others. It also emphasizes on participatory management and empowering people to implement water resources management in an integrated manner. The Ministry of water Resources and Meteorology (MOWRAM) has the responsibility for Knowledge, Information and Technology (KIT) transfer to stakeholders. However, MOWRAM does not have adequate resources for implementing the recommendations to enhance capacity.

As such there is no specific agency identified in Vietnam or Cambodia for IWRM capacity building. In Sesan, the state-derived capacity building activities are even more limited.

However, local NGOs financially supported by international donors, play a great role in capacity building. Personal meetings with stakeholders including NGOs, farmers and fishermen on both sides of the Vietnamese/Cambodian border indicated that they have indeed been exposed to training programs mainly organized by NGOs or international donors. This training included new and alternative farming techniques (e.g., dry-land rice and fish ponds; Fig. 2.4.2). More specifically in Sesan, the NGO 3SPN set to work building a network of respected community leaders that could legitimately voice the ‘Sesan communities’ concerns and demands. 3SPN holds on regular basis meetings and trainings with affected communities that focus on teaching communities and out their rights, how to document impacts, how to do advocacy, and how to share their concerns with others.

Other examples of capacity building projects in Sesan are on drinking water purification and sanitation. For example, the NGO Welt Hunger Hilfe has initiated several projects (Figure 2.4.3; left panel). These include mainly drinking water supply techniques and river-bank gardening projects for improved livelihood and sustainable development for indigenous people and ethnic minorities in Cambodia. Examples of more health-related projects could also be given that include simple sand-filters for household drinking water (Fig. 2.4.3; right panel).



Figure 2.4.2. Education poster for local farm-land fish-ponds in Cambodia. Photo: G. Gooch



Figure 2.4.3. Left panel: Pumping house for drinking water in Kreung village in NE Cambodia constructed by Welt Hunger Hilfe and financially supported by the European Commission. Right panel: Sand-filter tube for drinking water purification in a household cottage in NE Cambodia; initiated by ICC. Photo: P. Stålnacke

Tungabhadra

The Karnataka state water policy, 2002, does not say anything about improving IWRM competency. But it does mention that efforts should be made to develop integrated management of water. The new Participatory Irrigation Management (PIM) in Karnataka, also mentions that training of farmers and managers is essential in for implementing PIM.

In most water projects, capacity building is included as a part of the project activity, though, it is not specifically mentioned as a capacity building exercise for improving the IWRM competence. A certain amount of budget is allocated for training, but this is not adequate to meet the entire training needs in the basin. During the farmers' interviews in Tungabhadra, it was observed that a majority of the farmers expressed the desire to attend more training programs in water management.

The Water and Land Management Institute (WALMI) located in Hubli-Dharwar has been provided with a specific role to educate and train water managers, farmers and policy makers to get used to their new roles in the decentralized water management. Under the new Participatory Irrigation Management (PIM) in the state of Karnataka, in which Tungabhadra is located, the government has made training of farmers engaged in the Water User Co-operative Societies as a part of the new PIM program.

Each year, policy makers, water managers and farmers undergo training programs designed to improve the skills in water management. Farmer's survey in Tungabhadra has shown that, nearly half of the farmers in the basin have been exposed some kind of training programs at WALMI or other agencies, attended workshops or farmers meetings related to water management. In addition, the WUCS have regular meetings where farmers participate and discuss about water management problems. Officials from the Water Resources Department also participate in the meetings that are

organized at different levels. In addition, there are also public hearings organized by NGOs, like Jalaspandana that educates farmers and managers on water related issues.

Glomma

In general, the citizens and water managers in Norway are well educated in water and environmental issues. In addition, the laws despite some sectoral fragmentation are also strong. Extensive public hearings before granting a license for using water (e.g. to hydropower regulations or to fish farming) is instituted in Norway. Transparency and public involvement dominate the Norwegian licensing system. This is also included in the three major laws related directly or indirectly to integrated water resources management:

- The Planning and Building Act (<http://www.regjeringen.no/en/doc/Laws/Acts/Planning-and-Building-Act.html?id=173817&epslanguage=EN-GB>),
- The Pollution Control Act (<http://www.regjeringen.no/en/doc/Laws/Acts/Pollution-Control-Act.html?id=171893&epslanguage=EN-GB>)
- The Water Resources Act (Act No. 82 of 24 November 2000 relating to river systems and groundwater; (<http://www.ub.uio.no/ujur/ulovdata/lov-20001124-082-eng.pdf>)).

The Planning and Building Act that governs land use in general. Through planning, provisions can be made on use and protection of watercourses. Competent authorities are the municipality, the county and the Ministry of the Environment. The Pollution Control Act includes provisions on emissions to watercourses. The Ministry of the Environment is the highest administrative authority for this act, and the Norwegian Pollution Control Authority is the subordinate agency. The Water Resources Act is intended to ensure that river systems and ground water are used and managed in accordance with the interests of society. It takes a balanced view of natural resources and users, and is more resource-oriented than its predecessor. The Norwegian Water Resources and Energy Directorate (NVE) are subordinated to the Ministry of Petroleum and Energy, and are responsible for the management of this Act and issues related to water and energy resources. They are organizing various meetings, public hearings, seminars related to integrated water resources management and various law aspects such as the Water Resources Act. NVE also play a central role in developing regulations, handbooks etc and organizing courses and seminars on various water management topics like contingency measures against floods and other emergencies related to watercourses, and is in charge of maintaining power supplies under emergency conditions nationwide. A course in IWRM has been given by NVE three times since 2000 in cooperation with the Directorate for Nature Management (DN) and the Norwegian Pollution Control Authority (SFT). Employers at NVE also give regular lectures at universities. NVEs regional offices give advice to municipalities and county governors on water management issues. In addition, NVE provides hydrological data and flood risk maps for the public.

Other water related laws are:

The Outdoor Recreation Act governs the public right of free passage, bathing, passage by boat, etc. on watercourses. Fishing is regulated by the Act relating to Salmonids and Fresh-Water Fish. Watercourses can be protected as part of a protected area pursuant to the Nature Conservation Act. Highest administrative authority for these acts is the Ministry of the Environment, with the Directorate for Nature Management and County Governors as its subordinate agencies.

Further information about the water management system can be found on <http://www.regjeringen.no/upload/kilde/oed/bro/2006/0004/ddd/pdfv/287583-kap.10.pdf>

Laws are also pursued to rapid changes and adoptions due to new needs. For example, in 2006 the Norwegian Parliament passed a law to ensure that water and sanitation infrastructure is publicly owned for the indefinite future. Requirements for the quality of drinking water are established by law in Norway, and can be found in the Drinking water regulation (Drikkevannsforskriften; <http://www.lovdata.no/cgi-wift/lldles?doc=/sf/sf/sf-20011204-1372.html>).

In May 2008, The Ministry of Petroleum and Energy has presented a white paper to Stortinget (Parliament) on law amendments, stating that Norway's hydro power resources will remain in public possession. These amendments will secure and strengthen the public ownership of waterfalls and hydro power stations at state, regional and local level.

In Glomma, The Glomma and Laagen Water Management Association (GLB) is an important capacity institution in the integrated operation of the Glomma basin with respect to hydropower production, flood dampening and environmental mitigating procedures. The GLB play an important role in co-ordinating the operation of the complex system of reservoirs on behalf of their members (i.e. the hydropower companies). It is also a communication partner for other interests co-operating on ecological issues and mitigation

improvements. In this way, they might be regarded as an important capacity (building) institution in Glomma.

The present on-going process of implementation of the European Water Framework Directive in Norway has resulted in a slight re-organisation of the water and environmental governance structure. The largest change is that the previous management according to administrative borders (municipalities and regions (so-called fylker) now is at river basin level with one coordination regional administrative unit ('vannregionmyndighet'). Glomma river basin is such a new management unit. The present government in Norway via the Ministry of Foreign Affairs recently proposed in a white paper that the capacities for water monitoring should be given increased resources in the range of 9-11 M EUR per annum (<http://www.regjeringen.no/nb/dep/ud/dok/regpubl/stprp/2007-2008/stprp-nr-75-2007-2008-.html?id=519840&epslanguage=NO>). In addition, 1.5 M EUR should be spent on research and development projects in addition to the existing resources. The government also high-light the need for resources to citizen involvement and local participation in the planning processes should be strengthened. This should be done by increased support of 250-375 k NOK per year to the existing map- and web-based information tool Vann-Nett (<http://vann-nett.nve.no/innsyn/>). It should be particularly noted that laws and policy documents hardly ever mention capacity building directly if we disregard what's legally binding in laws and subsequent guiding documents. But as noted in the examples above, there are strong competences and capacity building initiatives in the Norwegian water administration and governance structure.

Tagus

Water management in the Tagus River basin in Spain is highly centralized in the Tagus Water Confederation (TWC). Traditionally, the water confederations have focused their activity mainly on managing the water allocation between the various users. Their main functions are: a) execution and supervision of the Hydrological Plan in the basin; b) management and control of the Hydraulic Public Domain; c) management and control of water uses of general interest and water uses affecting two or more regions; d) to project, construct and manage hydraulic projects such as dams and channels; e) other functions which are defined by agreements with the regional administration, local corporations or other public and private organizations. Apart from the TWC, the regional (Community of Madrid, Community of Castilla La Mancha, Community of Extremadura) and local (municipal) authorities have competences attributed in water management. For example, the municipalities are responsible for the waste water treatment plans. The attributions of the regional government are somehow similar to those of the TWC. Apart from them, other institutions such as the 'Canal de Isabel II' (CI-II) foundation exist. CI-II is responsible for the water supply to the Madrid region, and they manage a system of watersheds and water diversions in the NE of the Tagus basin.

As such, water management in the Tagus basin is highly specific and centralized, and there is little public involvement. In the Basin Management Plan, which defines the guidelines of the activity of the TWC and is renovated periodically, there is no express mention to capacity building activities. In the last years there has been an effort for promoting transparency and public participation (see, for example, the TWC website: <http://www.chtajo.es/>).

Apart from what is mentioned in the basin management plan, there are a number of initiatives leaded by the TWC, the public administration and other organizations (including NGO's, farming organizations, etc) devoted to capacity building. These campaigns focus mostly on good water use practices, and they are aimed at the families, farmers, etc. Some examples are campaigns promoting a rational use of water such as those by the foundation agua-dulce.org, or the campaign for a responsible consume (including water) by the TWC.



Figure 2.4.4. Brochure edited by the Tagus Water Confederation (TWC) ‘Towards a responsible consumption’, aimed at families.

In Portugal, the public administration institutions with competency in all issues related with water resources are the Water Institute (INAG), at the national level, and the Administrations of the Hydrographic Regions (ARH) at the hydrographic region level. The representation of the activity sectors and of the water users is ensured by the following two consulting or advisory entities: The National Water Council (Conselho Nacional da Água), CNA, and the Councils of the Hydrographic Regions (Conselhos de Região Hidrográfica), CRH. The former is the Government consulting *forum* for the water resources and the latter the consulting *fora* for the watersheds that belong to each one of those regions. Those who work in the previous institutions must have a background compatible with the activities that they develop which ensures the required capacity building. In terms of legal documents, the more relevant ones, including the “capacity building” context, is the Law 58/2005, 29th December (Water Law), and the Decree Law n. 226A/2007, 31st May. Besides that there are also other organizations and groups that contribute to capacity building, such as farmers or fishermen organizations or NGOs, such as the Liga de Protecção da Natureza, LPN (Nature Protection Association), Quercus - Associação Nacional de Conservação da Natureza (Quercus – National Association for the Nature Conservation).

Also, whenever special situations occur, as during the drought of 2005, warnings are spread to the population (through the *media*) “teaching” the public how to preserve water or energy, or how recycling contributes to the public healthcare, and so on.

The Water Institute has also a tradition of producing alerts and small brochures with some suitable actions for specific situations, as droughts, floods, pollution incidents etc. Those brochures (which are available in the internet) may have a target public – the young people, those who live in the cities, etc. – or not. Figure 2.4.5 exemplifies the front pages of some of those brochures, two of those brochures quite old and the rest produced much more recently: (1) “The water, the earth and the Man. Water educative campaign” (*A água, a terra e o Homem. Campanha educative da água*) which was produced in 1988 mostly for the young people and which provides some simple ideas about the interactions among different authors; (2) “Recommendations to protect and to stabilize the rivers” (*Recomendações para protecção e estabilização dos cursos de água*) from the same year and providing more specific and advanced knowledge regarding the interaction between the men and the rivers; (3). “Water: from the origin to the consumer” (*água: da origem ao consumidor*) and (4) “Water: save it today in order to have it tomorrow” (*Água: poupe hoje para ter amanhã*) teaching how to deal with the water and how to save water under different constraints; (5) “To take care of the water” (*Cuidar da água*) teaching how to preserve the water in terms of quantity and quality.

Also, the SNIRH website from the Water Institute (the SNIRH – Sistema Nacional de Informação de Recursos Hídricos - is the Portuguese hydrologic database - <http://snirh.pt/>) always have campaigns providing relevant information regarding the water resources. It has also a Hydro

Library (Hidro Biblioteca) where a large number of articles, books and specific publication are always available.

Equivalent information though more focused in the environmental questions is also provided in the webpage of the Portuguese Environment Agency (Agência Portuguesa do Ambiente) (<http://www.apambiente.pt>). Nowadays there is a joint program – between the Education Ministry and the Environment, Spatial Planning and Regional Development Ministry (to which the Portuguese Environment Agency belongs) – named the Eco-School Program (Programa Eco-Escolas) which acts at the levels of the under graduated schools and high schools providing information related with all the environmental areas, including the water resources. Also the so called Eco-Centers (Eco-Centros) aiming at spreading information related with the environment are being created, either by the Portuguese Environment Agency (for the time being already three centers, in Ria Formosa, Porto Mós and Mirandela) or by the local Municipalities (several centers, as in Miranda do Douro).





Figure 2.4.5. Brochures produced by the Water Institute in Portugal to increase awareness (available in the INAG website).

2.5 Transboundary aspects of the case studies

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Transboundary river basins cover almost half of the land area of the planet.

As part of the STRIVER projects, transboundary aspects of the four river basins studied have been analyzed. These aspects include: The type of transboundary problems; Legal agreements; Implementation of agreements by actors; the role of actors in negotiations; the existence of environmental impact assessments; and Exchange of information

In this report, a short description of the case study results concerning these issues will be presented, followed by an analysis of their probable importance for present and future transboundary relations. It should be noted, however, that only two of the four case basins are transboundary in the most common understanding of the term, that is, they are rivers that flow between two or more countries. The other two cases are rivers that either flow between different states (in India), or municipal administrative units (in Norway). As the inclusion of such rivers in an analysis of transboundary rivers is somewhat unconventional, a discussion of the relevance of this inclusion will be provided at the end of the report.

2.5.1 The transboundary relations in the STRIVER case basins

The Sesan River, Vietnam and Cambodia

The main transboundary problems, or issues, on the Sesan River are the result of the hydroelectric power (HEP) stations constructed by Vietnam in the Central Highlands, near Pleiku and Kontum, close to the Cambodia border, and which have had some detrimental effects on the river downstream of the border. The provinces of Ratanakiri and Stung Treng in the north east of Cambodia are among the poorest in the country, and irregular water flows have had negative impacts on fishing and farming in these provinces. To a significant extent it would seem that these problems have been extenuated by the lack of efficient mechanisms for information exchange; the remoteness of much of the population of the Cambodia provinces makes it difficult to provide rapid information on water releases from the dams. This is however a problem that could be lessened by the use of mobile phones, which, despite the widespread poverty of the provinces, are still to be found among parts of the population.

In terms of legal agreements, the Sesan is a tributary of the Mekong River, and as such it falls to a certain extent under the agreements of the 1995 Mekong Agreement, and the coordinating actions of the Mekong River Commission (MRC). However, the Mekong Agreement does not apply to HEP development in the tributaries. The Agreement on Co-operation for the Sustainable Development of the Mekong River Basin and the Se San River Water Management Committee are attempts to improve transboundary water management on the Sesan; as yet it is perhaps too early to see how well these can function.

The main actors in the Sesan are the governments of Vietnam and Cambodia, although it should be pointed out that international and national NGO's also play a role in Cambodia. In this respect the Sesan is somewhat unusual, as transboundary river management does not usually include an important role for civil society organizations (Raadgever and Mostert 2005) p.v.

According to our sources, agreements are implemented.

The Tagus River, Spain and Portugal

The main problems on the Tagus River are also derived from Hydro electric power production, and especially from the management of the Alcántara reservoir, which lies at the Spanish Portuguese border.

Problems are mainly related to periods of drought. The agreements on minimum flows during droughts do not take sufficiently into account the Portuguese needs for power production and other uses. The most important bilateral agreement is the 1998 “Agreement on the cooperation for the protection and the sustainable use of Spanish and Portuguese transboundary basins”, also known as the Albufeira convention, which came into effect in January 2000.

In the Tagus Basin (as in the other four transboundary river basins between Spain and Portugal), important actors in transboundary water management are the ‘Conference of the Parts’ which includes representatives of the Spanish and Portuguese Governments. A number of governmental and departmental working groups also exist.

Concerning information exchange, there is an ‘Information Exchange Work Group’, and agreements stipulate the type of data that has to be exchanged in order to monitor water management in transboundary basins.

According to our sources, agreements are implemented.

The Tungabhadra River, India

The main issues at stake in the Tungabhadra River are the utilization of water for agricultural, urban and industrial uses, HEP, and pollution from industries, urban areas and agriculture.

The Krishna Water Disputes Tribunal from the early 1970s is the main agreement for the use of water, and the so-called Tungabhadra Board oversees the distribution of the Tungabhadra reservoir water to the two States of Karnataka and Andhra Pradesh. Allocation of water for hydropower generation is also part of the agreement. The Board is staffed by engineers from both States. On 4 August 2004, a New Krishna Water Dispute Tribunal was constituted, which is expected to reach a decision in the course of 2008. The main problem with implementation of these agreements seems to be that there are no practical procedural arrangements for solving controversies.

Central government officials are actors and part of the Tribunal, as well as respective State governments, which are also responsible for legal issues. In the case of short term and crisis management response to concrete issues there are many players, including local authorities and user organizations.

Each state has an obligation to notify and consult each other of planned measures as per the Inter-State Water Dispute Act. However, while project proposals are accompanied by technical data, and there is a CWC (Central Water Commission) which checks procedure, States tend to treat data very secretly, and data exchange is not fully implemented, nor are there any statutory requirement for States to exchange data and information in general.

The Glomma River, Norway

While the Glomma River basin is almost completely within Norwegian borders, with only 1% in neighbouring Sweden. There is little or practical interaction with Sweden. The Glomma river basin covers 6 counties and a large number of municipalities. Thus, Glomma is the most “transboundary” river basin in Norway. Responsibility for Water management is at three levels, national, regional and local with ministries, counties and municipalities as responsible and between many sectors and user interests. Water Management can be divided in Water resource Management (quantity) and Water Quality Management. The Ministry of Oil and Energy has the overall responsibility for Water Quantity Management, while the Ministry of Environment has the overall responsibility for water Quality Management. The Ministry of Environment has the overall IWRM responsibility as it is responsible for the implementation of the Water Framework Directive. In Glomma the County governor in Østfold is on behalf of the other 5 counties responsible for the implementation of the WFD. There is still a certain amount of interaction between different administrative units at the county and local scales. The Ministry of Environment works in close cooperation with other ministries such as the Ministry of Petroleum and Energy, the Ministry of Fisheries and Coastal Affairs,

Ministry of Health and Care Services, Ministry of Agriculture and Food, and the Ministry of Transport and Communication. At the county level the County Governor coordinates work with the implementation of the EU Water Framework Directive (WFD). Hunnselva is one of the sub-basins in Glomma in which STRIVER is collaborating closely with the River Basin District working Committee. At the regional level there is also the River Basin District Committee (VRU) which collaborates with the river basin district authority (the county governor) to implement the WFD. The River Basin District Committee consists of representatives from sectorial authorities, county authorities, municipalities and is led by the river basin district authority (the county governor). The River Basin District Working Group is a group which provides input to the work to develop the management plan – action plan on regional level. Typical inputs from this group are related to the characterization work, and the evaluation of measures. It is the river basin authority (the county governor) that provides the setting and guides the organisation of this work in the river basin districts – and ensures that this is done in a disciplinary proper way and within deadlines. To sum up, water management in Glomma is partly divided between different sectorial ministries, and partly integrated through the implementation of the WFD. The River Basin District Working Committee can, where appropriate, appoint a particular working committee which consists of a selection of the representatives from the river basin district committee. Finally, municipal authorities and to a certain extent representatives for trade and industry are actors in water management in the Glomma.

2.5.2 Transboundary – just a case of national borders?

As noted above, the Glomma River basin is to 99% within one country, and the Tungabhadra River basin covers two states of India. Is it then correct to look at these as in any way transboundary? While the accepted use of the term only covers national boundaries, for the purpose of transboundary water management a case can be made to expand this definition and to include rivers that flow between individual states, as in India, or even perhaps rivers such as the Glomma that flow between individual municipalities in a nation state. The most obvious objection to this expansion of the use of the term is of course that nation states are sovereign in their ability to make and enforce laws, and that the special problem of transboundary water is that it comes under the jurisdiction of two or more states. In the international system there is said to be no central authority which can enforce laws in the same way as the nation state. However, some scholars of international relations would claim that while there may be few formal means of enforcing international agreements, the desires of states to function with others, and to be accepted as legitimate, can in fact lead to the implementation of agreements without access to the forms of power available to the nation state. A second argument for including rivers such as the Tungabhadra and Glomma is that the problems of coordination and benefit sharing that exist between states to a certain extent can also be found within countries. Different states, as in India, or municipalities, as in Norway, must work together and share knowledge and experiences in order to successfully manage their water resources, just as nation states must.

2.5.3 Present and Future Transboundary Relations

As seen by the short descriptions of the case basins above, there is a variety of transboundary arrangements in the STRIVER case basins. The formalized agreement of the Mekong River applies in principal to the Sesan, but does not regulate HEP production in the tributaries. The Albufeira Convention governs transboundary rivers between Spain and Portugal, but seems to miss important aspects such as low flow management. What can we then see from these examples? The role of governmental actors is central in all cases, as expected. However, we can also see that the number of governmental actors involved can vary considerably, and that even in a strictly organized country such as Vietnam, competition and overlapping competencies between official actors such as the Ministry of Agriculture and Rural Development - MARD and the Ministry of Natural Resources and Environment - MONRE can lead to complications in water management. It would seem that present and future transboundary water relations are dependent on a number of factors, and the following chart is an attempt to illustrate these factors and their connections.

	Sesan	Tagus	Tungabhadra	Glomma
Main problem	HEP effects on water levels	Competing water uses (Ecosystems, HEP, agriculture, urban)	Competing water uses (HEP, agriculture, urban)	Maintaining environmental flows
Legal agreements	Mekong River	Albufeira Convention	Krishna Water Disputes Tribunal	Water Framework Directive (WFD)
Official actors	Mekong River Commission, Government Ministries and Departments (Vietnam and Cambodia)	Spanish and Portuguese Government Ministries and Departments. Regional authorities in Spain, EU through WFD	National and State Ministries and Departments	Norwegian Government Ministries and Departments, EU through WFD
Non-official actors	International and national NGO's in Cambodia	Spanish NGO's	NGO's and user associations	Nature protection groups, business interests
Information exchange	Not fully developed	Yes	Officially yes, in reality only to a certain extent	Yes

3. Synthesis

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3.1 Challenges for water resource management

This comparative assessment, according to the five selected IWRM themes, has revealed both similarities and differences among the four basins - Glomma, Sesan, Tagus, and Tungabhadra. Their circumstances differ - for example with regard to climatic conditions and the level and pace of economic development - but all are all subject to socio-economic pressures linked to agriculture, industry and/or hydropower production. The degree of socio-economic pressure varies, and this is reflected in the differing levels of conflict in the basins. Economic growth often comes at the expense of the environment, and sometimes also of social equity - creating grounds for conflicts between water users. An effective institutional framework, guidelines and policies are needed to ensure that mitigation measures are devised, to sustain both natural resources and important human and cultural values. It was the need to establish a balance between economic growth, social equity, and the protection/conservation/sustenance of natural resources for future generations that inspired the development of the concept of IWRM - "integrated water resource management". But the measures and instruments that have been developed in order to promote IWRM are both demanding and wide-ranging, and include aspects such as integration of different disciplines and sectors, capacity building and public participation, protection of the water resource, and more. IWRM also requires that institutions and individual actors change along with changes in the environment and society. This is why IWRM is defined as a *process* "to promote the co-ordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP, 2001). IWRM has been adopted as a popular and appealing ideology by international agencies, regional bodies and individual countries seeking to protect environmental resources and alleviate poverty, but we find in the STRIVER basins that the implementation of overall IWRM plans is at a fairly early stage. Although some important IWRM components, such as public participation, and the existence of relevant policies and laws, can be found to varying degrees in most basins, the extent of integration – in its various forms – is generally limited.

While there is gradual progress towards improved water resource management, the pressures in the case study basins also increase. Continued socio-economic development in the river basins is in several cases limited by quantity of water, and often also threatened by decreasing quality of water. A situation of ample water obtains in the rivers Glomma and Sesan, while scarcity of water is a common problem for the Tagus and Tungabhadra basins. Scarcity of water in the Tagus and the Tungabhadra basins is related to conflicts over the allocation of water – both between sectors and between urban and rural areas. In the Tagus basin, urban versus rural consumption of water is a big issue, especially in relation to the major cities of Madrid and Lisbon. In the Tungabhadra basin, also, rural versus urban allocation of water is a growing issue of conflict - due to rapidly increasing urbanization. Nevertheless, it is allocation of water for irrigation which is the common most important issue of conflicts for Tagus (Portugal and Spain) and for Tungabhadra. Both areas are reliant on irrigation for their agriculture, and decisions regarding the distribution of water have a major influence on people's livelihoods. In Tungabhadra, the allocation of water between farmers has major implications for social equity. Here, the use of more water-demanding crops species in agriculture has led to a shortage of water for irrigation, and rich 'head' farmers have enough influence to claim more water at the expense of "tail end" farmers. The latter are subject to polluted drainage water, unreliable flow and flooding – all of which impinge negatively on their livelihoods. The situation in India, where water rights are linked to land rights, creates a particularly difficult situation. In the Tungabhadra basin there is competition not only within agriculture, but also with other sectors resulting from an increased demand for industry. Any new demands for water have to be met by reallocation from other sectors, an issue which is politically very sensitive.

Scarcity of water, however, can occur even in basins with ample amounts of water. This may be the case where water is regulated for hydropower purposes or for irrigation. In these circumstances, environmental flow needs to be determined and an effective monitoring system put in place to ensure sufficient water flow to sustain the river basin ecosystem. Water out-take for hydropower development in the water-rich rivers

Glomma and Sesan have resulted in insufficient water flow in some places, with a negative impact on the ecological conditions in the rivers, change in biodiversity and a reduction of the fish stock. Most hydropower regulations in Glomma, however, have measures of environmental flow, although the applied flow levels are not necessarily satisfactory to all user interests. In Glomma, regulation of water for hydropower leads to a reduction of water flow, and conflicts occur between environmentalists and local people emphasising recreational values (in particular fishing) on one side, and on the other side people concerned about economic development and employment opportunities in the region. In Sesan, problems and conflicts concerning hydropower development relate not only to the impact of reduced river water flow, but also problems caused by the reservoirs. Extensive flow variations and shortage of water reduce biodiversity and fish productivity in the river. And the reservoirs inundate agricultural land and forest which are vital for local subsistence. There are no requirements for environmental flow in Sesan, although this is an important measure of environmental protection.

Quality of water is another important aspect of environmental protection. All basins have problems related to quality of water – though the degree of conflict related to pollution varies among basins. The highest levels of conflicts are related to drinking water – such as in Tungabhadra, and in the Cambodian side of Sesan river. In Tungabhadra, domestic and industrial pollution, combined with deforestation, use of pesticides and fertilizers, and over-exploitation of groundwater cause contamination of surface water and groundwater. In the Sesan river on the Cambodian side, polluted water, i.e. toxin producing cyanobacteria³³ are found downstream of the Yali hydropower dam. Cyanobacteria can be found in slow running and still water. In Sesan (both Vietnam and Cambodia) and Tungabhadra, untreated water is used for drinking and in agriculture, and poor water quality has a major impact on livelihoods. In Tungabhadra and in Sesan (mainly the Cambodian side), people perceive water quality as poor, and water pollution has resulted in the killing of fish, foul smell, skin disease and stomach ailments. In the Glomma basin, poor water quality caused by agricultural runoff, domestic and industrial effluents has – in earlier years - had an impact on recreation values in the basin. In the Spanish part of the Tagus basin, waste water treatment from small towns and from Madrid is insufficient, causing problems for agricultural crops which depend on water quality. Runoff from agriculture and leaks from old power stations are other important sources of pollution in this area. It seems that in the Portuguese part of the Tagus river water pollution is not a major source of problem; however, little is known about the extent of contamination of waste water. All the basin reports refer to water standards and monitoring programs, but monitoring is said to be insufficient in most basins. (Monitoring control boards indicate that industries are meeting the required discharge standards, but people living near some of these industries report discharge of effluents without treatment).

Another aspect of “environmental protection” is the existence of protected areas. All the river basins have natural parks and protected areas to preserve the ecosystem habitat and biodiversity. However, if these areas represent only a small fraction of the river basin, and elsewhere the resources are managed in a non-sustainable way, such areas may not be sufficient. Little information is available about the management of the parks. The planning documents examined in order to assess the implementation of rules, laws and policies (see Annex B) indicate that environmental and social aspects are poorly analysed and described in all basins but Glomma. Generally, this is an indication of a rather weak environmental protection of the water resource.

3.2 Policies, Plans and Implementation

As one would expect, measures to ensure efficient use of water – such as water saving and re-use - are mainly found where water shortage is a problem. Thus, pressure to ensure efficient use of water exists in the water scarce basins Tagus and Tungabhadra. The Tagus basin has clearly the more developed initiatives: both Spain and Portugal apply the user-payer approach based on costs and benefits, and Spain has incentives for the adoption of new water saving technologies and efficient transport, and of non water-intensive crops and cultivars. Despite this, in Spain as much as 60 % of the water is wasted in agriculture, and 35 % in urban areas. In Portugal, comparable statistics are not available, but it is likely that the same situation applies. By contrast, few initiatives for efficient use of water exist in the water rich Glomma and Sesan basins. Nevertheless, optimizing water resources for hydropower production is an objective in both basins, and in the Glomma basin numerous studies have been carried out in order to ensure optimal water use – including for biodiversity and recreational purposes. Initiatives to treat water as an economic good are thus apparent in

³³ Cyanobacteria can be found in slow running and still waters.

all the four basins, although differing considerably with regard to approach and strength. Treating water as a social good is to some extent also apparent: special provisions exist in all basins for favourable treatment for the less rich and developed communities. Social inequity in relation to water supply is evident mainly in Tungabhadra and Sesan river basins, due to a combination of poor infrastructure and weak governance. A particular problem in the Tungabhadra basin is that water rights are tied to land rights, which tends to exacerbate inequalities. The extent to which problems of water scarcity and water pollution are effectively mitigated depends not only on the existence of relevant policies, but also the degree to which laws and policies are in fact implemented - In other words, it is the *management and the institutional situation* which ultimately determines the outcome. However, the reports from the case study basins recount situations relating to issues of pollution, environmental flow, water allocation, and more, where laws and policies are not always implemented. This situation may be partly due to weak institutions (particularly in Sesan and Tungabhadra), but also to poor coordination between institutions. The latter problem is evident in almost all basins, caused by the multitude of different bodies involved, and unclear definition of roles and functions as well as (in some cases) a lack of financial capacity. This can lead not only to inefficiency, but also inequity, since weak institutions can result in the allocation of water being determined largely on the basis of power and influence. It is largely for this reason that *transparency in decision making* and *public participation* is important. Transparency in the decision making process can help to ensure a balanced use of water and to reduce negative impacts on society and environment. Decision making may appear transparent in most countries, but the degree of transparency in reality varies. In Sesan, the flow of information from the centre to local authorities and local communities in Cambodia and Vietnam is irregular; EIA is treated as a formal step in a project planning system, rather than a decision support, and the quality of these assessments varies considerably. In the Tungabhadra, people may not get access to decision making; public hearings (compulsory for approving projects) are often manipulated to suit the interests of the proponents; there is no consultation among the different stakeholders on the question of inter-sectoral water allocation. (Nevertheless, India has, by comparison with many developing countries, a relatively active and engaged civil society – also in the water sector). In the Tagus basin, public participation in decision making has been relatively limited, however the river basin plans that are required under the WFD will open up the decision making process more, and in Spain, a new Hydrological plan for the Tagus basin involve greater participation from municipalities, and the energy, agriculture, business, associations, consumer and fishing associations and NGOs. In Glomma, planning documents, with accompanying data and analysis, are available to the public. Public participation is required by law, and the system is transparent – as exemplified in the "Upper Otta case" (Annex 2). The central role played by women (one of the Dublin Principles, also highlighted in the EU- INCOc report) has not received much attention in the basin reports. For the European basins the issue is not regarded as relevant. In the Tungabhadra and Sesan basins, initiatives to increase women's participation are described, including women's participation in NGOs.

Capacity building may be important to achieve effective public participation. Capacity building is included in many water policies and strategies in Sesan, Tungabhadra and Tagus case study basins; however, these official statements are seldom operationalised to any larger degree by the authorities. On the other hand, capacity building initiatives exist in all basins, run by different types of organizations (NGOs). Competence building which includes NGOs are increasingly becoming a part in basins. In Cambodia, most training and capacity building programmes are run by foreign donors due to financial constraints on domestic authorities. In Vietnam, regional and local authorities are active with projects concerned with the resettlement of people. In Tungabhadra, budget is allocated specifically for capacity building but it is mainly farmers that undergo training programmes. In Tagus, the type of capacity building includes information provided by environmental NGOs and aimed at increasing knowledge of environmental problems. Some information is provided by the ES and PT water authorities aiming at decreasing negative impacts of excessive use of water in agriculture. On the other hand, in Glomma – capacity building is seldom mentioned in policy documents or law, but there are nevertheless numerous capacity building projects and activities in practice.

3.3 Transboundary issues

The challenge of implementing IWRM, and the presence of conflicts are particularly marked when rivers cross national boundaries.³⁴ However, the case basins represent a full spectrum of alternative transboundary contexts/situations:

³⁴ It is estimated that transboundary river basins cover almost half of the land area of the planet.

Sesan: in Vietnam and Cambodia, neighbouring countries which are both members of the international Mekong River Commission. Tagus: in Spain and Portugal, neighbouring countries which cooperate with regard to this river on a bilateral basis. Tungabhadra: in India, in neighbouring states in a country with a federal system in which states have considerable power and autonomy. Glomma: in Norway, in administrative regions with relatively limited power and autonomy.³⁵ These cases illustrate that the extent of conflict decreases as we move along the continuum (from international to local), and that the extent of conflict varies by type: e.g. competition over quantity of water is more controversial than conflict over quality (pollution). The likelihood of conflict increases with socio-economic development (which leads to increased water use); but, the capacity to deal with potential conflict perhaps also increases with socio-economic development. Hydropower development is perhaps the most important issue in a transboundary context as it may potentially have some detrimental effects on the river downstream of the border. The hydropower development in Vietnam, close to the Cambodian border, has had negative impacts on fishing and farming in poor provinces of Cambodia. In order to meet the challenges of this transboundary issue, the governments of Vietnam and Cambodia have set up the Se San River committee to establish mechanisms for information exchange, and the Sesan hydropower development in Vietnam is based on an agreement of the Mekong River Basin Committee. However, this has not solved the transboundary conflicts and impacts on the local level in Cambodia. Also, in the Tagus river, (where the transboundary basin is regulated by the Albufeira convention, 1998), problems are caused by hydropower development and especially from the management of the Alcántara reservoir which lies on the Spanish and Portuguese border. These problems occur in particular in relation to drought. In the case of the Tungabhadra basin, which is transboundary at state level, the main issues at stake reflect the problems noted in general for the basin, i.e. inter-sectoral allocation of water, and pollution in urban areas and agriculture. Although the transboundary issue is here between Indian states rather than between nations, the challenge is still apparent, as states tend to treat information with some secrecy and data exchange is not fully implemented, despite the obligation of states to notify and consult each other according to the “Inter-State Water Dispute Act”. The Glomma river basin is transboundary only at county and municipal levels, and few problems are apparent. Cooperation occurs at both county and municipal levels (currently, the newly appointed WFD, River basin district committee, and the River basin District working group).

³⁵ Approximately 1% of the Glomma basin is in Sweden, but this is not of great significance.

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Annex 1 General IWRM assessment in the Glomma, Sesan, Tagus – Spain and Portugal, Tungabhadra

General IWRM status: The Glomma River basin

Per Stålnacke and Johannes Deelstra (Bioforsk), and David Barton (NIVA) on questions in section 6 and 7.

1. WATER AS A FINITE SOURCE, PROTECTION OF THE CATCHMENT AND ENVIRONMENT

1.1 Any major pressures in the last 10-20 years (from mining, industrial development, hydropower, land use changes, tourism)?

In the beginning of the 80's, initiatives were undertaken to develop a Master Plan for watershed with the objective to obtain a more integrated management of watersheds. The first Master Plan was accepted in 1986 by the Norwegian Parliament, with updates/modifications in 1988, 1993 and 2005 respectively. Through the Master Plan a methodology was accepted in which hydropower development projects were ranged according to their economical feasibility and conflict potential. In 2005, it was decided that hydropower projects with an installed capacity of more than 10 MW have to be evaluated according to the procedures as indicated under the Master Plan (ref.: Directorate for nature management, 2008; . Olje og Energidepartementet, 2008). As a consequence more recent hydropower development consists mainly of adjustments of older power plants, smaller hydropower developments and changes to market conditions both in Norway and for Nordic region power trade. The construction of new especially large dams has declined dramatically since the 1990's in Norway, mainly due to the introduction of the Master Plan. Other reasons for the decline in hydropower development have been due to more natural reasons since the majority of the hydropower energy potential are already had been is developed (Norwegian Institute for Nature Research et al, 2000). There is however, a renewed focus on the development of alternative energy sources including hydropower to abate carbon emissions to the atmosphere

Pressures from existing hydropower projects are present today as they often (?) affect river water flow regime which in turn affects the fishery. An example of this is the 150 km long river stretch between Høyegga and Rena, where 80% of the water is diverted to Rendalen, and where fish yields are considerably lower than before. In some of the high mountain lakes the fish productivity is reduced by high water level fluctuations. In the lower parts of the Rena River, which receives the water from the diversion, the increased and more stable flow has caused a great change in the fish species diversity. In several stretches the fish and fisheries are good, due to moderate regulation encroachment and efficient abatement measures. Major pressure from land use changes, such as construction work - bays, adjustment of land for beaches etc., can be regarded as minor and are of no significant influence on water use. However it is worth while mentioning that during the 80's water quality in Lake Mjøsa had been seriously deteriorated due to the impact from point and non point pollution sources. A serious of abatement measures were introduced which had a positive impact on the water quality. Still agricultural land use can constitute a potential source of water pollution in those areas with significant agricultural activities.

1.2 Which sector and/or problem has been the major 'driver'? (river commission, state etc; power industry, agriculture, etc).

The Hydropower industry has been and still is the major driver (WCD, 2000).

The GLB Water Management Association (<http://www.glb.no/English/index.html>) manages the hydropower stations in entire Glomma basin. The main purpose of the association is to develop and operate storage reservoirs and regulation systems to level the natural flow of water in the rivers so that the production of electricity can be better adapted to the actual demand. GLB is responsible for 26 reservoirs and watercourse

diversions with a combined storage capacity of an approximate 3,500 million m³, equivalent to 16 % of the runoff from the catchment area during an average year. The concessions for the 26 regulating dams and watercourse diversions involved are held by GLB on behalf of the members who are private and publicly owned hydropower companies.

GLB consists of, and is owned by, a total of 21 industrial enterprises and hydroelectric power companies who have 45 power stations within the catchment area. The annual production by the member hydroelectric power stations will in a good year exceed 10,000 million kilowatt-hours (10 Terawatt-hours), and constitutes an approximate 9 % of Norway's total electricity production

1.3 Any pressures that have caused major water (use) conflicts?

The water use conflicts are mainly due to the impacts from the hydropower developments.

According to WCD (2000), the following three drivers have dominated:

- industrialists
- county and municipal governments
- environmental groups

The latter include

- several local protection groups (project-specific issues and advocacy environment organisations emerged at a national level.
- non-governmental environmental organisations and the non-governmental user organisations (primarily in the field of environmental impacts of flood protection measures, agricultural activities on floodplains and riparian areas, infrastructure development and water pollution from municipalities and industries during the last 20 years).

1.4a Any new initiatives to protect or conserve the basin environment?

The EU water framework directive (WFD) came into force for all EU member states the 22 of December 2000 and will, in a short space of time, be incorporated into the EFTA agreement thus affect also Norway. In this conjunction, Norway will be committed to take care of its water resources in a good way. The directive forms a bridge over the existing regulations and gives direct guiding for integrated water management in the individual countries.

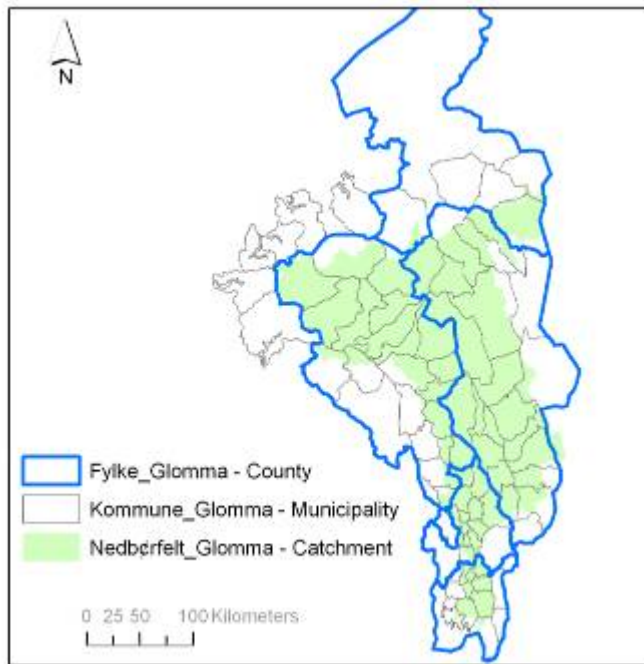
The main objective of the first WFD planning period is to improve the water quality by 2015, and if necessary to protect watercourses. Norway decided as a voluntary action to implement WFD to 30 pilot studies in Norway, and seven in the Glomma basin to join the first planning period. The other river basins will be implemented during the second planning period in the EU (for more on this see the basin report: "Hunnselva and the Water framework directive and the implementation in Norway" – this report). The objective is that all water bodies, hereby lakes, rivers, ground water and coastal waters out to 1 nautical mile outside the baseline, must achieve "good status" by 2015. Good status is defined as good chemical and ecological status.

Norwegian authorities have since 2000 worked to implement the framework directive. A governmental group, containing the five foremost affected ministries, has led the work.

The Ministry of the Environment is now the main responsible authority for the directive. A directorate group, led by the Directorate for Nature Management, has led the specialized work..

More specifically for Glomma, the river basin has been designated as a water region, implying that the six counties in the basin need to coordinate their water management according to the rules and principles in the implementation of the WRD (see figure). As a first step in the implementation of the WFD, 7 pilot areas have been established with the objective to test the implementation of the WFD.

The WFD implies that new hydropower initiatives must be evaluated against other solutions, such as alternative energy systems and power saving options.



The WFD is the new initiative for integrated water management .

The Master plan, accepted in 1986, with updates modifications in 1988, 1993, 2005 and includes all water courses in Norway and was initiative to obtain a more integrated management of watershed. The Master plan is a ranking of hydropower development plans according to their economical feasibility, and conflict potential (for more see 1.1).

The Glomma action plan was initiated by the Ministry of Environment in 1992 to develop a plan for the Glomma water course. The plan includes national aims for the water course, and strategies to reach the goals. Six areas were identified for national aims and strategies and budget to follow, the areas included *water quality, water course regulations, and hydropower development, cultural heritage, recreation and tourism, and water course related land use.*

1.4b Have new national parks or biosphere reserves been established in the basin and if so, by whom and what is there present status?

The Directorate for Nature Management under the Ministry of Environment is responsible for the management of protected areas. Today some 15% of mainland Norway is allocated as protected (mostly mountain areas) with full implementation expected in 2010, fulfilling the requirements set by the International World Conservation Union (IUCN). The protection is legally found in the Nature Conservation Act (Act of 19 June 1970 No.63 relating to nature conservation with amendment Act No.59 of 25 August 1995; <http://www.regjeringen.no/en/doc/Laws/Acts/Nature-Conservation-Act.html?id=173470>).

During the 70's and 80's there has been a substantial growth in the areas protected as National Parks under the Nature Conservation Act which has had an impact on hydropower development in that large power projects had to be abandoned (i.e. Veig and Dagali watercourses, Hardangervidda national park). There are three National Parks (Jotunheimen, Rondane and a part of Dovre Park), and some smaller protected areas located in the G&L basin (WCD, 2000). In early 2000, government policies (MoE, Børge Brende) lead to a significant increase in the number and area of national parks in Norway. A total of 192 new nature reserves, 33 landscape protection areas and 7 new or extended national parks were decided upon to be implemented.

1.5 Has there been an increase or a reduction in the forest cover in the catchment?

No major changes have been noted. Could you state why? Is it because of good management or a certain policy restricting deforestation. This is a lesson for other basins to learn.

“The use and management of forests is guided by a multitude of policies and programmes. The Forest and Forest Protection Act is the main legal framework for forest management. Other laws regulating the forest sector are the Planning and Building Act, the Nature Conservation Act (provisions for conservation of forests) and the Outdoor Recreation Act. Both the long time horizon in forestry as well as the ownership

structure in the Norwegian forest sector present challenges to the forest policy objectives in balancing the public, private, market and non-market benefits from forests. This has led to the public involvement to ensure that the objectives of the forest policy are fulfilled. The Norwegian forest policy is in this regard practising a form of public-private partnership. The Forest Trust Fund is one example of this partnership, whereby private money is collected and administered by a public agency. Investment from the fund is regulated by public law, but includes incentives that make it economically beneficial for the forest owner. New instruments have been introduced to monitor the efforts towards more sustainable forest management practices. During the second half of the 1990s the Norwegian forest owners, industry, NGOs, trade unions and the Government launched and developed a project called “Living Forest”. An important output of the project was criteria, indicators and standards for sustainable forest management in Norway. Certification of the Norwegian forests is based on the standards agreed in this project. The declining level of investment and recent developments in both the public and private extension services presents a challenge to the forest sector in the future. Maintaining the development in the sector as drawn up by the Parliament requires a thorough analysis and refinement of existing means in the Norwegian forest policy through a revision of the national forest programme” (Forest Policy and Goals of the Norwegian Forest Authorities, Knut Øistad, <http://www.joensuu.fi/metsatdk/barents/index.php>)

1.6 Have any major watershed/soil and water conservation projects been taken up in the basin?

The south eastern part of Norway, and especially the GLB, experienced a severe flood in early June 1995 whose economic cost has been estimated at NOK 1.8 billion. As a direct result of the flood the government established a commission on flood protection measures (NOU, 1996). The commission's major objective was to reduce society's vulnerability to the hazards and damage caused by floods whilst at the same time ensuring that the river system's resources and natural functions were taken fully into account. 10 different projects with considerable flood reduction capacity within the G&L basin were recommended. and were partly the establishment of new regulation reservoirs and the further regulation of existing hydropower reservoirs (NOU 1996). The projects also had the potential for hydropower production. The Parliamentary White Paper No. 42 of the 1996/97 approved the recommendation from the Commission on the 10 regulation projects for flood protection purposes meaning that license applications could be submitted. However, this does not necessarily lead to the actual application for and approval of licenses as the projects will have to go through the same licensing procedure as ordinary hydropower development projects (Norwegian Institute for nature research et al, 2000),

In the aftermath of the flood, also a large research project (HYDRA) was initiated with the objective to improve the preparedness of both the government and local authorities in coping with future floods (<http://www.nve.no/hydra/pdf/hydraslutt.pdf>). An important conclusion from the project was that hydropower development in the GLB had a significant reduction effect on floods while urban development had no measurable negative effect on floods.

1.7 To what extent is the management of surface and ground waters integrated?

The integration of ground water and surface water could be regarded as more or less included in the hydropower concessions since groundwater is one of the factors when the regulation rules for hydropower operation is established. Groundwater is used for drinking water supply and industrial purposes, however the total withdrawal is small compared to the total yearly runoff. In general, the effects of this withdrawal have little to no implications for hydropower production and vice versa.

1.8 To what extent is water related ecosystems protected and restored?

In total 37 areas in Norway have been accepted as Ramsar sites, three of which being the Åkersvika, Nordre Øyeren and Øra are located in the Glomma and Lågen basin. Åkersvika, located near Hamar in Mjøsa, is one of the largest fresh water deltas in Norway and is an important resting place for migratory birds. Nordre Øyeren is located in the northern end of Øyeren, approximately 20 km's east of Oslo and is the largest inland delta in Northern Europe with an important resting place for migratory birds. It has a large biologic diversity while having a large variety in fish species. Øra are located at the outlet of the Glomma into the North sea, in the vicinity of the town of Frederikstad. The area is an important nesting and resting place for wetland birds

1.9 Have management plans for vulnerable riverine vegetation zones and species been established and implemented?

Several organisations/stakeholder groups related to flora/fauna, recreational use and biodiversity are present in the basin. Large multiple use studies have been carried out in the Glomma watershed in order to optimise water uses an example of such a study is for Øyeren (Miljøfaglige Undersøkelser Øyeren 1994-2000: http://osloogakershus.miljostatus.no/dm_documents/oyeren_brosjyre_1N8aU.pdf) http://www.akershus.no/index.php?page_id=93&article_id=444. In addition have a number of locations been accepted as Ramsar sites (see 1.8).

1.10. Have there been a reduction or /increase in flow volume/water level over the last 10-20 years?

The only factor having a major influence on the yearly runoff/flow volume of the Glomma and Lågen basin is the precipitation. The distribution of the runoff is influenced by hydropower requiring a minimum discharge to be released which is part of the hydropower water discharge regime operation. Flood peaks have also decreased due to hydropower regulations (see 1.6). The major changes in the yearly discharge distribution took place more than 20 years ago during the period when hydropower development took place.

1.11 Are erosion and sedimentation monitored on a regular basis in the basin?

Indirectly via monitoring of suspended solids as this is a regular parameter in the water quality monitoring programme (see 1.13)

1.12 Have there been established mechanism to license and control effluent discharges from point and non-point sources?

Norway's waste water treatment policy is recipient-oriented, meaning that the standards for waste water treatment plants are set on the basis of conditions in the receiving water bodies and the quantities of waste water discharged. In this way a balance between the costs of measures to reduce discharges of pollutants, the user interests involved and the conservation value of different areas is obtained. Monitoring programmes exist for several recipients at national, regional and municipal level. (Pollution Control Act, 1981 No.6, EC Urban Wastewater Directive, Council Directive 91/271/EEC).

Regulations are available to reduce point source pollution from manure and silage storage facilities as well as to the timing and application of animal manure on agricultural land

To limit discharges of nutrients from agriculture and the environmental damage they can cause, different sets of regulations have been laid down pursuant to the Soil and Pollution Control Act. In addition to these regulations, the Ministry of Agriculture can use other regulations and grant schemes to reduce excessive nutrient inputs to open water and groundwater systems. In 1981 the Soil and Pollution Control Act came into being, an amendment to this being made in 1996. The objective of the Act is to protect the outdoor environment against pollution and to reduce existing pollution, to reduce the quantity of waste and to promote better waste management. The Act shall ensure that the quality of the environment is satisfactory, so that pollution and waste do not result in damage to human health or adversely affect welfare, or damage the productivity of the natural environment and its capacity for self-renewal.

The Ministry of Agriculture is responsible for drawing up action programmes as required by the EU nitrates directive (Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources). When these have been completed, it is expected that further measures will be taken to reduce nutrient inputs from agriculture. Two areas have been designated as vulnerable zone with respect to nitrogen pollution under the Nitrate Directive, i.e. 1) from the Swedish/Norwegian border to the town of Frederikstad and 2) the inner Oslo fjord. The coastline from the Swedish/Norwegian border – Lindesnes (southern tip of Norway) has been declared as vulnerable zone with respect to phosphorus

1.13 Is water quality monitored in the basin?

Water quality is monitored in the basin. As part of the reporting under the EU WFD, the web-site **Vann-nett** will provide access to water quality and hydromorphological status for all water bodies in nine water regions in Norway, including Glomma.

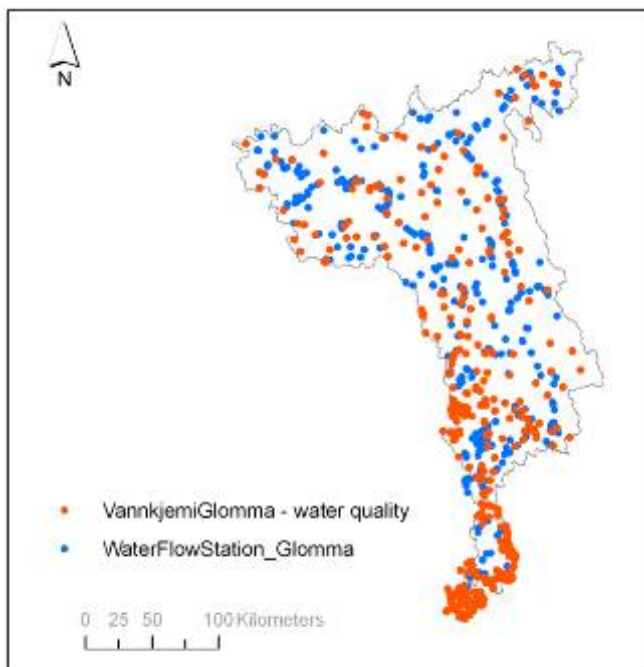
<http://www.vannportalen.no/hoved.aspx?m=31139&amid=2097740>

Pollution is monitored across the basin. Monitoring is oriented towards the design of measures (“Vassdragsorientert overvåkning av Mjøsa med tilløpselver”
: <http://vassdragsforbundet.no/mikpublish/media/4816-kje-mjosa-01-02.pdf>)

The Norwegian Institute for Water Research (NIVA) provides water quality monitoring data online through AQUAMONITOR for the following stations:

Høyegga; Funnefoss ; Svanfoss ; Solbergfoss ; Sarpsfossen ; Solbergåsen i Øyeren

http://www.niva.no/SYMFONI/infoportal/PUBLIKASJON.NSF/.viewwebInterEnkeltdokumenter/FCD8C02C63829CEFC12571DC002FEFDE?Open&Category=Internetweb_lenker_Analysedata%20online&m1=Webtjenester&m2=&m3=Glomma



Water quality and water flow stations in Glomma River basin

1.14 Existence of water quality standards, for effluent discharges, minimum river quality targets? (see also 1.12, and 1.13 on related issues)

All effluents to water from e.g., from industries and wastewater treatment plants are subject for control and licensing. The Norwegian Pollution Control Authority (SFT) is a directorate under the Ministry of the Environment. Almost all pollution activity in Norway is based on individual permits or licences issued by the Norwegian Pollution Control Authority or the county environmental agencies. Whether a permit is granted or not, depends on the professional judgement of the pollution control authorities.

1.15 Does the Pollution Control board use the results of water quality to influence policy decisions to curb pollution, if no, what are the reasons?

Yes, the Norwegian Pollution Control Authority (SFT) uses water quality data to monitor the environmental situation. Lately it used data for further investigation about pollution sources of flame-retardants to lake Mjøsa.

1.16 Are flood risks taken into account in broader land / water use management and environmental impact assessments?

Flood risks and management is included as a factor in connection to hydropower development. Although most of the larger regulation dams in Norway are built and used mainly for hydropower purposes, flood protection considerations were important in the planning processes and for the decisions to build several of the dams with lake reservoirs early in the 20th century. The flood reducing option of the regulation

dams has a considerable economic value by reducing damages on floodplain settlements, agricultural areas and crops, and infrastructure elements (roads, railroads, and telecommunication).

2. WATER ALLOCATION IN THE BASIN SHOULD IN PRINCIPLE HAVE BEEN AGREED BETWEEN ALL RELEVANT STAKEHOLDERS/SECTORS WITHIN A GIVEN FRAMEWORK

2.1 Is there a decentralised water allocation management system in the river basin?

The operation of water flow by the GLB Association may be regarded as a centralised water allocation management system.

“During the last 20 years the demand for impact assessments prior to and during the license application process has been high. Effects of a proposed hydropower development project on the multiple uses of water, historical and cultural monuments, and biological diversity are now important aspects in the licensing review process. In addition to licensing review processes for hydropower development projects, several types of local and regional planning processes are now carried out for both rivers Lågen and river Glomma with a diverse set of government participants and other stakeholders. Taking care of other stakeholder interests is common in Norwegian institutional practice. Other stakeholder interests relate to flood protection, inland fisheries and angling, tourism/water sports, environmental conservation, water supply and sanitation, and irrigation.. Previously also log driving, inland navigation and milling were considered significant stakeholder interests in Norwegian rivers.

Some of the processes are partly integrated basin wide processes, while others are specific for separate tributary rivers, counties or municipalities.

Several public authorities undertake the water management work connected to public interests in the G&L basin. The authorities are national level (ministries and directorates), regional level (5 counties and 5 county governors), and local level authorities (60 municipalities). Decisions affecting the public interest are made by all authority levels and drawn from different sector based acts as well as from general acts (Water Act, Land Use Act and Pollution Act)” (WCD, 2000).

The fact that GLB represents the hydropower interest but at the same time is taking care of other stakeholder interests is an important asset when comparing and evaluating integrated water management across borders.

2.2a) Is there an inter-ministerial co-ordinating body?

Historically no but the recent introduction of the WFD have the Ministry of Environment as the inter-ministerial coordination body.

2.2b Are there local co-ordinating bodies?

Historically no but the county most down-stream have been appointed to coordinate the work with WFD for the six involved counties.

In Norway national guidelines should be taken into consideration during preparing lower level plans (County and municipal level). However, in practice there is a great variation of using them in plans, sometimes they are only used in a very broad way. Variety of guidelines gives municipalities a chance to create a policy adapted to their particular local needs. However, general guidelines are used as a strong argument in planning; a plan can be stopped, if they are not taken into account. In other words, regional council can object to the local plans and use the policy guidelines as a basis of objection.

Water management on a regional level in Norway may be regarded as relatively weak, as it gives only general directions of regional development at large. Each county has its own County Plan, which is adopted by a political body - county council. The County plans should be revised every 4 year, in connection to political elections.

2.3 What are the mechanisms that exist for water allocation in the basin, who is consulted and who makes decisions?

See 1.1 and 2.1

2.4 Does the system of water allocation build on local knowledge?

Water allocation is not based on local knowledge as such but is based instead on (local) expert knowledge. Four major issues in this respect are decisive in water allocation, i.e.: minimum flow requirement, maximum storage capacity, hydropower production and flood protection. In these issues, the GLB plays a major role. .

2.5 Are traditional water rights respected when allocation takes place?

Watershed management/water use has been very much determined by hydropower interests. In 1994, national guidelines for protected watersheds were established, indicating that all interests have to be taken into consideration within watershed management. Any measure taken in a watershed has to be considered with respect to the values embedded in the cultural landscape, i.e. nature conservation, wildlife, fish, archaeological aspects, mm.

http://www.regjeringen.no/nb/dep/md/dok/lover_regler/retningslinjer/1994/T-1078-Vernede-vassdrag.html?id=425432)

Specific challenges are;

- understand/maintain the original river habitat in the watershed
- carry out a restrictive policy concerning interventions in the watershed
- individual initiated activities should be considered with respect to its side effects/impacts on other interest/activities
- watersheds should be managed across political boundaries

Many of the above mentioned aspects are also applicable to the GL basin.

2.6 Existence of defined water rights?

[See 2.5](#)

2.7 Are there a legal basis for secure property and contract rights?

“The legislation relevant for river basin use and management includes several acts headed by different ministries and several administrative tasks are delegated to directorates, counties, county governors and municipalities. The Ministry of Petroleum and Energy (OED) has the jurisdiction for the Watercourse Regulation Act and the general Water Act regulating water use issues and permanent structural watercourse measures in Norway (The Water Act is currently up for revision). The multiple uses of the Norwegian watercourses necessitate the involvement of several sector-authorities and different Sector-based Acts, e.g. The Pollution Act, The Nature Protection Act, The Salmonid and Freshwater Fish Act, The Act of Cultural Heritage and different forest and agricultural acts. As a result of the diversity of acts, institutions like the Ministry of Environment (MD) and the Ministry of Agriculture (LD) with their agencies and regional and local branches are important stakeholders of the water management system in addition to OED and their corresponding directorate (Norwegian Water\Resources and Energy Directorate . NVE). Locally, basin management is partly ruled by the municipalities according to The Planning and Building Act (Plan- og Bygningsloven).” WCD (2000).

“The fragmented nature of the legislation and the number of governmental institutions involved calls for co-operation and co-ordination in basin management and operation, and several types of planning processes and planning tools have been developed. At the basin level and for specific parts of river basins (e.g. a tributary river) inter-municipal plans (action plans and watercourse plans) have been initiated to co-ordinate the multiple uses of different river sections. At the national level the call for a better integration of the individual user-interests in the licence processes for hydropower reservoirs became evident during the middle of the 1970s. Two planning systems (The Master Plan for Water Resources and The Protection Plans for Watercourses) were introduced in order to plan further hydropower development in a manner that was assumed to be inclusive of all the interests. The Master

Plan for Water Resources is a ranking system for hydropower development plans based on economic profitability and impacts for the different user-interests. The Protection Plans (I-IV) are instructions to the Norwegian Government not to give licence for regulation or hydropower development in 341 river basins. This system targeted only hydropower development, and currently systems are developed to improve the management of the watercourses included in the Protection Plan. The environmental authorities currently have a project aiming to recognise various ecological values in protected watercourses (The VVV-project). The Protection Plan is administered by OED and the Master Plan by MD” WCD, (2000)

The Pollution Control Act indicates guidelines to be followed by different sectors stating among others “The pollution control authorities shall coordinate their activities with the planning authorities in such a way that land-use planning legislation together with this Act is used to avoid and limit pollution and waste problems”.

2.8 How are disputes resolved? In these disputes which sectors dominate and why?

It happens that different local authorities use different national guidelines and there are examples of conflicts and disputes. The County Governor is responsible for organizing negotiation meeting between two sides. If they cannot solve the conflict during this meeting, a draft of a plan is sent to the Ministry of Environment or OED for judgment. However, the competent Ministry does not necessarily take those guidelines into account, when conflict of local interests occurs. So in general, disputes are resolved at the local level. However, if no agreement is reached, political/judicial institutions at a higher level (provincial/national) will be involved. For hydropower projects there is a particular process for solving the disputes in connection to development of the master plans and associated protection plans.

2.9 Are the roles and responsibilities of the cooperative institutional arrangements clearly defined ? (central and local)

The roles and responsibilities are defined by the various ministries and directorates in the various sectoral Acts as well as between the 3-level of governance in Norway (see also 2.7 on the fragmented and sectoral management and legal system)

2.10 What changes have been made in water management in the recent years

See 1.4 (the introduction of WFD in Norwegian water management)

3. TRANSBOUNDARY MANAGEMENT IN THE BASIN

For more on transboundary issues related to the Glomma river and Norway, see comparative assessment Transboundary aspects of the case studies” chapter 2.

3.1 Does the basin have any transboundary issues/problems?

The Glomma river basin is almost solely under Norwegian territory with only 1% located in Sweden and therefore transboundary issues/problems are not present.

3.2 Does any legal agreement exist between different provinces or countries that share the water resources at basin level (for e.g. the Bachawat Tribunal in TB) (a table of such agreements, year constituted, by whom??, current status?? Etc)

In principal Norway follows the UNECE convention of transboundary water courses. In addition, WFD advocate joint river basin management plan in cases of transboundary river basins.

3.3 Are there examples where legal agreements between different sectors or provinces have not been respected?

Not applicable

3.4 What is the general role of different agencies in negotiations (central, state, court of law, informal bodies)

Not applicable

3.5 Do the states conduct appropriate environmental impact assessments when planning new activities on transboundary waters?

Not applicable

3.6 Have basin/bilateral agreements been fully transposed at the national / provincial / local level?

Not applicable

3.7 Are neighbouring states obliged to notify and consult each other of planned measures?

Not applicable

3.8 Do watercourse agreements oblige states to accompany such notification with available technical data and information, including the results of any environmental impact assessment?

Not applicable.

3.9 Are states obliged to exchange data and information?

Not applicable

4. STAKEHOLDER INVOLVEMENT

4.1a Has stakeholder participation been made mandatory in the process through legislation or other government directives? Is there a standardized framework for stakeholder involvement with operational guidelines that have to be followed?

Traditionally, any initiative taken, being it related to hydropower, construction or road/railway building has to be presented to the general public by the executing organization, which then can submit their objections/present modification. In Norway public participation in planning process has a long tradition and is regulated by Planning and Building Act. It is stated that municipal planning authorities shall inform the public about preparing municipal or zoning plans at an early stage of the planning. Active participation in the planning process should be available for affected citizens and institutions. Before the preparation of zoning plan, it is necessary to announce it in two newspapers.

See detailed description of the stakeholder involvement in the basin report “The Upper Otta case”. This case may serve as an example of stakeholder involvement in practice. Depending on the case (how much it attracts public attention etc., systematic public involvement is quite active. Public concerns are taken into consideration given that the concerns are those of the majority (for more, see the Upper Otta case).

The implementation of the WFD will not lead to any major changes in this, also requiring the full participation of all users in the watershed.

4.1b IF such exist, Is the framework satisfactory? – does it ensure transparency of the process?, is it open for anyone?, does it ensure participation from the poor, marginalized groups, women?

Given both tradition with public hearings (see 4.1a) and that public participation is a requirement by law and that the system is transparent (any official document is accessible by the citizens), it may be regarded as highly satisfactory, especially at the local level (municipalities).

The system does not ensure participation by all groups since it is up to the citizen themselves to raise their voice during the hearings.

4.2 What initiatives have been taken up by the state agencies to involve stakeholder and end users in water management (in planning, basin management plan preparations, land, water and irrigation management initiatives, new policy changes?

See 4.1

4.3 Is there an enforceable and adequate right of access to information (including environmental information)

The Freedom of Information Act of 19 June 1970 is the implementation of freedom of information legislation in Norway on a national level. It basically draft the rules and principles of access to public documents

There is a specific Act on access to environmental information: Act of 9 May 2003 No.31 relating to the right to environmental information and public participation in decision-making processes relating to the environment

The purpose of this Act is to ensure public access to environmental information and thus make it easier for individuals to contribute to the protection of the environment, to protect themselves against injury to health and environmental damage, and to influence public and private decision-makers in environmental matters. The Act is also intended to promote public participation in decision-making processes of significance relating to the environment (ref 4.1a).

Environmental information means factual information about and assessments of:

- a) the environment,
- b) factors that affect or may affect the environment, including
 - projects and activities that are being planned or have been implemented in the environment
 - the properties and contents of products
 - factors related to the operation of undertakings, and
- administrative decisions and measures, including individual decisions, agreements, legislation, plans, strategies and programmes, as well as related analyses, calculations and other assumptions used in environmental decision-making,
- c) human health, safety and living conditions to the extent that they are or may be affected by the state of the environment or factors such as are mentioned in litra b).

The environment means the external environment, including archaeological and architectural monuments and sites and cultural environments.

4.4 In practice to what extent do public authorities make IWRM related information available to the public where requested ?

Any information held by authorities in principal is open for all citizens (§ 8. Duty of administrative agencies to hold environmental information and make it accessible to the public). More specifically administrative agencies shall hold general environmental information relevant to their areas of responsibility and functions, and make this information accessible to the public.

Ministry of environment and SFT also publish IWRM related data on the web.

The new web-site for WFD-issues also makes IWRM relevant data available and the public can follow this work online for e.g. Glomma water Region.

<http://www.vannportalen.no/infomag.aspx?m=36286>

4.5 Do the authorities publish the facts and analysis of facts which it considers relevant and important in framing major policy proposals related to IWRM?

All Acts in Norway imply that facts and analysis prepared by the authorities in planning documents etc. should be available for the public. For example, data included in Environmental impact assessments should be made available by the authorities.

4.6 To what extent do agencies involved in IWRM make available to the public a clear description of its decision making processes including opportunities for participation?

The real and inside decision making process is generally not included besides a description of the legal and formal process. But generally the plans and project are made available and as written in 4.1a made available for public with a clearly defined process (public hearings etc).

4.7 Are the states party to any international agreements related to public access to information?

Norway has ratified (June 2003) the AARHUS CONVENTION (Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters)

5. CAPACITY BUILDING IS THE KEY TO EFFECTIVE IWRM

5.1 What initiatives have been taken up by the state agencies for capacity building of stakeholder in water management?

See, the section on comparative analysis of capacity building, pages xx- xx, and 5.4 below.

5.2 What measure is in place to build the capacity of staff within public authorities with regard to IWRM?

A course in IWRM has been given by NVE three times since 2000 in cooperation with the Directorate for Nature Management (DN) and the Norwegian Pollution Control Authority (SFT). Employers at NVE also give regular lectures at universities. NVEs regional offices give advice to municipalities and county governors on water management issues. In addition, NVE provides hydrological data and flood risk maps for the public.

5.3 What is the priority given by the state agencies to capacity building?

It should be particularly noted that laws and policy documents hardly ever mention capacity building directly if we disregard what's legally binding in laws and subsequent guiding documents. But, there are strong competences and capacity building initiatives in the Norwegian water administration and governance structure (see 5.4 and section for comparative analysis of capacity building in Section 2.4).

5.4 Has any special budget been allocated by the water resources dept. or other relevant agency for capacity building?

The present government in Norway via the Ministry of Foreign Affairs recently proposed in a white paper that the capacities for water monitoring should be given increased resources in the range of 9-11 M EUR per annum (<http://www.regjeringen.no/nb/dep/ud/dok/regpubl/stprp/2007-2008/stprp-nr-75-2007-2008-.html?id=519840&epslanguage=NO>). In addition, 1.5 M EUR should be spent on research and development projects in addition to the existing resources. The government also highlights the need for resources to citizen involvement and local participation in the planning processes should be strengthened. This should be done by increased support of 250-375 k NOK per year to the existing map- and web-based information tool Vann-Nett (<http://vann-nett.nve.no/innsyn/>). See 5.1

5.5 How effective are these training programs (in terms of content, quality,).

Not applicable

6. EFFICIENT USE OF WATER IS ESSENTIAL AND AN IMPORTANT MEANS TO RESOLVE WATER CONFLICTS

6.1 What initiatives have been taken up in the basin to improve water use efficiency?

Water use efficiency in the sense of optimizing the benefits per unit water use is often related to agricultural production under irrigated condition. This is not a case in the Glomma and Lågen basin. On the other hand, optimising water resources for hydropower production is the main objective of GLB among others through modernization of power plants.

Water use also includes recreational use and biodiversity interests. In a wider perspective water use efficiency also concerns hydropower operation that maximises power generation within constraints set by needs of other water users. This is a common feature of all hydropower concessions in the catchment (see Figure below) through the specification of maximum and minimum regulated water level regulations. Large multiple use studies have been carried out in the Glomma watershed in order to optimise water uses. The best example of such a study is for Øyeren (Miljøfaglige Undersøkelser Øyeren 1994-2000): http://osloogakershus.miljostatus.no/dm_documents/oyeren_brosjyre_1N8aU.pdf http://www.akershus.no/index.php?page_id=93&article_id=444



Hydropower regulations in the Glomma basin and the Solbergfoss powerstation downstream and Bingsfoss powerstation upstream of Lake Øyeren

The figure on next page shows a study of different water regulation levels that account for different river values, in particular bird and fish populations while broadly maintaining current power production at the Solbergfoss powerstation. The figure is an example of attempts at the efficient use of water by hydropower, where efficiency is interpreted widely as the acceptable trade-off between multiple user interests. The jagged curve shows a regulation trial regime that was actually tested by the operator. The other curves were established through expert judgement. The resultant curve indicates a compromise, based on expert-judgement, between user interests.

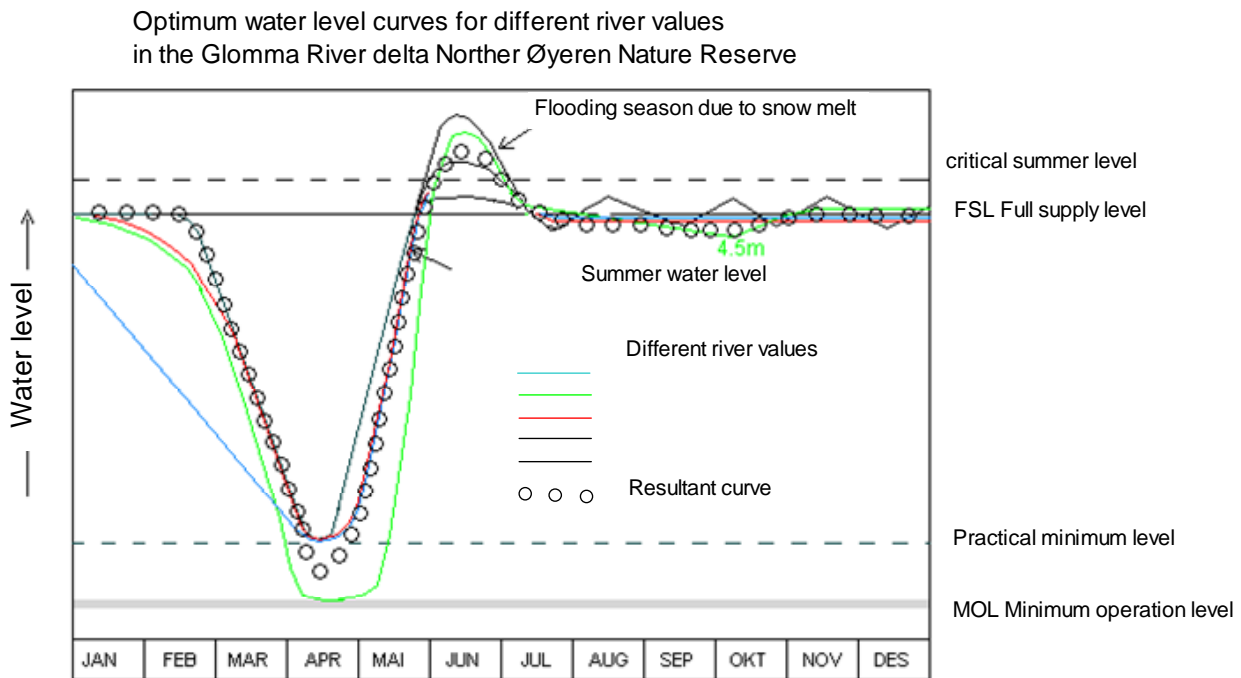


Figure XX. Optimal regulation accounting for different user interests. Source: adapted from Miljøfaglige Undersøkelser Øyeren 1994-2000

6.1a How effective are they? (new cropping patterns, re use of water through waste water treatment measures, promoting multiple uses of water etc).

“GLB has an important role in reducing flood damage as there is a considerable flood abatement effect in optimal basin operation. However, the basin operation is not yet optimal from an economic point of view. An additional income potential of \$3,8 million was estimated in 1995.” (WCD 2000). Income potential is calculated based on upgrading of existing power plants and more optimal coordination of production capacity. However it is reasonable to assume that parts of this potential is not attainable without negative impacts on other water use interests, particular with regards to flood prevention.

Multi-use plans such as that of Øyeren have been instrumental in adjusting hydropower regulation of the lake/reservoir.

6.2 Are there measures to re use water (water treatment and re usage)

Not applicable to Glomma basin.

6.3 Does any type of co-ordination exist between various departments to address water use efficiency?

“In 1960 Parliament took the initiative to establish regional plans for the protection of rivers and waterfalls, and around 1980 a Master Plan for all the remaining hydropower development projects was devised. The aim was to get a more unified approach to decision making in particular projects. These plans led to avoidance of (further) hydro-impacts in the river selected for protection, thereby reducing conflict levels.” (WCD 2000)

The Glomma . Laagen Water Management Association (GLB) is an important institution in the integrated operation of the G&L basin with respect to hydropower production, flood dampening and environmental mitigating procedures (see section 1.1)

+“Conservation plans were spurred on by means of a Master Plan for the remaining river systems which provided an instrument to assess and utilise the resources in a holistic manner, balancing multiple interests and giving it a more transparent decision making process. This involved the organising and construction of a priority list of all the remaining hydro power projects, referring them to one of two categories: (i) those already approved for the applying of a license (MP-Category 1); and (ii) those who the authorities are, in principle, prepared to deal with at a later date (MP-Category 2).” (WCD 2000)

“Vassdragsforbundet for Mjøsa og tilløpselver” is an example of water user associations that have been established in the catchment (<http://www.vassdragsforbundet.no/>). In the context the EU WFD special task forces have established by this association, such as the group working on Hunnselva.

Finally, The implementation of the WFD has now organised work in water regions which coordinate efforts between different government institutions. The public can follow this work online for e.g. Glomma water Region.

<http://www.vannportalen.no/infomag.aspx?m=36286>

6.4 Are there any monitoring devices/systems to record and control water use?

“Data series and subsequent (water allocation and hydropower capacity) modelling of the water course is a salient management tool used to meet the various and often conflicting demands in the short and long term operation of the basin, including flood issues, impact assessments, economic simulations, operational planning, and development planning. Additionally, detailed descriptions of reservoirs, basin, power stations and other technical facilities, in addition to reliable market forecasts, are required to produce good modelling, analysis and management strategies. There are no divergent views among stakeholders on this issue”.(WCD 2000)

As part of the reporting under the EU WFD the web-site **Vann-nett** will provide access to water quality and hydromorphological status for all water bodies in nine water regions in Norway, including Glomma.

<http://www.vannportalen.no/hoved.aspx?m=31139&amid=2097740>

NVE provides running flood forecasting online.

http://www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=5907

Pollution is monitored across the basin. Monitoring is oriented towards the design of measures (“Vassdragsorientert overvåkning av Mjøsa med tilløpselver”

:<http://vassdragsforbundet.no/mikupublish/media/4816-kje-mjosa-01-02.pdf>)

NIVA provides water quality monitoring data online through AQUAMONITOR for the following stations:

Høyegga; Funnefoss ; Svanfoss ; Solbergfoss ; Sarpsfossen ; Solbergåsen i Øyeren

http://www.niva.no/SYMFONI/infoportal/PUBLIKASJON.NSF/.viewwebInterEnkeltdokumenter/FCD8C02C63829CEFC12571DC002FEFDE?Open&Category=Internetweb_lenker_Analysedata%20online&m1=Webtjenester&m2=&m3=Glomma

7. WATER SHOULD BE TREATED AS HAVING AN ECONOMIC AND SOCIAL VALUE.

7.1 What initiatives are present to treat water as an economic and social good?

Water is obviously an economic good given its importance for hydropower production in Glomma. The definition of social good is unclear, but recognition is given to other water uses than hydropower in regulation concessions given by the government to hydropower producers of the catchment (especially recreation). This is most evident in the Øyeren study (Miljøfaglige Undersøkelser Øyeren 1994-2000).

“The direct economic effects in the GL region today stem from revenues to the municipalities in the form of taxes, license fees, sale of licensed energy and owner incomes (dividends). Of the accumulated public income of \$71 million from the energy sector in G&L, \$55 million or almost 80% went to the G&L region. The large revenue entries are owner incomes and taxes. The energy revenues for the municipal sector (municipal and counties) in the G&L region constitute approximately 1.9% of the total incomes to the municipal sector. (..) Municipalities with large energy incomes receive lower subsidies than municipalities without energy incomes. When considering that the State subsidies are reduced for municipalities with large energy incomes, the net effect of the energy revenues probably lay around 1.5% of the municipal sectors.

aggregate annual incomes in the GL region. In a few municipalities, the revenues of the power installations make up more than 5% of the incomes. “(WCD 2000)

“The hydropower development represents an annual hydropower production of 9-11 TWh (annual value \$159.253 million). (...) The constructions and operations have created important employment opportunities. Today the hydropower sector alone employs 250 people. When including the system and utilities producing power services, employment is 2100 people.” (WCD 2000).

7.2 Are the human and the animal health situation along the river basin carefully monitored?

Information on animal health and food safety (e.g. fish) is given to the public through “Matportalen”. One of the most pressing issues regarding human health in the basin concerns environmental contaminants in fish. http://matportalen.no/artikler/2004/9/flere_miljogifter_i_fisk_fra_mjosa

7.4 How effective are the emergency alleviation and response systems in limiting risk and protecting people, property and the environment?

“The basin’s degree of regulation increased from 4% to 16% during the 20th century. In addition to the use of the reservoirs during major flood events other protective measures in the low areas of the basin include flood banks, and since 1995 flood hazard mapping, zoning and public information during flood periods.” (WCD 2000).

NVE has produced flood inundation maps to help the public help assess own flood risk. (http://www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=3709&noscript=)

7.6a Is there pricing of water, or any such initiatives coming up??

“The municipalities in the basin have 227 water supply plants serving 682 000 inhabitants with water from main rivers, tributary rivers, lakes, and ground water resources within the basin. Lake Mjøsa is the only reservoir in the G&L basin with considerable municipal water supply interests. Of the approximately 150 000 people living in the immediate surrounding of the lake, about 35 000 persons use Lake Mjøsa as their source of drinking water. According to records from the Directorate for Public Health the annual water abstraction from Lake Mjøsa is 4,75 million m³. Most of the water returns to the lake as runoff from sewage treatment plants and has minor effect on hydropower production.” (WCD 2000).

KOSTRA provides an overview of water and sewage charges at municipal level and is open to the public. Household can for example obtain an overview of W&S charges and how well their particular municipality spends the money (cost recovery rates) and the level of water service provided. All statistics for municipal services including W&S can be accessed at: http://statbank.ssb.no/statistikkbanken/Default_FR.asp?PXSid=0&nvl=true&PLanguage=0&tilside=selecttable/MenuSelS.asp&SubjectCode=17

7.6b Do farmers pay for water used? Do households pay for water?

Farmers pay for irrigation water delivered through the municipal supply. Otherwise they do not. Households pay W&S services (see above).

7.6c Are some categories of water users exempted from paying water use tariffs (E.G., In TB, the socially backward groups are exempted from paying membership fees to WUCS)

No.

7.7 Are traditional water uses allowed in the basin?

No traditional water uses as such remain.

8. WATER MANAGEMENT AND GENDER

8.1 a Does any initiatives exist in the basin that encourage women in water management?

No. But generally woman is highly represented in water management bodies, NGO and interest groups etc in Norway.

8.1b If so, how does it work , is this real or just on paper?? E.g. Women Self Help groups

Not applicable

8.2 How do the women feel about it?

Not applicable

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General IWRM assessment: The Sesan river basin

D.K. Nhung, Institute of Geography, Vietnam

1. Water as a finite source, protection of the catchment and environment

Guiding questions

1.1 Any major pressures in the last 10-20 years (from mining, industrial development, hydropower, land use changes, tourism)

The major water pressure in the Se San basin has been:

- Hydropower development: Several projects have been identified within the Se San River basin in Vietnam, including one large project, the Yali Hydropower Project (720 MW). Three hydropower projects: Se San 3 (273 MW), Se San 4 (330 MW) and Pleikrong (110 MW) have been commissioned.
- Agricultural practices: The population previously cultivated upland rice, but have shifted more and more to wet rice cultivation. Water for cultivation is insufficient and fields are mainly rain fed. 115 small irrigation systems have been built but they are poorly maintained.

1.2 Which sector and/or problem has been the major 'driver'?

List the drivers (river commission, state etc; power industry, agriculture, etc) and describe what they have influenced. Drivers can be those who recognise the problem or are of cause of the problem or those who are trying to solve it.

1. Recently the MoNRE has the responsibility on water resources management. Some important offices in WRM as Vietnam Mekong River Committee, Water Resource Management agency (WRMA) now belong to MoNRE. Main role of WRMA is state management on water resources, including water resource planning for the river basins.
2. MoNRE is a licensing authority for water use. Though recently the water supply works and irrigation construction are undertaken by MARD, the Hydropower project by Ministry of Industry, etc; but MoNRE controls authorization.

3. The related Ministries and Organizations are:

- National Water Resources Committee with the chairman is Deputy of Prime Minister. Permanent office is Ministry of Natural resources and Environment. Its members are from difference Ministries , provincial authorities. The Committee plays a consultative role for Government in WRM.
- The Ministries (including and Ministry of Defense, Ministry of Public Security, Ministry of Health)
- Provincial People's Committees
- Difference Departments at provincial level

When resolving all issues relating water resources use in a river basin WRMA invites both representatives of People's Committee and Departments in province. But People's Committee is governing office, they give the policy in order to department implement these policies. The contact is not only with DoNRE but also other related departments in province such as: DARD, Department of Investment and Planning, Department of Traffic, etc.

4. At Provincial level: there are 4 organizations which are of equal role for IWRM:

- + DoNRE (WRM in general, licensing authority, water resource monitoring)
- + DARD (water supply and irrigation works)
- + Department of Planning and Investment (appraise and finance the projects)

- + Department of Industry (hydropower projects)

Beside that there are some related organizations as Department of Science and Technology, Department of Health, etc.

There are some organizations its activities impact on water resource in the basin such as: Irrigation Division and Center of Fresh Water and Sanitation. Both belong to DARD.

5. In the DoNRE there are some divisions related with WRM as;

- + Division of Natural Resource (water resource management)
- + Division of Environment (EIA, water pollution)
- + Division of Land Use and Planning (land management)

6. At District level there are:

- + Department of Economy which belongs to District People's Committee (water supply and irrigation works management).
- + Irrigation work Exploiting Company which belongs to DARD.
- + Water use Complex in the district, communes (small irrigation works exploiting)
- + Irrigation works construction Companies (many private companies).
- + Hydropower project construction Companies (joint-stock, private companies for small hydropower projects).

1.3 Any pressures that have caused major water (use) conflicts?

Conflicts in the Se San basin are:

- Hydropower development and Agriculture

The areas of 22,250 ha is inundated in the hydropower reservoirs, including 4,600 ha of agriculture land (includes growing of coffee, rice, maize and vegetables) and 4,200 ha of forest. It is vital for local needs for all the residents of the area. It appears that the residents in the area rely on agricultural products and their loss will be significant in terms of land and productive land. There is a large portion of wasteland in the reservoir area as well.

- Hydropower development and Fishery

Fish from Se San river basin is an important protein source in the diet of part of the local population. Most households living along the river do fishing in the dry season. In the rainy season the fishing activity is less and the people get protein from other sources. With a relative fixed water level in the reservoirs, it should be possible to maintain a good fish productivity in the reservoirs. As the littoral zone will not be destroyed, it should be possible to establish a good production of fish belonging to the bottom animal food web. This web is normally much more efficient in producing fish. In the first years after impounding there may also be an increase in fish production due to the fish having access to food from the inundated terrestrial areas.

The dams will act as the barriers to the migratory species, and these will disappear from the river in the Project Areas. The species diversity of the fish community will be reduced. Some of the 5 recorded red list species may also disappear. It is not known to which extent these endangered species can survive in the tributaries after impounding and detailed surveys have to be conducted.

- Hydropower development and Biodiversity

Forestry In the reservoir areas the forest area is substantial comprising of the planted forest and natural forest of high quality contiguous with protected areas. The forest resources are also very important to local ethnic minorities who rely on them for subsistence. The catchment area as a whole has a large proportion of forest,

which is extremely valuable for its hardwoods, unique biodiversity and habitat diversity. The immediate area is seriously impacted.

Flora Flora in the river basin is very rich and contains several precious elements and most of these are reportedly housed in some of the more intact forests, protected areas and contiguous tracks of forestland. The five Natural Reserves are located in the basin and have many reported threatened as well as endemic species. Some of the area and biodiversity is facing pressure from the Hydropower Projects. The immediate project areas is seriously impacted.

Fauna Fauna in the river basin and catchment area is rich and contain several precious elements and most of these are reportedly housed in some of the more intact forests and protected areas. The natural reserves are located in the basin and has many reported threatened as well as endemic species. In addition the Mon Ray Protected Area houses what is believed to be the best habitats for the tiger, *Panthera tigris*. Due to the river the area may be an important water source, breeding area and in the migratory path of animals. Some of the area and biodiversity is facing pressure from the Hydropower Projects. The immediate area is seriously impacted.

Aquatic Life In fact, the aquatic life in the hydropower reservoirs is richer than in the previous river stretch, except for the fact that the dam will act as a barrier to migratory species. However, the flow variations from the Yali Reservoir have already created much of the impacts.

According to the Law on Environmental Protection the owners of projects have to elaborate EIA reports and submit them to competent state agencies for approval. In the EIA reports they have to show the environment mitigation measures and have responsibilities to implement the contents of EIA reports.

EIA report-approving agencies have the following responsibilities;

- To notify contents of their decisions approving EIA reports to provincial, district and commune – levels People's Committees in the project areas.
- To direct and organize the inspection of the implementation of contents of EIA reports

1.4a Any new initiatives to protect or conserve the basin environment? List and describe possible initiatives (an example in Europe is the water framework directive).

A number of initiatives have been taken at the national level. These include the Law on Water Resources (1998), development of a National Water Resources Strategy, the establishment of a National Water Resources Council, and the decree on Integrated River Basin Management.

The Law on Environmental Protection is promulgated on 2005.

Beside that new Law on WR is editing and will be published soon.

1.4b Have any new national parks or biosphere reserves been established in the basin? By whom?? Any major watershed/soil and water conservation projects been taken up in the basin?? The impacts and status

There are five Protected Areas in the Se San River basin, located in the provinces of Gia Lai and Kon Tum. Chu Mo Ray and Ngoc Linh Natural Reserves in Kom Tum province have the largest area of primary forests in Vietnam. These Natural Reserves are established to preserve primary forests and rare flora and fauna species such as precious timber species, tigers, elephants, etc.

Protected Areas in Se San River Basin

Name of Natural Reserve	Location	Management Level	Decision of Establishment	Area (Ha)		Objective
				Total	Forest	
Chu Mo Ray	Kon Tum	Provincial. Management Board	65/HDBT-1982.	48,658	36,352	Natural reserve to protect the tropical eco-landscape and big-sized mammals such as tigers, elephants, Bos banteng ,

						Pygathrix, Artiodactyla and precious timbers
Ngoc Linh	Kon Tum	Provincial.	194/CT -1986	51,000	38,000	Natural reserve to protect precious mountainous timbers, endemic birds and Ngoc Linh Ginseng
Kon Ka King	Gia Lai	Provincial	194/CT -1986	28,000	19,000	Natural reserve to protect mountainous eco-landscape and precious timbers .
Kon Cha R'ng	Gia Lai	Provincial	104/CT	16,000	11,000	Natural reserve to protect mammals and precious flora species
Dalag forest in Kon Tum	Kon Tum	Provincial				To protect precious wood species

1.5 Has there been an increase or a reduction in the forest cover in the catchment ? Try to find support for your argument with statistics.

There is a reduction in the forest cover in the Se San river basin.

Forest in Kon Tom Province (ha)

	2002	2003	2004	2005
Total of Forest	631,276	629,942	630,804	629,261
Natural Forest	602,109	598,350	597,959	597,661
Planted Forest	29,167	31,592	32,845	31,600

Below some more detailed questions about various specific environmental issues in the basin

1.6 Any major watershed/soil and water conservation projects been taken up in the basin?? The impacts and status

- Intergrated Water Use and Water Resource Protection Plan of Sesan River Basin. MARD.

It's has not been published yet.

- Project Forest conservation and development. JICA.

1.7 To what extent is the management of surface and ground waters integrated? (question from D6.3)

The National Water resource Strategy shows: "To combine the exploitation with rational use of surface water and underground water sources; attach importance to the protection and preservation of underground water sources; restrict the exploitation of underground water where surface water is exploitable".

In fact, groundwater is one of the factors when the regulation rules for hydropower operation is established.

1.8 To what extent are water related ecosystems protected and restored? (question from D6.3) Are water related ecosystems rare or threatened by extinction in the basin; have the state signed international or national conventions to protect such environments such as the RAMSAR convection?

In the basin there is not any water related ecosystems protected and restored

1.9 Have management plans for vulnerable riverine vegetation zones and species been established and implemented?

No, there is not any management plans for vulnerable riverine vegetation zones in the basin

1.10 Have there been a reduction or /increase in flow volume/water level over the last 10-20 years?

The change of flow volum is not clear

The flow volum of Se San river at Kon Tum station

<i>Year</i>	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
1978	36.6	21.6	23.6	24.1	30.2	42.3	79.5	193	241	150	115	80.2	1037.1
1979	53.4	36.6	26.2	27.0	64.5	157	177	316	198	226	144	86.7	1512.4
1980	60.2	44.4	32.4	27.1	71.7	84.7	111	107	184	232	283	115	1352.5
1981	76.9	51.8	39.4	41.2	53.0	154	108	187	107	260	280	152	1510.3
1982	85.2	56.2	39.5	39.1	33.7	99.4	128	118	196	115	79.5	55.4	1045.0
1983	38.3	28.4	21.6	17.2	33.9	53.7	55.7	132	98.9	284	209	94.4	1067.1
1984	68.0	49.8	37.0	52.1	52.7	127	79.2	235	226	211	229	127	1493.8
1985	78.9	58.2	45.1	46.7	48.8	101	94.6	159	168	148	109	91.4	1148.7
1986	60.8	43.5	31.8	30.2	106	59.8	83.2	21.3	206	236	131	166	1175.6
1987	76.1	54.2	40.7	28.9	28.5	47.2	68.1	118	147	83	133	73.5	898.2
1988	44.3	35.5	29.7	27.9	45.4	73.7	60.3	70.8	69.8	250	119	63	889.4
1989	59.1	41.8	35.8	35.8	77	70.3	130	161	179	125	86	64.4	1065.2
1990	44.4	31	26.3	25	56.4	90.9	76.5	110	144	305	202	101	1212.5
1991	70.5	55	46.9	38.8	40.8	54.3	83.1	153	181	217	114	92.2	1146.6
1992	65.6	43.4	37.4	33.1	46.4	61.7	65.6	131	132	224	154	82.8	1077
1993	56.5	45	38.8	34.9	44.9	35.2	58.4	97.6	105	167	93.5	114	890.8
1994	61.1	45.6	37.4	40.3	48.9	59.2	161	170	345	142	89.4	72.2	1272.1
1995	53.1	46.1	35.6	30.1	31.8	36.3	57	102	124	172	227	100	1015
1996	64.6	52.3	37.2	40	58.9	64	101	144	290	215	434	235	1736
1997	95.2	66.1	47.3	53.7	66	51.4	87.5	170	191	164	114	65.3	1171.5
1998	44.0	33.8	25.7	19.9	25.9	26.5	24.5	34.9	66.8	104	246	130	782.0
1999	68	48.2	40	41.3	73.2	87.7	93.9	161	144	200	262	168	1387.3
2000	90.5	67.8	44.4	51.1	57.7	76.6	163	176	221	193	190	111	1442.1
2001	77.2	56.2	47.3	35.1	58.9	55.4	100	196	157	138	96.5	70.8	1088.4

1.11 Are erosion and sedimentation monitored on a regular basis in the basin? [Give a brief description of who is responsible, what is monitored, how frequent in time and space.](#)

There is no erosion and sedimentation monitored on regular basis in the basin.

1.12 Have there been established mechanism to licence and control effluent discharges from point and non-point sources? [Describe the mechanism, and inform of responsibilities.](#)

In the Se San basin, the mechanism to licence and control effluent discharges is according to Decree No.149/2004/ND-CP of July 27,2004 on the issuance of permits for water resources exploration, exploitation and use, or for discharge of waste water into water source; and Circular No. 02/2005/TT-BTNMT of June 24, 2005, guiding the Decree No.149/2004/ND-CP.

Article 5.- Permit-issuance grounds

1. The issuance of permits for water resource exploration, exploitation and use, or for discharge of wastewater into water sources must be based on the following grounds:

a/ The Law on Water Resources and relevant legal documents;

b/ The national, branch, regional and local socio-economic development strategies;

c/ The river-basin plannings already approved by competent State agencies under law provisions; in cases where such plannings are not yet available, the permit issuance shall be based on the potentials of water sources and must ensure that water sources shall not be exhausted or polluted;

d/ The competent State agencies' reports on the evaluation of dossiers of application for permits for water resource exploration, exploitation and use, or discharge of wastewater into water sources.

2. Apart from the grounds defined in Clause 1 of this Article, the issuance of permits for discharge of wastewater into water sources must also be based on:

a/ The wastewater standards; in cases where such standards are not yet available, the guidance of the Ministry of Natural Resources and Environment shall apply;

b/ The water sources' capability of accommodating wastewater;

c/ The sanitation-protection zone for the water-exploitation area, as defined by the competent State agency.

Article 13.- Competence to issue, extend, change terms, and adjust contents of, invalidate and withdraw permits

1. The Ministry of Natural Resources and Environment shall issue, extend, change terms, and adjust contents of, invalidate and withdraw permits in the following cases:

a/ Exploiting, using water resources for important national projects already approved by the Prime Minister;

b/ Exploring, exploiting underground water for projects with the flow of 3,000 m³/day and night or more;

c/ Exploiting, using surface water for agricultural production with the flow of 2m³/second or more;

d/ Exploiting, using surface water for electricity generation with the capacity of 2,000 kW or more;

e/ Exploiting, using surface water for other purposes with the flow of 50,000 m³/day and night or more;

f/ Discharging wastewater into water sources with the flow of 5,000 m³/day and night or more.

2. The provincial-level People's Committees shall issue, extend, change terms and adjust contents of, and invalidate and withdraw permits in cases not defined in Clause 1 of this Article.

Article 14.- Agencies receiving and managing dossiers and permits

1. The Department for Water Resources Management under the Ministry of Natural Resource and Environment shall be responsible for receiving and managing dossiers and permits issued by the Ministry of Natural Resources and Environment.

2. The provincial/municipal Services of Natural Resources and Environment shall be responsible for receiving and managing dossiers as well as permits issued by the provincial-level People's Committees.

Article 15.- Responsibilities and powers of permit-issuing agencies

Permit-issuing agencies shall have the following responsibilities and powers:

1. To issue, extend, change terms and modify contents of, invalidate, withdraw permits strictly according to their competence defined in Article 13 of this Decree.

2. To notify in writing the applying organizations and individuals of the refusal to issue, extend, change terms or adjust the contents of, permits, clearly stating the reasons therefor.

3. To inspect, examine permit owners in performance of their obligations prescribed in Article 18 of this Decree.

Article 16.- Responsibilities, powers of agencies receiving and managing dossiers and permits

Agencies receiving and managing dossiers and permits shall have the following responsibilities and powers:

1. To receive dossiers and guide the procedures of application for permits.
2. To request organizations and individuals applying for permits to supplement their dossiers according to regulations.
3. To evaluate the permit-application dossiers and take responsibility for evaluation results.
4. To fill in the procedures for submission of dossiers to the competent State agencies for issuance of permits.
5. To archive dossiers related to the issuance of permits for water resource exploration, exploitation and use, and discharge of wastewater into water sources.

Article 17.- Rights of permits owners

Permit owners shall have the following rights:

1. To explore, exploit and use water resources, discharge wastewater into water sources according to the provisions of their permits.
2. To have their legitimate rights and interests prescribed in their permits protected by the State.
3. To be compensated by the State in cases where their permits are withdrawn ahead of schedule for national defense or security reasons or for national or public interests under law provisions.
4. To request organizations and individuals to pay compensations for damage to their legitimate rights and interests regarding water resource exploration, exploitation and use, and/or discharge of wastewater into water sources according to law provisions.
5. To propose the permit-issuing agencies to extend, change terms or adjust contents of, permits according to regulations.
6. To return permits according to regulations.
7. To lodge complaints or initiate lawsuits about acts of infringing upon their legitimate rights or interests in water resource exploration, exploitation and use, and/or discharge of wastewater into water sources according to law provisions.
8. To use data and information on water resources according to current regulations.
9. To transfer, lease, bequeath, mortgage or provide guaranty with, assets invested in water resource exploration, exploitation and use, and/or discharge of wastewater into water sources under law provisions.

Article 18.- Obligations of permit owners

Permit owners shall have the following obligations:

1. To observe law provisions on water resource and the provisions of their permits.
2. To pay fees for the issuance of permits for underground water exploration, underground water exploitation and use, surface water exploitation and use, or discharge of wastewater into water sources; to pay natural resource tax and environment protection charges for wastewater; to pay compensations for damage caused by them, according to law provisions.
3. Not to obstruct or cause damage to, the lawful water resource exploration, exploitation and use, discharge of wastewater into water sources by other organizations or individuals.
4. To protect water sources in the areas of water resource exploration, exploitation and use, or discharge of wastewater into water sources.

5. To provide complete and truthful data and information on water resources in the areas under their exploration, exploitation and use, and discharge of wastewater into water sources at the requests of competent State agencies.
6. To take measures to ensure safety, prevent and overcome incidents in the course of water resource exploration, exploitation and use, and discharge of wastewater into water sources; to promptly report thereon to the permit-issuing agencies for appropriate handling measures.
7. To adopt measures to supervise the process of exploring, exploiting and using water resources, and discharging wastewater into water sources under the guidance of the competent State agencies.
8. Not to arbitrarily dismantle or destroy projects or equipment under the entire people's ownership, which are related to water resource exploration, exploitation and use or discharge of waste water into water sources when their permits cease to be effective. Within sixty (60) days, to remove all the properties of their own and of the involved parties from areas subject to water resource exploration, exploitation and use or discharge of wastewater into water sources; to rehabilitate the environment and land according to law provisions.
9. To create conditions for organizations and individuals permitted by competent State agencies to conduct activities of scientific research, investigation and/or evaluation of water sources in their respective permitted areas.
10. To observe the regime of reporting on the results of water resource exploration, exploitation and use as well as discharge of wastewater into water sources to competent State agencies under law provisions.

Article 22.- Order and procedures for issuance of permits for discharge of wastewater into water sources

1. Organizations and individuals applying for permits for discharge of wastewater into water sources shall submit two (2) dossier sets at the dossier-receiving agencies defined in Article 14 of this Decree. Such a dossier includes:
 - a/ The application for permit;
 - b/ The results of analysis of the quality of water sources that receive wastewater, according to the State's regulations at the time of application for the permit;
 - c/ The regulations on sanitation-protection zone (if any), issued by the competent agency for the area where wastewater is to be discharged;
 - d/ The scheme on discharge of wastewater into water sources, enclosed with the procedures for operation of the wastewater treatment system; in cases where wastewater is being discharged into water sources, there must be a report on the current wastewater-discharge situation, enclosed with the results of analysis of wastewater composition and written certification of the payment of environment protection charges for wastewater;
 - d/ The map of the area where wastewater is discharged into water sources, of 1/50,000- 1/25,000 scale;
 - e/ The report on assessment of environmental impacts already approved by competent agency, for cases subject to assessment of environmental impacts under law provisions;
 - f/ The notarized copies of the certificate of, or valid papers on, the right to use land where the wastewater-discharge project is to be located, according to the Land Law's provisions. In cases where the land for wastewater-discharge project location falls beyond the land use right of the applying organization or individual, there must be a written land-use agreement between the wastewater-discharging organization or individual and the organization or individual having the land use right, which must be certified by the competent People's Committee.
2. The permit-issuing order is provided for as follows:

a/ Within five (5) working days after receiving dossiers, the dossier-receiving agencies shall have to consider and examine them; in cases where dossiers are invalid, the permit-issuing agencies shall notify such to the applying organizations or individuals for dossier completion according to regulations;

b/ Within thirty (30) working days after receiving complete and valid dossiers as prescribed in Clause 1 of this Article, the dossier-receiving agencies shall have to evaluate them, conduct field inspection when necessary and, if obtaining enough permit-issuance grounds, submit the dossiers to the competent agencies for issuance of permits; in cases where the permit-issuance conditions are not fully met, the dossier-receiving agencies shall return the dossiers to the applying organizations or individuals and notify the latter of the reasons for non-issuance of permits.

1.13 Is water quality monitored on a regular basis in the basin (including water temperature, nitrate pollution, phosphor pollution, pesticides, toxic chemicals, microbial pollution, organic matter, heavy metals, algae)? Give a brief description of who is responsible, what is monitored, how frequent in time and space.

There are two systems to control water quality:

- Hydro-station belonging National hydrometeorological network: Kon Tum station, the monitored parameters of surface water are showed in the below table, 1 time per month.

Monitored Water quality parameters

No	Parameters
1	DO
2	COD
3	ΣFe
4	SiO_2
5	Cl^-
6	CO_3^{2-}
7	HCO_3^-
8	SO_4^{2-}
9	Na^+
10	K^+
11	Ca^{2+}
12	Mg^{2+}

13	Ph
14	Alkali
15	$\Sigma \text{ ion}^+$
16	$\Sigma \text{ ion}^-$

- The water quality of surface and underground water is monitored one time per five years as one of the issues of “Existence of Environment Report”, which is implemented by the DoNRE. The monitored parameters are flowed Vietnamese standards (See 1.14)

1.14 Existence of water quality standards, for effluent discharges, minimum river quality targets? If such standards exist, describe them.

There are different Vietnam Standards for fresh water and for effluent discharges:

TCVN 5942 – 1995 - *Water quality - Surface water quality standard*

TCVN 5944 – 1995 - *Water quality –Ground water quality standard*

TCVN 5945 – 1995 – *Industrial waste water – Discharge standards*

TCVN 6772 – 2000 - *Water quality – Domestic wastewater standards*

TCVN 6773 – 2000 - *Water quality – Water quality guidelines for irrigation*

TCVN 6774 – 2000 - *Water quality –Fresh-water quality guidelines for protection of aquatic life*

TCVN 6980 – 2001 - *Water quality –Standards for industrial effluents discharged into rivers using for domestic water supply*

TCVN 6981 – 2001 - *Water quality - Standards for industrial effluents discharged into lakes using for domestic water supply*

TCVN 6982 – 2001 - *Water quality - Standards for industrial effluents discharged into rivers using for water sport and recreation*

TCVN 6983 – 2001 - *Water quality - Standards for industrial effluents discharged into lakes using for water sport and recreation*

TCVN 6984 – 2001 - *Water quality - Standards for industrial effluents discharged into rivers using for protection of aquatic life*

TCVN 6985 – 2001 - *Water quality - Standards for industrial effluents discharged into lakes using for protection of aquatic life*

Examples:

TCVN 5942 – 1995 - *Water quality - Surface water quality standard*

No	Parameters	Units	Standards	
			A	B

1	pH	-	6 đến 8,5	5,5 đến 9
2	BOD5 (20oC)	mg/l	< 4	< 25
3	COD	mg/l	>10	>35
4	DO	mg/l	≥ 6	≥ 2
5	Suspended sediment	mg/l	20	80
6	Asen	mg/l	0,05	0,1
7	Bari	mg/l	1	4
8	Cadimi	mg/l	0,01	0,02
9	Pb	mg/l	0,05	0,1
10	Crom (VI)	mg/l	0,05	0,05
11	Crom (III)	mg/l	0,1	1
12	Cu	mg/l	0,1	1
13	Zn	mg/l	1	2
14	Mangan	mg/l	0,1	0,8
15	Niken	mg/l	0,1	1
16	Fe	mg/l	1	2
17	Hg	mg/l	0,001	0,002
18	Thiếc	mg/l	1	2
19	Amoniac (tính theo N)	mg/l	0,05	1
20	Florua	mg/l	1	1,5
21	Nitrat (ΣN)	mg/l	10	15

22	Nitrit (ΣN)	mg/l	0,01	0,05
23	Xianua	mg/l	0,01	0,05
24	Phenola (Σ)	mg/l	0,001	0,02
25	Oil	mg/l	không	0,3
26	Chất tẩy rửa	mg/l	0,5	0,5
27	Coliform	MPN/100ml	5000	10000
28	Chemical Pertilizer (except DDT)	mg/l	0,15	0,15
29	DDT	mg/l	0,01	0,01
30	Radioactive \square	Bq/l	0,1	0,1
31	Radioactive \square	Bq/l	1,0	1,0

TCVN 6980 – 2001 *Water quality – Standards for industrial effluents discharged into rivers using for domestic water supply*

No	Parameters	Q > 200 m ³ /s			Q = 50 ÷ 200 m ³ /s			Q < 50 m ³ /s		
		F1	F2	F3	F1	F2	F3	F1	F2	F3
1	Color , Co – Pt when pH = 7	20	20	20	20	20	20	20	20	20
2	Smell	No smell	No smell	No smell	No smell	No smell	No smell	No smell	No smell	No smell
3	BOD ₅ (20 °C), mg/l	40	35	35	30	25	25	20	20	20
4	COD, mg/l	70	60	60	60	50	50	50	40	40
5	Suspended sediment, mg/l	50	45	45	45	40	40	40	30	30
6	Asen, As, mg/l	0.2	0.2	0.2	0.15	0.15	0.15	0.1	0.05	0.05
7	Chi, Pb, mg/l	0.1	0.1	0.1	0.08	0.08	0.08	0.06	0.06	0.06
8	Oil, mg/l	5	5	5	5	5	5	5	5	5
9	Animal oil, mg/l	20	20	20	10	10	10	5	5	5
10	Cu, mg/l	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2
11	Zn, mg/l	1	1	1	0,7	0,7	0,7	0,5	0,5	0,5

12	Phospho, mg/l	10	10	10	6	6	6	4	4	4
13	Clorua, Cl ⁻ , mg/l	600	600	600	600	600	600	600	600	600
14	Coliform, MPN/100 ml	3000	3000	3000	3000	3000	3000	3000	3000	3000
Note: Q – river flow, m ³ /s; F - discharge, m ³ /days (24 h); F1 from 50 m ³ /days to <500 m ³ / days, F2 from 500 m ³ /days to < 5000 m ³ /days, F3 ≥5000 m ³ / days										

TCVN 6984 – 2001 Water quality – Standards for industrial effluents discharged into rivers using for protection of aquatic life

No	Parameters	Q > 200 m ³ /s			Q = 50 ÷ 200 m ³ /s			Q < 50 m ³ /s		
		F1	F2	F3	F1	F2	F3	F1	F2	F3
1	Color, Co – Pt when pH=7	50	50	50	50	50	50	50	50	50
2	Smell	Light smell	Light smell	Light smell	Light smell	Light smell	Light smell	Light smell	Light smell	Light smell
3	Suspended sediment, mg/l	100	100	100	90	80	80	80	80	80
4	pH	6-8.5	6-8.5	6-8.5	6-8.5	6-8.5	6-8.5	6-8.5	6-8.5	6-8.5
5	BOD ₅ (20 °C), mg/l	50	45	40	40	35	30	30	20	20
6	COD, mg/l	100	90	80	80	70	60	60	50	50
7	Asen, As, mg/l	0.1	0.1	0.1	0.08	0.08	0.08	0.05	0.05	0.05
8	Cadmi, Cd, mg/l	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
9	Chi, Pb, mg/l	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
10	Fe, mg/l	5	5	5	4	4	4	3	3	3
11	Xyanua, CN, mg/l	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05
12	Oil, mg/l	10	5	5	10	5	5	5	5	5
13	Animal oil, mg/l Clorua, Cl ⁻ , mg/l	20	20	20	20	10	10	10	10	10
14	Organic Phospho, mg/l	1	1	0.8	0.8	0.5	0.5	0.5	0.5	0.5
15	Total Phospho, mg/l	10	8	8	6	6	6	5	5	4
16	Clorua, Cl ⁻ , mg/l	1000	1000	1000	800	800	800	750	750	750
17	Surface substance, mg/l	10	10	10	5	5	5	5	5	5
18	Coliform, MPN/100 ml	5000	5000	5000	5000	5000	5000	5000	5000	5000
19	PCB, mg/l	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01

Note: Q – flow, m³/s; F - discharge, m³/days (24 h); F1 from 50 m³/days to <500 m³/ days, F2 from 500 m³/days to < 5000 m³/days, F3 ≥5000 m³/ days

1.15 Does the Pollution Control board use the results of water quality to influence policy decisions to curb pollution, if no, what are the reasons?

Yes

1.16 Are flood risks taken into account in broader land / water use management and environmental impact assessments?

Yes. Flood risks and management is included as a factor in connection to irrigation and hydropower development

Most of the large regulation dams in Se San basin are multipurposed and flood protection considerations were important in the planning processes and for the decisions to build the dams.

Projects Integrated Water Use and Water Resource Protection Plan of Sesan River Basin and National Hydropower Plan are the documentation of these.

2. Water allocation in the basin should in principle have been agreed between all relevant stakeholders/sectors within a given framework

Example guiding questions:

2.1 Is there a decentralized water allocation management system in the river basin? [Describe briefly the water management system.](#)

According to the Water Law (1998):

Article 59.- Competence in ratifying the general planning and projects on water resource

1. The National Assembly shall decide on the policy of investing in important national works on water resource.
2. The Government shall ratify the list and general planning of the major river basins and important projects on water resource.
3. The Ministry of Agriculture and Rural Development shall ratify the general planning on river basins, the general planning on water conservancy on assignment from the Government.
4. The Ministries, ministerial level agencies, the agencies attached to the Government, the People's Committees of the provinces and cities directly under the central government, basing themselves on the planning on water resource shall ratify the draft projects on water resource on assignment of powers and allocation of responsibilities from the Government.
5. The Government shall provide for the assignment of powers and the allocation of responsibilities to ratify the plans and draft projects stipulated in Items 2,3 and 4 of this Article.

Recently the MoNRE has the responsibility on water resources management. Some important offices in WRM as Vietnam Mekong River Committee, Water Resource Management agency (WRMA) now belong to MoNRE. Main role of WRMA is state management on water resources, including water resource planning for the river basins.

The water resource planning for the river basin consists: a water use concept for the main river, water resource plan for each fields, water resource protection and natural hazards prevention.

In fact MoNRE orders MARD to set up the river basin planning. There are some basins for which the water resource planning are completed such as: Dong Nai, Ba, North of Center region.

MoNRE is a licensing authority for water use. Though recently the water supply works and irrigation construction are undertaken by MARD, the Hydropower project by Ministry of Industry, etc; but MoNRE controls authorization.

2.2a Is there an inter-ministerial co-ordinating body? [If so state the responsibilities and the authority of the c-ordinating body.](#)

Article 63.- National Water Resource Council

1. The Government shall set up the National Water Resource Council to provide consultancy for the Government in the important decisions on water resource that come under the tasks and powers of the Government.
2. The National Water Resource Council shall be composed of a President of the Council who is a Deputy Prime Minister, a standing member who is the Minister of Agriculture and Rural Development,

and other members who represent a number of Ministries, branches and localities together with a number of scientists and specialists.

3. The concrete tasks and powers of the National Water Resource Council shall be defined by the Government.

2.2b Are there local co-ordinating bodies? If so state the responsibilities and the authority of the co-ordinating body.

The People's Committees of the provinces and cities directly under the Central Government shall take responsibility for conducting State management over water resources within their localities as prescribed by this Law, other regulations of law and as assigned by the Government.

The People's Committees of the provinces and cities directly under the central government, basing themselves on the planning on water resource shall ratify the draft projects on water resource on assignment of powers and allocation of responsibilities from the Government.

2.3 What are the mechanisms that exist for water allocation in the basin, who is consulted and who makes decisions? Describe the mechanisms.

Article 20.- Regulating and distributing water resource

1. The regulation and distribution of water resource for use puposes must be based on the planning of the river basin and the real potential of the water source and must ensure the principle of fairness, reasonability and priority in the quantity and quality of water for living.

2. In case of water shortage, the regulation and distribution must give priority to the living purpose. For other use purposes, the regulation and distribution shall be made according to the percentage defined in the planning of the river basin and the principle of ensuring fairness and reasonability.

The Government shall make concrete provisions on the regulation and distribution of water resource.

See also 2.1

2.4 Does the system of water allocation build on local knowledge? Is local knowledge taken into account, describe the situation?.

Water allocation is not based on local knowledge as such but are based instead on (local) expert knowledge, ie minimum flow requirement, maximum storage capacity, etc.

2.5 Are traditional water rights respected when allocation takes place? Refer to the general practice, preferably with references to named cases.

Watershed management/water use has been very much determined by hydropower interests. In Water Law, indicating that all interests have to be taken into consideration within watershed management.

Article 20.- Regulating and distributing water resource

1. The regulation and distribution of water resource for use puposes must be based on the planning of the river basin and the real potential of the water source and must ensure the principle of fairness, reasonability and priority in the quantity and quality of water for living.

2. In case of water shortage, the regulation and distribution must give priority to the living purpose. For other use purposes, the regulation and distribution shall be made according to the percentage defined in the planning of the river basin and the principle of ensuring fairness and reasonability.

The Government shall make concrete provisions on the regulation and distribution of water resource.

Article 29.- Exploitation and use of water sources for hydro-electricity

1. The State encourages the exploitation and use of water sources for hydro-electricity.

2. The building of hydroelectric works must comply with the planning of the river basin and the prescriptions on environmental protection.

3. Organizations and individuals that exploit and use water sources for hydro-electricity must comply with the process of operating and regulating water ratified by the competent State agency, ensure the integrated use of the water sources except for the exploitation and use of water sources for hydro-electricity on small scale for family use.

2.6 Existence of defined water rights? State the rights

See 2.5

2.8 How are disputes resolved? In these disputes which sectors dominate and why?

Article 62.- Settling disputes on water resource

1. The State encourages conciliation in the disputes on water resources.

The People's Committees of the communes, wards and townships have the responsibility to coordinate with the agencies, organizations and individuals in the reconciliation of the disputes on water resources in conformity with the prescriptions of law.

2. The competent State agency which has issued a certain kind of permit on water resource shall have to settle complaints arising from the carrying out of that permit. In case the person in question disagree with the decision on settling the complaint, he has the right to send the complaint to the competent State agency or start a legal action at the Court as prescribed by law.

3. Other disputes on water resources shall be settled according to prescriptions of law.

2.9 Are the roles and responsibilities of the cooperative institutional arrangements clearly defined ? (central and local) question in the template for D6.3)

In general the roles and responsibilities are defined by the various ministries and directorates. But sometimes it's not well defined. There is also a lack of coordination among sectors involved in the water management planning.

2.10 What changes have been made in water management in the recent years (Eg. PIM in Tungabhadra a major shift in water management). Describe the possible outcomes.

- The State management function on water resource of the Ministry of Agriculture and Rural Development is transferring to MoNRE.
- The National Strategy on Water Resource until 2020 has been published in 2006
- The new Water Law is editing

3. Transboundary management in the basin

Guiding questions:

3.1 Does the basin have any transboundary issues/problems? If yes, describe the issues/problems.

The main transboundary problems in the Se San basin are derived from the management of the hydropower reservoirs, just at the Vietnam border with Cambodia. The main cross-border water resource issue is the downstream impacts of the hydropower plants in Vietnam, in particular the releases from Hydropower Dams, in Ratanakiri and Stung Treng Provinces in north-eastern Cambodia.

3.2 Does any legal agreement exist between different provinces or countries that share the water resources at basin level (for e.g the Bachawat Tribunal in TB) (a table of such agreements, year constituted, by whom??, current status?? Etc)

Se San River is a tributary to Mekong River, and the Mekong River Commission (MRC) attempts to negotiate a series of trans-boundary water allocation rules to achieve a reasonable and equitable utilization of the Mekong River waters, as envisioned in the 1995 Mekong Agreement. As part of the co-operation within MRC, the Se San hydropower development in Vietnam is now based on the Agreement on Co-operation for the Sustainable Development of the Mekong River Basin and associated rules and procedures, which represent an important legal framework for hydropower development on the river. Vietnam has now notified Cambodia and the MRC of the hydropower projects on Se San River.

For the prevention of further negative impacts on Se San River, Vietnam and Cambodia have also set up the Se San River Water Management Committee. The two parties have also established mechanisms of regular information exchange, emergency alerts on the flow regime, operating process and discharge of water from the hydropower plants, as well as flood alerts and river water quality control.

3.3 Are there examples where legal agreements between different sectors or provinces have not been respected? No

3.4 What is the general role of different agencies in negotiations (central, state, court of law, informal bodies)

Water law shows:

Article 56.- Settling disputes on international water sources

In settling disputes on international water sources related to countries in the river basin, besides applying the

principles set in Article 53 of this Law, the following prescriptions shall also have to be complied with:

1. All disputes on sovereignty in the basic survey, protection, exploitation and use of international water sources, in the prevention, combat against and overcoming the harmful effects of water among countries sharing the same water sources including Vietnam shall be settled by the Vietnamese State and the related States on the basis of negotiations in conformity with the international conventions which the Socialist Republic of Vietnam has signed or acceded to and with international practice;
2. All disputes on international water sources arising in the river basin involving an international river basin organization with the participation of the Socialist Republic of Vietnam shall be settled by the Vietnamese State and the related States in the framework of that international river basin organization as prescribed by the international conventions which the Socialist Republic of Vietnam has signed or acceded to.

In Se San basin, the Mekong River Commission (MRC) attempts to negotiate a series of trans-boundary water allocation rules to achieve a reasonable and equitable utilization of the Mekong River waters, as envisioned in the 1995 Mekong Agreement. Beside that, Vietnam and Cambodia have also set up the Se San River Water Management Committee. The two parties have also established mechanisms of regular information exchange, emergency alerts on the flow regime, operating process and discharge of water from the hydropower plants, as well as flood alerts and river water quality control.

3.5 Do the states conduct appropriate environmental impact assessments when planning new activities on transboundary waters? (question from D6.3). [Remember justify your conclusions.](#)

It's obligatory to establish EIA reports when planning new activities, including the activities on transboundary waters

In the National Hydropower Plan, the EIA have been established as one of important parts.

The EIA reports are established for every hydropower project in the basin.

A report "Rapid EIA on the Cambodian part of the Se san river due to Hydropower Development in Vietnam" has completed in 2007.

3.6 Have basin/bilateral agreements been fully transposed at the national / provincial / local level? (question from D6.3) [Remember to justify your conclusions.](#)

See 3.2

3.7 Are neighbouring states obliged to notify and consult each other of planned measures? (question in the template for D6.3) [If yes, refer to related legal framework.](#)

Yes. See 'Procedures for Notification, Prior Consultation and Agreement' in "1995 Mekong Agreement and Procedural Rules"

3.8 Do watercourse agreements oblige states to accompany such notification with available technical data and information, including the results of any environmental impact assessment? (question in the template for D6.3). [State the agreement.](#)

Yes. See 3.7

3.9 Are states obliged to exchange data and information? (question in the template for D6.3) [If yes, according to what legal framework, or agreement, as well as what type of data/information and the means of exchange \(dissemination events, reports etc\)?](#)

Yes. See "Procedures for Data and Information Exchange and Sharing" in "1995 Mekong Agreement and Procedural Rules"

The objectives of the Procedures are;

- Operationalize the data and information exchange among the four MRC member countries;
- Make available, upon request, basic data and information for public access as determined by the NMCs concerned;
- Promote understanding and cooperation among the MRC member countries in a constructive and mutually beneficial manner to ensure the sustainable development of the Mekong River basin.

Major types of data and information: Water resources; Topography, Natural resources; Agriculture; Navigation and Transport, Flood Management and Mitigation; Infrastructure; Urbanization/Industrialization; Environment/Ecology; Administrative boundaries; Socio-economy; Tourism

4. Stakeholder involvement

Guiding questions:

4.1a Has stakeholder participation been made mandatory in the process through legislation or other government directives? Is there a standardized framework for stakeholder involvement with operational guidelines that have to be followed? Describe the mandatory process.

There is not any specific mandatory legislation for stakeholder participation.

4.1b IF such exist, Is the framework satisfactory? – does it ensure transparency of the process?, is it open for anyone?, does it ensure participation from the poor, marginalized groups, women?

4.2 What initiatives have been taken up by the state agencies to involve stakeholder and end users in water management (in planning, basin management plan preparations, land, water and irrigation management initiatives, new policy changes?

- Public consultation in National Hydropower Plan
- Public consultation in EIA of Hydropower and Irrigation projects

4.3 Is there an enforceable and adequate right of access to information (including environmental information) if yes, describe how, if no, describe the situation.

Yes. See at Decree no 162/2003/ND-CP about Regulation on collecting, managing, exploiting and using data and information of water resources; Law of Environmental Protection; Law of Water resources...etc...

4.4 In practice to what extent do public authorities make IWRM related information available to the public where requested ? (question from D6.3)

DoNRE, DARD and others all have information centers. There are documents about WRM and relative field. Yearly, DoNRE reports about environment situation, include water used planning, send to MoNRE. Way of communication: departmental LAN, conferences, meetings, workshops between departments and districts. Most of information are not showed to the public. There are DoNRE's website to online conference. This website is used mainly to answer people's questions about land use policy. It's necessary to pay for the department if require for documents. If there are information about environment (symnotical information) needed to inform public, will use the media. In fact, there is not much information like this. The EIA of the projects in the basins is informed to the local public by public consultation. However these activities have just started few years ago.

4.5 Do the authorities publish the facts and analysis of facts which it considers relevant and important in framing major policy proposals related to IWRM? (question from D6.3) Yes, in the cases which it's necessary and where requested.

4.6 To what extent do agencies involved in IWRM make available to the public a clear description of its decision making processes including opportunities for participation? (question from D6.3)

See 4.4

4.7 Are the states party to any international agreements related to public access to information? (question in the template for D6.3)

1995 Mekong Agreement

5. Capacity building is the key to effective IWRM

Guiding questions:

5.1 What initiatives have been taken up by the state agencies for capacity building of stakeholder in water management?

None

5.2 What measure are in place to build the capacity of staff within public authorities with regard to IWRM? (question from D6.3)

5.3 What is the priority given by the state agencies to capacity building?

5.4 Has any special budget been allocated by the water resources dept. or other relevant agency for capacity building?

5.5 How effective are these training programs (in terms of content, quality,). [Brief description of the efficiency, and why they are effective/not effective.](#) (for e.g in TB basin special courses are set up for farmers to educate about Participatory Irrigation Management

6. Efficient use of water is essential and an important means to resolve water conflicts(?)

Guiding questions:

6.1 What initiatives have been taken up in the basin to improve water use efficiency?

Four hydropower plants (Se san 3, Se san 3A, Se san 4) are under construction following the NHP.

- The EIA reports are established for every hydropower project in the Se San river basin during Feasibility Study. In the EIA report the mitigation measures have to be indicated.

- Rapid EIA on Cambodia part of Se San river basin due to hydropower development in Vietnam have completed by SWEKO international in 2007.

- Re-regulation reservoir Se san 4A is under construction, i.e. the flow out from this reservoir should be kept as close to the Natural Flow as possible.

National Hydropower Plan

6.1a How effective are they? (new cropping patterns, re-use of water through waste water

Four hydropower plants (Se san 3, Se san 3A, Se san 4) are under construction following the NHP.

- The EIA reports are established for every hydropower project in the Se San river basin during Feasibility Study. In the EIA report the mitigation measures have to be indicated.

- Rapid EIA on Cambodia part of Se San river basin due to hydropower development in Vietnam have completed by SWEKO international in 2007.

- Re-regulation reservoir Se san 4A is under construction, i.e. the flow out from this reservoir should be kept as close to the Natural Flow as possible.

Treatment measures, promoting multiple uses of water etc)

Promoting multiple uses of water

6.2 Are there measures to re-use water (water treatment and re usage)? [Describe the measures.](#)

No

6.3 Does any type of co-ordination exist between various departments to address water use efficiency ?

[Describe the co-ordination.](#)

There are two Ministries are involved: the Ministry of Agriculture and Rural Development and the Ministry of the Natural Resource and Environment and EVN as water user.

6.4 Are there any monitoring devices/systems to record and control water use?

Whose controls is it, and is it accepted by all involved parties?

No

7. Water should be treated as having an economic and social value

Guiding questions:

7.1 What initiatives are present to treat water as an economic and social good? [Is this regarded as an important principle in the basin? In such case by whom?](#)

Water is an economic good given its importance for hydropower production in

Se San. The definition of social good is clear, infrastructure and living condition of the local people is improved. Recognition is given to other water uses than hydropower in regulation of the catchment (especially fishery in the reservoirs).

The hydropower development represents an annual hydropower production of 5400 GWh/year.

7.2 Are the human and the animal health situation along the river basin carefully monitored? [Describe how they are monitored and who is responsible for the task.](#)

No

7.4 How effective are the emergency alleviation and response systems in limiting risk and protecting people, property and the environment? Describe the response system, and its efficiency.

The response system is weak. See 7.8

7.6a Is there pricing of water, or any such initiatives coming up??

No

7.6b Do farmers pay for water used? Do households pay for water?

Farmers and households pay very low for water use, mainly for irrigation.

In the urban areas the household pay for fresh water.

7.6c Are some categories of water users exempted from paying water use tariffs (E.G., In TB, the socially backward groups are exempted from paying membership fees to WUCS)

Some categories of water users are exempted from paying water use tariffs such as poor and minority groups.

7.7 Are traditional water uses allowed in the basin?

Yes

7.8 Does the law provide an effective emergency alleviation and response systems in limiting risk and protecting people, property and the environment?

The Water Law shows:

Chapter IV

PREVENTING, COMBATING AND OVERCOMING THE CONSEQUENCES OF FLOODS AND OTHER HARMFUL EFFECTS OF WATER

Article 36.- Responsibility and duty to prevent, fight and overcome the consequences of flood and other harmful effects of water

1. State agencies, economic organizations, political organizations, socio-political organizations, social organizations, People's Armed Forces units and all individuals have the duty to take part in the prevention, fight against and overcoming the consequences of flood and other harmful effects of water.
2. The Government shall decide and direct the Ministries, branches and the People's Committees at various levels to carry out measures to prevent, fight and overcome the consequences of flood and other harmful effects of water.
3. The Ministries, branches and the People's Committees at various levels shall, within their tasks and powers, decide and organize the implementation of measures to prevent, fight and overcome the consequences and other harmful effects of water.

Article 37.- Setting norms and plans to prevent and combat floods

1. The State managing agency on water resource has the duty to set the norms for preventing and fighting floods in each area of the river basin as basis for the planning and building constructions and programs for preventing and fighting floods in the river basin.
2. The Ministries, branches and People's Committees at various levels shall base themselves on the norms for preventing and combating floods in each area of the river basin and the program of preventing, and combating floods in the river basin to work out plans of each Ministry, branch and locality to prevent and combat floods.
3. Basing themselves on the general plan for preventing and combating floods, the Ministries, branches and People's Committees at various levels shall work out their own plans of preparing manpower, materials, means and other necessary conditions to handle the situation when flood occurs.
4. The State managing agency in meteorology has the responsibility to organize the observation and forecast and issue timely information on rain, flood and the rising of sea water on the national scale.

Article 38.- General plan of distributing the population, distributing production and building the infrastructure in the flood-prone regions

1. The planning of the population, distributing production and building the infrastructure in the flood-prone regions must comply with the general plan for prevention and combat against floods of the river basin and with the characteristics of floods in each region.
2. The building of stores for food, noxious substances, explosives, fuel, essential materials and other important assets in the area of flood diversion, flood delay, and areas prone to flood must comply with the overall plan of preventing and combating flood of the river basin and must have the permission of the competent State agency.

Article 39.- Water reservoirs and the preventing and fight against flood

1. The building of water reservoirs must comply with the provisions of Article 5 of this Law and ensure the norms for prevention and fight against flood.

2. Organizations and individuals that manage, exploit and protect the water reservoirs must have a plan to ensure the safety of the construction, to prevent and combat flood at the lower reaches in conformity with the general plan of prevention and combat against flood in the river basin and must strictly carry out the process of operation of the reservoir already approved by the competent State agency.

The Government shall provide for the appointment and assignment of responsibility for each level in operating the major water reservoirs.

Article 40.- Decision on flood diversion and delaying

1. In emergency situations when the dyke system is seriously threatened, the Prime Minister shall decide measures to divert or delay the flood related to the provinces and cities directly under the Government upward according to the plan already approved by the Government; the Presidents of the People's Committees of the provinces and cities directly under the Central Government shall decide measures of flood diversion and delaying in the locality according to the plan already approved by the Prime Minister.

2. The Government shall make concrete provisions for the emergency situations which warrant the diversion or delaying of floods and measures to evacuate the population safely, ensure production and life of the population, overcome the consequence of flood and provide relief for the population of the areas affected by the flood diversion and delaying.

Article 41.- Mobilizing manpower and means for the prevention and combat against flood and overcoming the consequence of flood

1. In emergency situations, the Prime Minister and the Presidents of the People's Committees at various levels have the right to mobilize manpower, materials and means of any organization and individual to rescue victims, rescue constructions and properties threatened or damaged by flood and shall take responsibility for their decision.

2. The mobilized organizations and individuals must carry out the decisions of the competent State agency.

3. Organizations and individuals that have materials and means mobilized according to the decision of the competent State agency shall receive compensation according to prescriptions of law if damage is done to them.

4. If dykes or constructions to prevent and fight against flood or any construction related to the prevention and fight against flood are meeting with accidents or are threatened with accident, the local authorities must mobilize manpower, material and means to protect and rescue them according to the provisions of Article 51 of this Law and must report it to the managing agency of the works and the higher authorities.

5. The Government shall decide and direct the Ministries, branches and the People's Committees at various levels to conduct the overcoming of the consequence of flood.

6. The Ministries, branches and People's Committees at various levels shall, within the ambit of their tasks and powers, have the responsibility to organize the carrying out of measures to overcome the consequence of flood.

Article 42.- Draining flooded areas

1. The People's Committees of the provinces and cities directly under the Central Government frequently subjected to water logging must build and organize the implementation of a plan of drainage in line with the planning of the river basin and the requirement for socio- economic development and the protection of the environment.

2. The Ministries, branches, People's Committees at various levels and the related organizations and individuals have the responsibility to coordinate efforts in carrying out the drainage according to the assignment of responsibilities in the general plan of drainage of the locality.

3. The State shall invest in and support the building, exploitation and protection of the drainage works with priority given to the especially vital areas.

Article 43.- Preventing, combating and overcoming the consequence of drought

1. The State shall invest in and support the building of water conservancy works in the areas frequently affected by drought in order to provide water source for living, production and to prevent and fight forest fires.

2. Organizations and individuals have the duty to take part in the prevention, fight against and overcoming the consequence of drought.

3. The State managing agency on water resource, the People's Committees at various levels have the responsibility to work out the plan and organize and direct effectively the prevention, fight against and overcoming of the consequence of drought.

4. The State managing agency on meteorology has the responsibility to supply in time information and forecast about meteorology in service of the prevention and fight against drought.

Article 44.- Prevention and fight against salinity infiltration, rising and spill of sea water

1. The State shall invest in and support the building of sea dykes and anti-saline and fresh water retaining dams, in the protection and development of protection forests against sea waves, against salinity infiltration and the rising and spilling of sea water.
2. The management and operation of anti-salinity and fresh water retaining dams and water reservoirs, and current regulating works must comply with the process and rules of ensuring the prevention and fight against salinity infiltration.
3. The prospection for and exploitation of underground water in the coastal areas must ensure the prevention and fight against salinity infiltration for the underground water holding layers.

Article 45.- Prevention and fight against hail and acid rain

1. The State managing agency on meteorology shall have to supply in time information and forecast on the possibility of hail and warn the population in time with a view to taking measures of prevention, fight against and reduction of damage.
2. Organizations and individuals shall have to take measures to treat waste gas as prescribed by the law on environmental protection in order to avoid causing acid rain. If damage is caused by acid rain due to untreated gas, compensation shall have to be paid according to prescriptions of law.

Article 46.- Funding to prevent, combat and overcome the consequence of flood, drought and other serious effects of water

Funding to prevent, combat and overcome the serious effects caused by water include:

1. The State budget for the building and reinforcement of dykes and other works to prevent and fight flood and drought and other serious effects caused by water;
2. The reserve State budget to be spent on the overcoming of the consequences of flood, drought and other serious effects of water;
3. The fund for preventing and fighting against flood and storms of the locality contributed by the population according to prescriptions of the Government;
4. Aid from organizations and individuals in the country; from foreign governments, foreign organizations and individuals and international organizations

8. Water management and Gender

Guiding questions:

8.1 a Do any initiatives exist in the basin that encourage women in water management? [If yes, describe the initiatives](#)

No

8.1b If so, how does it work , is this real or just on paper?? E.g. Women Self Help groups

8.2 To what extent are women able to exercise their right to participate in planning ? (question from D6.3)
They have complete right to participate in planning

8.3 Is women representation compulsory in water user societies (In TB, WUCS management should involve one women member)

No, it's not compulsory

8.4 Are NGOs strong and include gender perspective

The NGOs are strong and one of them is Woman Association

General IWRM assessment: Tagus river basin, Portuguese part

Maria Manuela Portela, Marta Machado, IST- Cehidro, Portugal

1. Water as a finite source, protection of the catchment and environment

1.1 Any major pressures in the last 10-20 years (from mining, industrial development, hydropower, land use changes, tourism)

The major water pressures in the Portuguese part of Tejo River basin are related with the irrigation needs, the industrial and urban supplies as presented in the next tables and characterized in task 9.1. Also the hydropower production and the tourist activities need to be considered in the basin.

Table 1 – Water requirements for agriculture (in hm^3) in an average year, in a dry year and in a wet year.

Average year		
Groundwater	Surface water	Total
1400	530	1930
Dry year		
Groundwater	Surface water	Total
1562	592	2154
Wet year		
Groundwater	Surface water	Total
1238	469	1707

Table 2 – Annual water requirements for urban supply and for the industry (in hm^3).

Supply based on the public water distribution networks (hm^3)		
Groundwater intake	Surface water intake	Total
131	212	343
Supply based on own water intakes (only for the industry) (hm^3)		
Groundwater intake	Surface water intake	Total
60	67	127
TOTAL (hm^3)		
Groundwater intake	Surface water intake	Total
191	279	470

1.3 Which sector and/or problem has been the major ‘driver’?

The main water users previously presented are the major “drivers”. The Castelo do Bode dam is also a relevant “driver”. Until the construction of Alqueva dam in the south of Portugal Castelo do Bode was the largest reservoir in the country. It ensures most of the water supply to Lisbon (the capital of Portugal), the flood control in the lower reach of Zêzere River (though to a small extent) and a relevant contribution in terms of electricity production. The reliability of the water supply to the capital is a very relevant “driver”.

1.4 Any pressures that have caused major water (use) conflicts?

There are not major water conflicts, not even regarding the transboundary issues.

In fact the management of the international waters shared between Spain and Portugal has been regulated since the early thirties (nowadays a bi-lateral agreement - the “Albufeira Convention” – is in force), when no water shortness was foreseen, thus not being the source of water conflicts.

1.4a Any new initiatives to protect or conserve the basin environment?

There are not new national parks. The areas with special protection are represented in the next figure (this figure as any other one included in this report can be enlarged).



The land changes in what concerns the forest occupation are presented in the next table and figure (see report from 9.3 and 9.4 tasks). The table shows that from 1985 to 2000 the forest area was reduced in approx. 110 000 ha

Land use change	Area	
	Value (ha)	In percentage of the basin area (%)
Agriculture for forest	136499,815	5,43%
Forest for agriculture	91402,354	3,63%
Forest for artificial area	3343,813	0,13%
Forest for other forest types	66614,519	2,65%
Forest for semi-natural areas	161188,104	6,41%
Semi-natural areas for forest	76111,092	3,03%
Semi-natural areas for forest	76111,092	3,03%

112

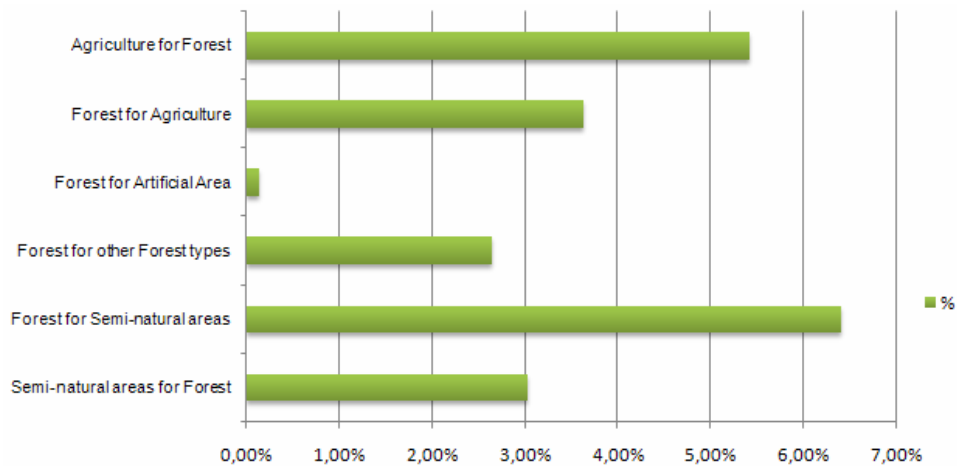


Figure – Land use changes (expressed in percentage of the basin area) from 1985 (CLC85) and 2000 (CLC00) according to the Corine Land Cover.

Below some more detailed questions about various specific environmental issues in the basin

1.6 Any major watershed/soil and water conservation projects been taken up in the basin??

No. Only the areas previously mentioned in 1.4b have special status.

1.7 To what extent is the management of surface and ground waters integrated?

Both surface and underground waters are under the supervision of the same institution – The Water Institute which responds to the Environment Spatial Planning and Regional Development. Therefore an integrated policy for water management is expected.

1.8 To what extent are water related ecosystems protected and restored?

All the initiatives in the protected areas are subjected to environmental impact assessment (EIA). The fluvial corridor (the river reach plus an adjacent area with about 50 m wider along each river side) always belongs to a protected area – the National Ecological Reserve (REN) – and therefore any intervention in that corridor is also subjected to EIA. This procedure ensures that special attention is given to the protection of the natural ecosystems, related or not with the water.

1.9 Have management plans for vulnerable riverine vegetation zones and species been established and implemented?

No.

1.10 Have there been a reduction or /increase in flow volume/water level over the last 10-20 years?

This information is not available as it requests for additional studies that were never carried out.

1.11 Are erosion and sedimentation monitored on a regular basis in the basin?

The monitoring system sponsored by the Water Institute includes the sediment monitoring stations schematically located in the next figures. The data is regularly acquired.

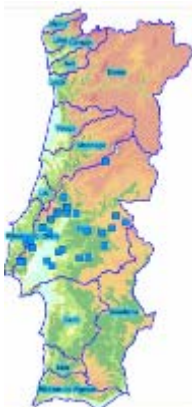


Figure – Portuguese part of Tejo River basin. Location of the sediment monitoring stations.

1.12 Have there been established mechanism to license and control effluent discharges from point and non-point sources?

Besides the new Water Law (Law n.º 58/2005, 29th December) the following Decree-Law also apply: n.º 236/98, 1st August, and n.º 152/97, 19th June.

1.13 Is water quality monitored on a regular basis in the basin (including water temperature, nitrate pollution, phosphor pollution, pesticides, toxic chemicals, microbial pollution, organic matter, heavy metals, algae)?

The monitoring system carried out by the Water Institute includes the water quality monitoring stations schematically located in the next figure. The data acquired regularly comprehends several parameters, systematized in the table that follows the figure.

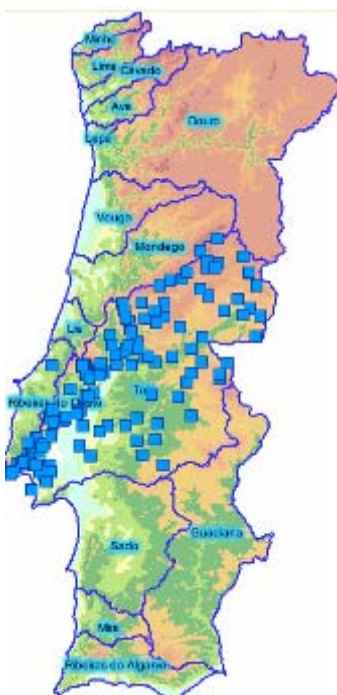


Figure – Portuguese part of Tejo River basin. Location of the water quality monitoring stations.
Table – Quality parameters considered in the water quality monitoring stations.

Parameter			
total ammonia (NH ₄)	chlloide	dissolved iron	dissolved oxygen in the lab
total arsenic	chlorophyll a	total iron	dissolved oxygen in the lab
nitrogen	total copper	total phosphorus	pH - lab
dissolved cadmium	fecal coliform	total manganese	1000 ml salmonella
total cadmium	total coliform	dissolved nickel	total suspended solids
oxygen demand	conductivity in the lab at 20°C	total nitrate	sulfate
bioquimistry oxygen demand in 5 days	color	total nitrite	sample temperature
lead dissolved	total chromium	oils and fats	pH temperature in the lab
total lead	detergents	total orthophosphate	total zinc
cyanide	fecal streptococces	oxidability	

1.14 Existence of water quality standards, for effluent discharges, minimum river quality targets?

The quality standards are defined in the Decree Law mentioned in question 1.12 (Decree-Law n.º 236/98, 1st August, and Decree-Law n.º 152/97, 19th June).

1.15 Does the Pollution Control board use the results of water quality to influence policy decisions to curb pollution, if no, what are the reasons?

There is not a pollution control board. Nevertheless the pollution mitigation is a national issue that is ruled by the legislation previously identified.

1.16 Are flood risks taken into account in broader land / water use management and environmental impact assessments?

Yes. At the European level, the Directive 2007/60/EC on the assessment and management of flood risks is in force since 26th November 2007. This Directive now requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. With this Directive also reinforces the rights of the public to access this information and to have a say in the planning process. The Directive must be translated into the legislation of each country according to a schedule also defined in the Directive.

2. Water allocation in the basin should in principle have been agreed between all relevant stakeholders/sectors within a given framework

Example guiding questions:

2.1 Is there a decentralised water allocation management system in the river basin?

No the system is centralized through Water Institute which responds to the Ministry for Environment Spatial Planning and Regional Development.

2.2a Is there an inter-ministerial co-ordinating body?

No.

2.2b Are there local co-ordinating bodies?

Yes. The Lisbon and Tejo Valley Hydrographic Region Administration.

2.3 What are the mechanisms that exist for water allocation in the basin, who is consulted and who makes decisions?

The water allocation to a specific user requires the emission of a water resource utilization permission/concession which is issued by the Water Institute and by the Administrations of the Hydrographic Regions, according to the Law n.º 58/2005, 29th December (Water Law).

2.4 Does the system of water allocation build on local knowledge?

No.

2.5 Are traditional water rights respected when allocation takes place?

All the traditionally or pre-existent water rights are respected as they play a very important role in the social structure and organisation of local communities.

2.6 Existence of defined water rights?

Only the pre-existent water rights must be respected, regardless to whom they may concern (from a very small farmer to a large electricity production company). All the new water utilizations require appropriated permission/concessions licences.

2.8 How are disputes resolved? In these disputes which sectors dominate and why?

No dispute are expected.

2.9 Are the roles and responsibilities of the cooperative institutional arrangements clearly defined ? (central and local)

The competencies of each organism are clearly defined though sometimes there is some overlapping among different entities.

2.10 What changes have been made in water management in the recent years (Eg. PIM in Tungabhadra a major shift in water management).

The governance paradigm related with the water resources changed recently due to the new Portuguese Water Law (Law n.º 58/2005, 29th December) and to others legal documents, some of them resulting from the Water Law, with emphasis for the Decree-Law n. 226A/2007, 31st May, which rules the titles and the concessions required by the water resources utilization, and for the Decree-Law 197/2005, 8th November, which establishes the framing for environmental impact assessment and which partially transposes into the Portuguese context the Directive n.º 2003/35/CE from the European Parliament and Council, 26 May. The Water Law transposes into the Portuguese context the Directive n.º 2000/60/CE from the European Parliament and Council, 22 October (Water Framework Directive).

3. Transboundary management in the basin

Guiding questions:

3.1 Does the basin have any transboundary issues/problems?

The Tejo is a shared river between Portugal and Spain. Since the 30s, the transboundary issues are solved at a governmental level nowadays supported by the Albufeira Convention.

3.2 Does any legal agreement exist between different provinces or countries that share the water resources at basin level (for e.g the Bachawat Tribunal in TB) (a table of such agreements, year constituted, by whom??, current status?? Etc)

The answer is the same as the one provided by the Spanish team.

3.3 Are there examples where legal agreements between different sectors or provinces have not been respected?

No.

3.4 What is the general role of different agencies in negotiations (central, state, court of law, informal bodies)

The Cooperation Organs that institute the Albufeira Convention are:

- The Partners Conference/the Conference of the Parts (in Portuguese: *Conferência das Partes*). The Conference is constituted by representatives of each part, designed by Spanish and Portuguese Governments. The minister of the Environment is also represented. The Conference meets when it is necessary to evaluate and solve issues that have not been agreed in the Commission.
- The Commission for the Application and Development of the Convention (CADC). It is the Organ responsible for the solution of the issues related to the interpretation and application of the Albufeira Convention. The Commission includes several Work Groups (WG): Discharge Regimes WG, Droughts and Emergency Situations WG; Information Exchange WG; Security Hydraulic Infrastructures and Floods WG; Water Framework Directive and Water Quality WG.

3.5 Do the states conduct appropriate environmental impact assessments when planning new activities on transboundary waters? (question from D6.3).

Article 8 of the Albufeira Convention is about “transboundary impacts queries” and Article 9 is about “the evaluation of the transboundary impacts”. The Annex 2 of the document includes a list of projects and activities subject to transboundary impact evaluation:

- The distance to the border in < 100 km
- Cause a significant discharge modification
- Cause effluent discharge with nitrates, phosphates, toxic substances and metals

3.6 Have basin/bilateral agreements been fully transposed at the national / provincial / local level? (question from D6.3)

The Albufeira Convention is an agreement between Spain and Portugal (both at national levels) that establishes all the relevant issues regarding the five shared river basins of Douro (Duero), Minho (Miño), Lima (Limia), Tejo (Tajo) and Guadiana.

3.7 Are neighbouring states obliged to notify and consult each other of planned measures?

Yes, for all the basins included in the Albufeira Convention, through the Information Exchange Work Group.

3.8 Do watercourse agreements oblige states to accompany such notification with available technical data and information, including the results of any environmental impact assessment?

Yes. The document presents a list of data that have to be exchanged in order to monitor water management in transboundary basins: concessions, hydrometeorological data and reservoir data.

3.9 Are states obliged to exchange data and information?

Yes, this is one of the main statements of the Albufeira Convention: information exchange (Art. 5); transboundary impacts queries (Art. 8); Communication, Alert and Emergency Systems (Art. 11); Water Uses (Art. 15); Floods (Art. 18).

4. Stakeholder involvement

*Guiding questions:*4.1a Has stakeholder participation been made mandatory in the process through legislation or other government directives? Is there a standardized framework for stakeholder involvement with operational guidelines that have to be followed?

Nowadays, all the projects – related or not to water resources – subjected to environmental impact assessment (EIA) must pass through a phase of public inquiry (as established in the Decree-Law 197/2005, 8th November). This is as near as the stakeholders can participate in those projects.

Specifically in what concerns the studies of the Tejo River Basin Plan, their elaboration was closely followed by two stakeholders *fora*: the Water National Council (*Conselho Nacional da Água*, CAN, create in 1994 and still in force) and the Tejo Basin Council where main stakeholders were represented and all the basin strategic decisions were discussed. Both organisms received the information regarding the stakeholders meetings being of their responsibility to inform those they represented.

The Water National Council comprehends representatives from more than 20 agencies belonging to five different Ministries (Environment, Spatial Planning and Regional Development; Economy and Innovation; Public Works, Transport and Communications; Agriculture, Rural Development and Fisheries; and Health), representatives of different local municipalities; representatives of the main water users (electricity production, water supply, irrigation, fishery, industry, associations), representative of non-governmental agencies (NGO) and representative of technical-scientific associations. The Water National Council acts as a governmental consulting entity having meetings whenever there is a water relevant issue at a national level.

The Tejo River Basin Plan was also subjected to a public discussion process from the 1st of November 2000 until the 15th of January 2001. During that period several public meetings took place either to present the successive studies or to discuss the partial results and methodologies. The meetings were held in Lisbon but also in other cities located in the basin (e.g. Abrantes) in order to facilitate the participation. All the documents related with the Tejo River Basin studies were presented to the participants in the meeting at the beginning, sometimes being also accessible to the general public via specific websites, promoted by the Water Institute. After the public discussion period the Water National Council emitted a favourable opinion about the plan (15th February 2001).

4.1b IF such exist, Is the framework satisfactory? – does it ensure transparency of the process?, is it open for anyone?, does it ensure participation from the poor, marginalized groups, women?

The framework that nowadays provides the largest framing for the public participation whenever environmental impact assessment (EIA) is required is established in the Decree-Law 197/2005, 8th November, which partially transposes into the Portuguese context the Directive n.º 2003/35/CE from the European Parliament and Council, 26th May.

4.2 What initiatives have been taken up by the state agencies to involve stakeholder and end users in water management (in planning, basin management plan preparations, land, water and irrigation management initiatives, new policy changes?

Concerning the Tejo River Basin Plan those actions were identified in question 4.1a. In general terms they are carried out in accordance with Decree-Law 197/2005, 8th November, as previously stated.

4.3 Is there an enforceable and adequate right of access to information (including environmental information)

The Decree-Law 197/2005, 8th November defines the right of access to environmental information.

4.4 In practice to what extent do public authorities make IWRM related information available to the public where requested ?

Same response as question 4.3.

4.5 Do the authorities publish the facts and analysis of facts which it considers relevant and important in framing major policy proposals related to IWRM?

Same response as question 4.3.

4.6 To what extent do agencies involved in IWRM make available to the public a clear description of its decision making processes including opportunities for participation? Same response as question 4.3.

4.7 Are the states party to any international agreements related to public access to information?

The Article 6 of the Albufeira Convention about “Public Information” states that all the information related to the Convention must be available for any reasonable request.

5. Capacity building is the key to effective IWRM

Guiding questions:

5.1 What initiatives have been taken up by the state agencies for capacity building of stakeholder in water management?

At a National level the legal document that applies in the context under mention is the Water Law (Law 58/2008) which states that (article n.º 7) “ the representation of the activity sectors as well as of the water users is ensured by the following two consulting entities: the national Water National Council (*Conselho Nacional da Água*, CNA) while governmental consulting entity of the Portuguese government regarding the water resources; and the Hydrographic Region Councils. One of these councils includes the Tejo basin.

Whenever Environmental Impact Assessment (EIA) is required the Decree-Law 197/2005, 8th November applies, establishing the framing for the public participation, namely in terms of public inquiry phase.

5.2 What measure are in place to build the capacity of staff within public authorities with regard to IWRM?

As in terms of water authorities the water related issues are concentrated only in two entities (the Water Institute/Ministry for Environment Spatial Planning and Regional Development and the Administration of the Hydrographic Regions) we admit that the capacity building is ensured by hiring specialized staff.

5.3 What is the priority given by the state agencies to capacity building?

We do not have the information required to answer the question.

5.4 Has any special budget been allocated by the water resources dept. or other relevant agency for capacity building?

We do not have the information required to answer the question.

5.5 How effective are these training programs (in terms of content, quality,). Brief description of the efficiency, and why they are effective/not effective. (for e.g in TB basin special courses are set up for farmers to educate about Participatory Irrigation Management) -----

We do not have the information required to answer the question.

6. Efficient use of water is essential and an important means to resolve water conflicts(?)

Guiding questions:

6.1 What initiatives have been taken up in the basin to improve water use efficiency?

At a national level we think that no measures were undertaken. The objective of improving the water use efficiency is expressed in the new Water Law (for example in article n.º 3 which states the principle of

the economic value of the water: as the water is becoming a more and more scarce asset its utilization must be economic efficient, and the cost related with the water services must be recovered based on the polluter-payer principle and on the user-payer principle).

6.1a How effective are they?

We think that at a national level no measures were undertaken, as stated in question 6.1.

6.2 Are there measures to re-use water (water treatment and re usage)?

We think that at a national level no measures were undertaken, as stated in question 6.1.

6.3 Does any type of co-ordination exist between various departments to address water use efficiency ?

We do not have the information required to answer the question.

6.4 Are there any monitoring devices/systems to record and control water use? Whose controls is it, and is it accepted by all involved parties?

All the water uses must be measured in order to enable the application of the legislation in force (Law n.º 58/2005, 29th December – known as Water Law and Decree-Law 97/2008, 11th June).

7. Water should be treated as having an economic and social value

Guiding questions:

7.1 What initiatives are present to treat water as an economic and social good? Is this regarded as an important principle in the basin? In such case by whom?

The payment related with the water resources in nowadays a European obligation, as established in the European Directive n.º 200/60/CE which was translated into the Portuguese legal framing by the Water Law.

Among the principles established by the legislation in force - Law n.º 58/2005, 29th December – known as Water Law, the following two are directly related with the question: principle of the social value of the water (the water should be understood as a universal asset therefore its cost should be socially acceptable) and principle of the economic value of the water (as the water is becoming a more and more scarce asset its utilization must be economic efficient, and the cost related with the water services must be recovered based on the polluter-payer principle and on the user-payer principle).

7.2 Are the human and the animal health situation along the river basin carefully monitored?

The human and the animal health are indirectly controlled through the water quality monitoring system (see Part II section 1.13).

7.4 How effective are the emergency alleviation and response systems in limiting risk and protecting people, property and the environment?

The emergency agency regarding the water resources related issues at a national level is the Civil Protection National Authority which has several competencies, such as dissemination the emergency alerts; supervision of the emergency plans; coordination among different authorities, etc. The disasters that are under the supervision/coordination of the Civil protection include those due to natural causes (floods, droughts, fires), the pollution accidents; the dam break accidents (see also answer to question 7.8).

7.6a Is there pricing of water, or any such initiatives coming up??

According to the Water Law (Law 58/2005) the structure of the water taxes follows the following general equation which takes into account the type of the economic activity, by means of the five components:

$$\text{Tax} = A + E + I + O + U$$

where A accounts for the water abstractions from the water mass (public domain); E, for the discharge into the river; I, for the gravel and sand extraction from the rivers; O, for the occupation of the public domain

(river and overbanks) and U, for the utilization, with adverse impact, of the waters under public administration.

Only in June the new water financial and economic regime was approved (Decree-Law 97/2008, 11th June. The tax began to be applied only in July 2008.

7.6b Do farmers pay for water used? Do households pay for water?

Only the very small water users do not have to pay the tax. Regarding surface or underground water intakes only those based on equipments with less than 5HP are excluded. The land occupied by the houses of families with very low incomes is also exempted from paying.

7.6c Are some categories of water users exempted from paying water use tariffs (E.G., In TB, the socially backward groups are exempted from paying membership fees to WUCS)

Previous answer (question 7.6b).

7.8 Does the law provide an effective emergency alleviation and response systems in limiting risk and protecting people, property and the environment?

Yes it does mainly through the Civil Protection National Authority. The Civil Protection is the activity carried-out by the State, Autonomous Regions and Local Authorities, by citizens and by all public and private entities, with the aim of preventing collective risks inherent to serious accidents or disasters, to attenuate its effects and to protect and help people and assets in danger, whenever those situations occur.

The main objectives of the Civil Protection are to prevent collective risks and the occurrence of serious accidents or resulting disasters; to attenuate collective risks and to limit its effect; to rescue and to assist people and other living beings in danger, to protect cultural and environmental assets and other assets of high public interest and to support the reestablishment of normality in the life of people living in the areas affected by serious accidents or disasters.

The domains of action of the Civil Protection are: survey, forecast, evaluation and prevention of collective risks; permanent analysis of vulnerabilities facing risk situations; information and training of populations, aiming at raising awareness for self-protection measures and for the necessity of collaborating with the authorities; emergency planning, search and rescue, providing aid and assistance, as well as evacuation, lodging and population supplies; inventory of resources, availability of means and the most suitable way to mobilise them, at the local, regional and national levels; study and dissemination of adequate forms of protection of buildings in general, monuments and other cultural assets, infrastructures, archival patrimony, essential services facilities, as well as environmental and natural resources; forecast and planning of actions concerning the eventual isolation of areas affected by risks.

Some of the legislation that provides the framing for the previous authority is the Law n.º 27/2006, 3rd July; the Decree-Law n.º 134/2006, 25th July, the Decree-law n.º 203/2006, de 27th October; the Decree-Law n.º 75/2007, 29th March.

More specific legislation exists in specific domains (as, for example, the Decree-Law n.º 124/2006, 28th June which defines the National System of Defence against forest fires)

8. Water management and Gender

Guiding questions:

8.1 a Do any initiatives exist in the basin that encourage women in water management?

Not applicable to the Portuguese context.

8.1b If so, how does it work , is this real or just on paper?? E.g. Women Self Help groups

8.2 To what extent are women able to exercise their right to participate in planning? (question from D6.3).

They have complete right to participate in planning or in any other issue.

8.3 Is women representation compulsory in water user societies (In TB, WUCS management should involve one women member)

No.

Are NGOs strong and include gender perspective?

Environmental NGOs are strong but they do not include any particular gender perspective.

General IWRM assessment: Tagus river basin, Spanish part

CSIC Team, Spain

Lana-Renault, N., Beguería, S., Vicente-Serrano, S., García-Ruiz, J.M.

1. Water as a finite source, protection of the catchment and environment

Guiding questions

1.1 Any major pressures in the last 10-20 years (from mining, industrial development, hydropower, land use changes, tourism)

Certainly, the major water pressure in the Tagus basin has been, and still are, linked to:

- agricultural practices: the irrigation system within the basin (2000 Hm³/year) and the water transfer system between the Tagus and Segura rivers (500 Hm³/year). The water transfer Tagus-Segura, started in 1978, supply water to the irrigated areas in southeast Spain. The original plans estimated a volume of water transfer of about 1100 hm³ per year, but in practice only exceptionally the volume exceeded 500 hm³ per year. The volume of water transfer must be approved year by year (and even month by month or season by season) by the Spanish Government, according to the volume of water stored in the Entrepeñas and Buendía reservoirs.
- the industrial sector: the refrigeration of nuclear plants (1400 Hm³/year). Also, the electric power generation plays an important role and it is notably linked to reservoir management.
- water consumption from an increasing urbanisation (1000 Hm³/year)

These pressures are recognised by the State throughout the Tagus Basin Administration Office, which is the last responsible, sometimes with the voice of the regional governments.

1.4 Which sector and/or problem has been the major 'driver'?

Local governments such as in Madrid, where the expansion of urbanisation and speculation with the soil is the greatest, and power stations, play a major role in water decisions. Active participation of the all the concerned sectors within the basin, encouraged by the Water framework directive and the A.G.U.A. Programme, should balance the sectoral weight in future water management.

1.5 Any pressures that have caused major water (use) conflicts?

The water transfer Tagus-Segura represents a complex policy of water distribution that generates many political conflicts between different regions in Spain. Compensation measures were implemented for the reduction of stream flow and water resources availability in the Tagus River. These measures included the ending of irrigation areas under transformation and their corresponding infrastructures in the Alagón, Almonte, Tiétar and Jerte rivers, as well as the encouragement of local irrigated areas and the construction of a plant for water purification in the city of Cáceres. However, some of the plans forecasted by that time are still waiting. Within the A.G.U.A Programme context, water for southeast Spain is supplied by desalinisation plants.

An urban model based on a high consumption of resources (i.e., water resources) has led to problems of water supply in Madrid. Also, new demands such as for leisure and cleaning, appear. The increasing

urbanisation provokes conflicts for water distribution (i.e., irrigation vs. urban consumption). A low water quality has been observed in the river after it crosses Madrid.

Nuclear plants need a minimum baseflow to ensure their refrigeration and sometimes this minimum baseflow is not reached. Besides, such refrigeration punctually provokes an elevation of temperature in the river that can present negative ecological impacts. Finally, leaks at some old power stations have been documented.

Another conflict is derived from the management of the Alcántara reservoir, just at the Spanish border with Portugal, and can be particularly critical within the transboundary context. Since February 2000, the management of international waters shared by Spain and Portugal is regulated by a bi-lateral agreement, named the “Albufeira Convention” (see Section 3).

1.4a Any new initiatives to protect or conserve the basin environment?

- A.G.U.A Programme; National Strategy for River Restoration; National Plan of Water quality: water treatment 2007-2015; Action Plan for 0 Sewage; Plan of Priority Actions for hydrological and forestry restoration; Nature Net 2000

1.4b Have any new national parks or biosphere reserves been established in the basin? By whom??. Any major watershed/soil and water conservation projects been taken up in the basin?? The impacts and status

The protected areas included in the Nature Net 2000, LICs (Areas of Community Interest; in Spanish: Lugar de Interés Comunitario) and ZEPAs (Areas of Special Protection for Birds; in Spanish: Zonas de Especial Protección Para las Aves), are represented in Figure 3. Aquatic Habitats are represented in Figure 4.

1.5 Has there been an increase or a reduction in the forest cover in the catchment ?

Not very much in surface cover (only maybe in the Iberian headwaters, to the East of the catchment). But there has been an increase in the vegetation cover due to the abandonment of traditional forest logging activities and a big reduction of pastures.

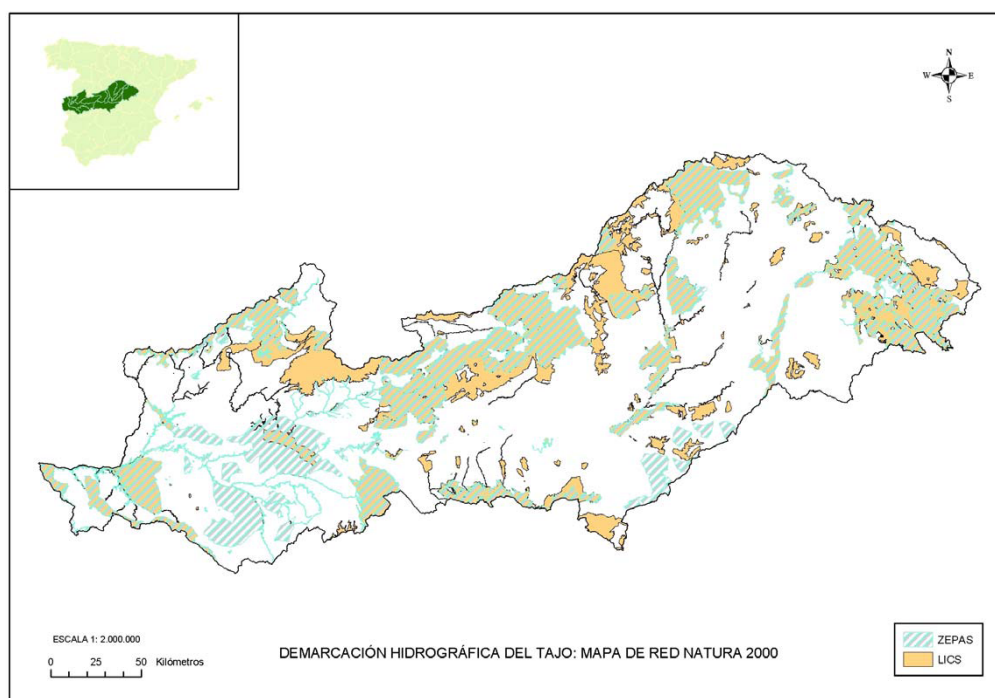


Figure 3. Protected areas in the Tagus basin. LICs: Areas of Community Interest; ZEPAS: Areas of Special Protection for Birds.

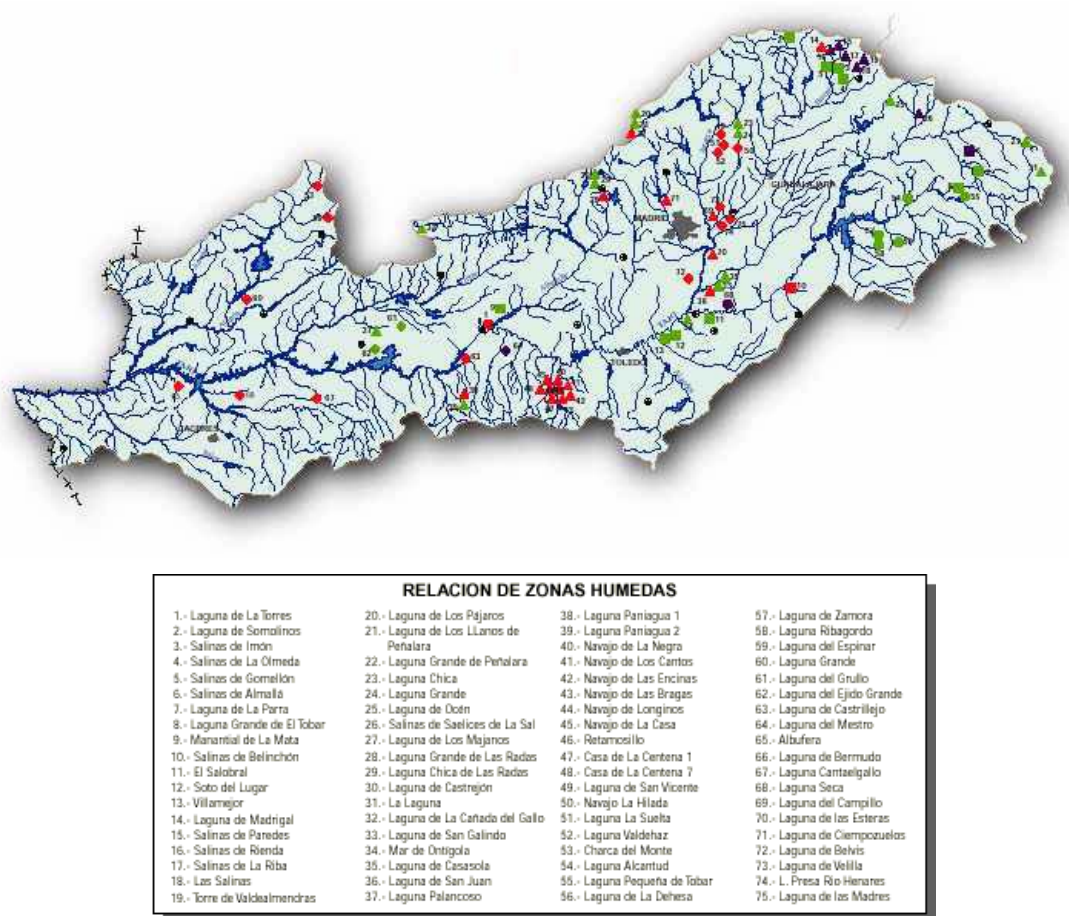


Figure 4. Wetlands. In green: preserved areas; in red: modified/damaged areas; in black: high modified/damaged areas.

Below some more detailed questions about various specific environmental issues in the basin**1.6 Any major watershed/soil and water conservation projects been taken up in the basin??**

The “Plan of Priority Actions for hydrological and forestry restoration” focuses on the hydrological and forestry restoration, erosion control and against desertification. The objectives of this Plan are:

- to improve the protective role of forests; to control soil erosion; to improve hydrological regimes and discharge regulations;

The Priority Actions are:

- to replant with forest cover; to convert cultivated land into forest; to improve/replant shrub and/or grass cover; river restoration

Reforestation and afforestation is mostly performed with *Pinus* and less frequently with *Quercus*. Natural shrubs must be preserved because it is important to obtain different vegetation layers: the whole ecosystem, and not only the trees, represents a better soil protection. Grass cover should also be planted as it decreases soil erosion and contributes to runoff generation.

1.7 To what extent is the management of surface and ground waters integrated?

The Hydrological Plan of the Basin defines hydrological and hydrogeological perimeters (Figs. 1 and 2 of Part I) and states that the management of surface and groundwater must be coordinated (Art. 40).

1.8 To what extent are water related ecosystems protected and restored?

Among the protected areas presented in Figure 2, the Laguna de Los Llanos de Peñalara and the Laguna Grande de Peñalara are included in the RAMSAR Convention.

1.9 Have management plans for vulnerable riverine vegetation zones and species been established and implemented?

One of the objectives of the Hydrological Plan of the basin is “to protect, preserve and restore the hydraulic public domain and to manage its cultural and recreation uses”. This goal is achieved within the National Strategy for River Restoration that defines conservation measures and promotes volunteering work to involve the population in the river conservation (http://www.mma.es/portal/secciones/aguas_continent_zonas_asoc/dominio_hidraulico/conserv_restaur/index.htm)

1.10 Have there been a reduction or /increase in flow volume/water level over the last 10-20 years? No**1.11 Are erosion and sedimentation monitored on a regular basis in the basin? No****1.12 Have there been established mechanism to license and control effluent discharges from point and non-point sources?**

There is an inventory of authorised effluent discharges where more than 1000 effluent points are recorded (last update: December 2007). The inventory includes the following information: owner, location, characteristics of the effluent discharge, authorised volume of discharge.

1.13 Is water quality monitored on a regular basis in the basin (including water temperature, nitrate pollution, phosphor pollution, pesticides, toxic chemicals, microbial pollution, organic matter, heavy metals, algae)?

The Tagus Basin Administration Office has different systems to control water quality:

- The Automatic System of Water Quality Information (SAICA network) continuously controls (15 min time resolution) surface water quality parameters (Figure 5).

- Monitoring network of underground water quality (Figure 6).

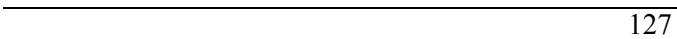
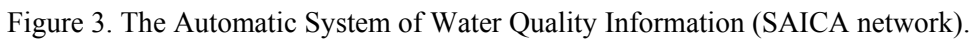


Figure 4. Underground water quality

Categoría trópica	P. T.	Cl a media mg/m ³	Cl a máxima mg/m ³	D.S. medio m	D.S. mínimo m
Ultra Oligotrófico ...	R 4	R 1	R 2,5	T 12	T 6
Oligotrófico	R 10	R 2,5	R 8	T 6	T 3
Mesotrófico	10-35	2,5-8	8-25	6-3	3-1,5
Eutrófico	35-100	8-25	25-75	3-1,5	1,5-0,7
Hipereutrófico	T 100	T 25	T 75	R 1,5	R 0,7

network.

Table 4. Water quality standards for lakes/reservoirs. *P.T.*: Mean annual phosphorus concentration; *Cl a media*: mean annual surface chlorophyll; *Cl a máxima*: maximum annual surface chlorophyll; *D.S. medio*: mean annual transparency (Secchi disc); *D.S. mínimo*: minimum annual transparency.

1.15 Existence of water quality standards, for effluent discharges, minimum river quality targets?

The “Chapter V- Water Quality and effluent discharge management” of the Hydrological Plan of the Tagus Basin defines the standards for rivers and for lakes/reservoirs (Table 4).

1.15 Does the Pollution Control board use the results of water quality to influence policy decisions to curb pollution, if no, what are the reasons? Yes

1.16 Are flood risks taken into account in broader land / water use management and environmental impact assessments?

One of the goals of the Hydrological Plan is “to protect the population against hydrological extreme events (floods and droughts)”. Article 43 makes reference to actions and criteria for studies in order to prevent floods and Article 44 describes a specific programme to prevent floods.

2. Water allocation in the basin should in principle have been agreed between all relevant stakeholders/sectors within a given framework

Example guiding questions:

2.1 Is there a decentralised water allocation management system in the river basin?

Water allocation is managed by the Tagus Basin Administration Office. In 1926 water management was decentralised and the first Administration Offices for each basin were created. They are attached organisations of the Spanish Ministry of the Environment.

2.2a Is there an inter-ministerial co-ordinating body? No

2.2b Are there local co-ordinating bodies?

The Basin Administration Office is the exclusive responsible, sometimes with the voice of the regional governments

2.3 What are the mechanisms that exist for water allocation in the basin, who is consulted and who makes decisions?

Water allocation in the basin is defined in the current Hydrological Plan of the Tagus Basin, which is elaborated by the Tagus Basin Administration Office. However, the new Hydrological Plan under the

A.G.U.A. Programme involves a greater participation of the local actors so that it should consider all the concerned parts.

2.4 Does the system of water allocation build on local knowledge?

For the elaboration of the new Hydrological Plan, local end users, local environmental organizations and independent water experts will form the planning body.

2.5 Are traditional water rights respected when allocation takes place?

Traditionally, the agricultural sector and, especially, irrigation communities had a very important role in the social structure and organisation of local communities. The Hydrological Plan of The Tagus Basin respects the historical rights that are still preserved in some private irrigation systems.

2.6 Existence of defined water rights?

Water rights are implicit in the Hydrological Plan that establishes priority water uses, ordered according to their priority:

- 1) Human supply (urban use), including industrial resources connected to the urban network;
- 2) Irrigation and agricultural use; 3) Industrial use for electricity production; 4) Other industrial uses; 5) Aquiculture; 6) Recreational uses; 7) Navigation and aquatic transport; 8) Other uses

2.8 How are disputes resolved? In these disputes which sectors dominate and why?

Within each use, the priority is established according to the following criteria (Art. 12):

- The most important general use; The greater water savings as a result of technical innovation; Inexistence of alternative resources; Greater technical, socio-economic and environmental efficiency

2.9 Are the roles and responsibilities of the cooperative institutional arrangements clearly defined ? (central and local)

Although there are numerous policies and regulations on water management, one of the main problems is that the specific role/responsability of the different Administrations is sometimes not well defined. There is also a lack of coordination among sectors involved in the water management planning.

2.11 What changes have been made in water management in the recent years (Eg. PIM in Tungabhadra a major shift in water management).

Modifications of the National Hydrological Plan (PHN): Law 53/2002, of December 30; Law 62/2003, of December 30; Royal Decree-Law 2/2004, of June 18; Law 11/2005, of June 22.

A.G.U.A Programme and the Water Framework Directive 2000/60/CE have lead to the conception of a new Hydrological Plan for the Tagus Basin. The elaboration of the Plan is currently in its initial steps (see Part I).

3. Transboundary management in the basin

Guiding questions:

3.1 Does the basin have any transboundary issues/problems?

The main transboundary problems in the Tagus basin are derived from the management of the Alcántara reservoir, just at the Spanish border with Portugal. There are no guarantees during droughts for minimum base flows in the Portuguese part, necessary for hydroelectric power stations.

3.2 Does any legal agreement exist between different provinces or countries that share the water resources at basin level (for e.g the Bachawat Tribunal in TB) (a table of such agreements, year constituted, by whom??, current status?? Etc)

Historically, Spain and Portugal had bilateral agreements on the management of transboundary rivers. In 1998 they signed the “Agreement on the cooperation for the protection and the sustainable use of Spanish and Portuguese transboundary basins” known as well as the Albufeira convention, which went into effect in January 2000. Basically, the aim of this convention is to control the hydroelectric use of the shared rivers, allocating to each country 50% of the benefits, and to ensure a minimum discharge during dry periods as well as water quality. The Albufeira Convention alludes to the Hydrographic Basin as a reference management unit. The main objectives are:

- An enlargement of the territorial framework for the agreements, Global cooperation point of view between Spain and Portugal; Better coordination in the management of the water resources; Respect and compatibility in the current agreements ; (<http://www.cadc-albufeira.org/>)

Other transboundary conventions: - Espoo de 1991 Conventions about the Environmental Impact within a transboundary framework; - Helsinki de 1992 Convention about the Protection and Use of the transboundary resources and international lakes

3.3 Are there examples where legal agreements between different sectors or provinces have not been respected? No

3.4 What is the general role of different agencies in negotiations (central, state, court of law, informal bodies)

The Cooperation Organs that institute the Albufeira Convention are:

- The Conference of the Parts (in Spanish: *Conferencia de las Partes*). The Conference is constituted by representatives of each part, designed by Spanish and Portuguese Governments. The minister of the Environment is also represented. The Conference meets when it is necessary to evaluate and solve issues that have not be agreed in the Commission.
- The Commission for the Application and Development of the Convention (CADC). It is the Organ responsible for the solution of the issues related to the interpretation and application of the Albufeira Convention. The Commission include several Work Groups (WG): Discharge Regimes WG, Droughts and Emergency Situations WG; Information Exchange WG; Security Hydraulic Infrastructures and Floods WG; Water Framework Directive and Water Quality WG.

3.6 Do the states conduct appropriate environmental impact assessments when planning new activities on transboundary waters? (question from D6.3).

Article 8 of the Albufeira Convention is about “transboundary impacts queries” and Article 9 is about “the evaluation of the transboundary impacts”. The Annex 2 of the document includes a list of projects and activities subject to transboundary impact evaluation:

- The distance to the border in < 100 km
- Cause a significant discharge modification
- Cause effluent discharge with nitrates, phosphates, toxic substances and metals

3.6 Have basin/bilateral agreements been fully transposed at the national / provincial / local level? (question from D6.3)

The Albufeira Convention is an agreement between Spain and Portugal (national level) that affects five main river basins: Duero basin, Miño basin, Limia basin, Tajo basin and Guadiana basin.

3.7 Are neighbouring states obliged to notify and consult each other of planned measures?

Yes, for all the basins included in the Albufeira Convention, through the Information Exchange Work Group.

3.8 Do watercourse agreements oblige states to accompany such notification with available technical data and information, including the results of any environmental impact assessment?

Yes. The document presents a list of data that have to be exchanged in order to monitor water management in transboundary basins: concessions, hydrometeorological data and reservoir data.

3.9 Are states obliged to exchange data and information?

Yes, this is one of the main statements of the Albufeira Convention: information exchange (Art. 5); transboundary impacts queries (Art. 8); Communication, Alert and Emergency Systems (Art. 11); Water Uses (Art. 15); Floods (Art. 18).

4. Stakeholder involvement

Guiding questions:

4.1a Has stakeholder participation been made mandatory in the process through legislation or other government directives? Is there a standardized framework for stakeholder involvement with operational guidelines that have to be followed?

There is not any specific mandatory legislation for stakeholder participation. However, the A.G.U.A Programme promotes public/social participation in the elaboration of hydrological plans.

4.1b IF such exist, Is the framework satisfactory? – does it ensure transparency of the process?, is it open for anyone?, does it ensure participation from the poor, marginalized groups, women? -----

4.2 What initiatives have been taken up by the state agencies to involve stakeholder and end users in water management (in planning, basin management plan preparations, land, water and irrigation management initiatives, new policy changes?

A.G.U.A Programme (<http://www.mma.es/secciones/agua/programa/quees.htm>)

4.3 Is there an enforceable and adequate right of access to information (including environmental information)

The Law 38/1995 defines the right of access to environmental information

4.4 In practice to what extent do public authorities make IWRM related information available to the public where requested ? (question from D6.3)

4.5 Do the authorities publish the facts and analysis of facts which it considers relevant and important in framing major policy proposals related to IWRM? (question from D6.3)

4.6 To what extent do agencies involved in IWRM make available to the public a clear description of its decision making processes including opportunities for participation? (question from D6.3)

4.7 Are the states party to any international agreements related to public access to information? (question in the template for D6.3)

The Article 6 of the Albufeira Convention about “Public Information” states that all the information related to the Convention must be available for any reasonable request.

5. Capacity building is the key to effective IWRM PREGUNTAR SNTG

Guiding questions:

- 5.1 What initiatives have been taken up by the state agencies for capacity building of stakeholder in water management? None
- 5.2 What measure are in place to build the capacity of staff within public authorities with regard to IWRM? (question from D6.3)
- 5.3 What is the priority given by the state agencies to capacity building? We do not know
- 5.4 Has any special budget been allocated by the water resources dept. or other relevant agency for capacity building? We do not know
- 5.5 How effective are these training programs (in terms of content, quality,). Brief description of the efficiency, and why they are effective/not effective. (for e.g in TB basin special courses are set up for farmers to educate about Participatory Irrigation Management) -----

6. Efficient use of water is essential and an important means to resolve water conflicts(?)

Guiding questions:

6.1 What initiatives have been taken up in the basin to improve water use efficiency?

The Hydrological Plan of the Tagus Basin supports water efficiency by:

Establishing priority to water uses that use technical innovation for water saving (Art.12)

Establishing priority to the new water allocations based on a water efficiency and water quality improvement (Art. 14)

Promoting sewage reutilisation

The Ministry of Agriculture, Fisheries and Food presents the “Action Plan for the Modernisation of Irrigation”. One of the foremost objectives is to promote water savings. To achieve this, the aim is to optimise the use of the available water by taking action such as modernising the water transport, distribution and application systems on the plots, selecting crop varieties that require less water or using alternative hydrological resources to conventional ones, such as desalted water and recycled water. modernising irrigation systems means creating quality employment that will be capable of managing irrigation water in a different way and the development of a powerful services sector linked to the agro-industrial system associated to irrigation. A total of 2,344 million euros will be invested, affecting 866,898 ha and 291,024 farmers.

Besides, the Agrarian Policy of the European Union provides options by subsidizing crops that need less water (rainfed agriculture); e.g.: olive trees have been favoured by subsidizing because they use very efficiently the water in the soil.

Finally, the Ministry of the Environment is currently working on the elaboration of the National Plan for (water) Reutilisation.

6.1a How effective are they?

Results can not be evaluated yet since the Action Plan for the Modernisation of Irrigation has been implemented very recently (Royal Decree 287/2006, of March 10, 2006) and the National Plan for (water) Reutilisation is being elaborated.

6.2 Are there measures to re-use water (water treatment and re usage)?

See section 6.1 (Part II)

6.3 Does any type of co-ordination exist between various departments to address water use efficiency ?

Basically, two Ministries are involved: the Ministry of Agriculture, Fisheries and Food and the Ministry of the Environment

6.4 Are there any monitoring devices/systems to record and control water use? Whose controls is it, and is it accepted by all involved parties?

The water user should install a gauging device to control the volume of the water he/she uses. The water user must provide the Administration Office punctual and periodic information of the water use so that the Administration Office can monitor the consumption and can elaborate statistical reports (Art. 14 of the Hydrological Plan of the Tagus Basin). Besides, all the irrigated systems must implement a gauging device (Art. 15 of the Hydrological Plan Tagus Basin).

7. Water should be treated as having an economic and social value

Guiding questions:

7.1 What initiatives are present to treat water as an economic and social good? Is this regarded as an important principle in the basin? In such case by whom?

In the current Hydrological Plan it is said that the river has a socioeconomic function as it supports regional development; however, this function has to be compatible with the hydraulic and biophysical functions. End users still perceive water as a right, not as limited resource. In this way, the A.G.U.A. Programme pretends to highlight the economic, social and natural value of water.

7.2 Are the human and the animal health situation along the river basin carefully monitored?

The human and the animal health are controlled through the water quality monitoring system (see Part II section 1.13). The ecosystem health is controlled within the protected areas (see Part II section 1.4b).

7.4 How effective are the emergency alleviation and response systems in limiting risk and protecting people, property and the environment?

The National Observatory of Droughts elaborates a monthly report about the impacts of the droughts, with the information offered by the Basin Administration Office and the Regional Governments. Each report also includes the measures adopted to mitigate the drought (http://www.mma.es/portal/secciones/aguas_continent_zonas_asoc/ons/mapa_informe_ons/)

The National System for Mapping Flood Areas is being elaborated, therefore no evaluation of the system has been done.

7.6a Is there pricing of water, or any such initiatives coming??

The pricing of water is very low. One of the aims of the A.G.U.A Programme is to fix water pricing according to the real costs (acquisition and treatment) and to the economic benefits.

7.6b Do farmers pay for water used? Do households pay for water?

Farmers and households pay very low for water use. The water for irrigation purposes has a political price in order to reduce the production costs of the farmers.

7.6c Are some categories of water users exempted from paying water use tariffs (E.G., In TB, the socially backward groups are exempted from paying membership fees to WUCS)

No

7.8 Does the law provide an effective emergency alleviation and response systems in limiting risk and protecting people, property and the environment?

Droughts:

- Art. 42 of the Hydrological Plan of the Tagus Basin
- Special Plan of Actions In Alert Situations and Possible Droughts (Order MAM/698/2007)

Floods:

- European Directive 2007/60/EC on the assessment and management of flood risks. Under this Directive, The National System for Mapping Flood Areas is being elaborated.
- Art 11 of the 46/1999 Water Law; Art. 14 of the Public Domain regulation; Art. 2.2-3 of the Law 10/2001 National Hydrological Plan; ; Art. 43 and 44 of the Hydrological Plan of the Tagus Basin; Art. 9.1 and 12.2 of the Law 8/2007 of Soil; Law 2/1985 of Civil Protection; Specific Regional Plans

for Civil Protection; Art. 366 to 374 of the Civil Code; Royal Decree 7/2004 of the Legal Statute of the Insurance Reward Consortium

8. Water management and Gender

Guiding questions:

8.1 a Do any initiatives exist in the basin that encourage women in water management? No

8.1b If so, how does it work , is this real or just on paper?? E.g. Women Self Help groups

8.2 To what extent are women able to exercise their right to participate in planning? (question from D6.3).
They have complete right to participate in planning

8.3 Is women representation compulsory in water user societies (In TB, WUCS management should involve one women member) No

8.4 Are NGOs strong and include gender perspective? Environmental NGOs are the strongest and do not include any particular gender perspective

General IWRM assessment: Tungabhadra river basin

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1. Water as a finite source, protection of the catchment and environment

1.1 Any major pressures in the last 10-20 years (from mining, industrial development, hydropower, land use changes, tourism)

Describe the major environmental pressures that have been pointed out in reports, by government etc causing severe environmental impacts. Try also to assess if this pressures has been quantified (e.g. loads of pollutants in tonnes, measures effluent emissions etc) or only exist at a qualitative basis (based on indirect data like maps, observed problems). Indicate if the pressures are recognised by the authorities/managers or only by the knowledge community (research) and others (single public voices, NGOS etc). Describe if any major pressures cause land use impacts and changes.

Since the Green revolution in 70s combined with urbanization, Tunga Bhadra basin has been experiencing a number of changes both in terms of land and water use patterns,. Land use changes were mostly due to new areas brought under agriculture, new urban settlements, mining and other development pressures. It was land under natural forest cover, common grazing lands owned by the Revenue Department and the village panchayats (village council) that was occupied illegally or allotted by the state agencies for agriculture and other purposes. These pressures brought about significant changes in the land cover making it more vulnerable to degradation. The first major intervention by the Government to protect the catchments and forest cover in the country was the introduction of the Forest Conservation Act, 1980 that strictly prevented the conversion of forest land for other purposes without the prior approval of the government. This applies as well to forest areas, especially the “Reserved Forests “ in TB catchment. In addition, large areas within the TB catchment was also declared as a National Park to protect the biodiversity and the forests as such. A number of other soil and water conservation projects and measures to increase tree cover by the Forest Department were initiated in the catchment area. Despite such efforts, the catchment in TB basin is continuously exposed to a number of problems. **Agriculture, mining and industrial development are the major land use pressures in the TB basin.**

Mining

Mining activities (largely Manganese and Iron ore) are concentrated in areas close to the Hospet, Bellary, Sandur and Hatti townships resulting in loss of vegetation, soil erosion and siltation.. The contamination of surface water from iron ores is observed in Bellary district. The concerned officials mention about the negative impacts of mining, but no concrete measures are taken to monitor or stop the impacts. Some studies by NGOs and scientists have been done, but most of the studies end up as reports and not taken up by policy makers.

A study by Jagdish Krishnaswamy et. al. (2006) on the ‘Impact of iron ore mining on suspended sediment response in a tropical catchment in Kudremukh’, highlights that more than 50 per cent of the suspended sediment load in both the Bhadra River and Bhadra Reservoir comes from mining-affected lands that occupy less than one per cent of the total catchment area. During the 2002 and 2003 monsoons, the suspended sediments discharge rates had increased to about 1.99 and 7.89 Mg km² day⁻¹ for upstream and downstream sites respectively and sediment concentration downstream was significantly higher than upstream for all conditions. The current annual suspended sediment load below the mine ranges from 100,000 to over 150,000 Mg, depending on the size and frequency of large rain events. Comparison of historic data and another study in 1994, with recent measurements confirm that mining and associated activities in Kudremukh National Park are the greatest sources of sediment entering the Bhadra River; and the Bhadra river carries considerably more sediment now than before mining started damaging riverine ecosystems and disrupting downstream water resources.

Studies on the impact of Kudremukh mining activity on the environment of the western-ghats region has revealed the sedimentation in the Bhadra river – from Gangamoola to NR Pura (Chikamagalur) between 2002 to 2004. According to this, the mining and other related activities have altered the water quality of Bhadra river in Kudremukh area. The water leached from mine waste/tailing and dumps in the Kudremukh area is joining the river Bhadra. It carried various dissolved metallic and non metallic chemical compounds. The water quality was analysed by collecting samples at Gangamoola, catchment area near Lakya Dam, Nellibeedu, Kalasa and NR Pura. The concentration of BOD was high at NR Pura as it receive high organic contents due to agricultural activities. The iron content has increased from Gangamoola and downstream areas towards Lakya Dam, Nellibeedu and Kalasa and finally reduced at NR Pura. The high concentration of Manganese at Gangamoola, Lakya dam and Nellibeedu are due to runoff from the mining area. The heavy metal concentrations were within the permissible limits for drinking water except iron. The iron concentration in three locations is higher than the standards prescribed by BIS for drinking water except at Gangamoola and NR Pura. The lead and content was 0.02 mg/l at Lakya dam and 0.01 mg/l near Nellibeedu and Kalasa whereas at Gangamoola and NR pura it was below detectable limits. This indicates the presence of lead content at Lakya dam, Nellibeedu and Kalasa due to mining activities. Similarly, chromium and aluminum contents were below detectable limits at Gangamoola and NR Pura compared to other locations.

The concentrate sediment analysis revealed that it was rich in ferrous and ferric iron ore magnetite, haematite and consisted of 59 per cent of magnetic concentrate of iron ore tailings and other additional metallic compounds. The location near Lakya dam. Nallibeedu and Kalasa were with high concentration of iron, manganese and other heavy metals compared to Gangamoola and NR Pura (Anil N Patel, 2005).

Industrial Development

A number of industries have come up in the TB catchment area during the last 2-3 decades. Although, the Environment (Conservation), Act, 1986 and other legal and administrative regulations exist to check pollution from the industries, monitoring and enforcement is rather weak. In the TB catchment, several large-scale industries have set up treatment plants to check pollution, but do not operate them. According to the Karnataka Pollution Control Board who collect and analyses water samples as a part of monitoring activities, find that the water quality is much below the standards due to pollution from the industrial sources

The number of small-scale industries shows an increasing trend over time (see Annexure 1). However, compilation of data with respect to increasing industries basin wise has not been done so far. This adds to the pressures, and as many industries depend on ground water, pollution of ground water is a problem due to poor monitoring and accountability.

Agriculture: Violation of cropping pattern

The current cropping pattern in the TB catchment is not in line with the cropping pattern that was planned and recommended when the TB irrigation dam project was commissioned. The cropping pattern was determined on the basis of estimated water availability. However, farmers do not follow the cropping pattern that has been recommended. For example, sugarcane that was not in the original crop plans is currently one of the major crops grown in the TB basin. This has led to water use conflicts due to high demand for water between upstream and downstream farmers, problems of salinity, alkalinity and water logging in the basin (Table 12.0). The following data has been compiled from the Tungabhadra Command Area Development Authority and Bhadra Command Area Development Authority reports.

Table 12.0: Taluk-wise areas affected with Salinity, Alkalinity and Water Logging in the TB Basin

Dist / Taluk	Area affected (Area in Hectares)			Total
	Salinity	Alkalinity	Water logging	
Tungabhadra Command Area				
Koppal dist				
Koppal	41.08	50.02	82.57	173.67
Gangavati	6,875.43	978.86	3,932.02	11,786.31
Total	6,916.51	1,028.88	4014.59	11,959.98
Raichur Dist				
Sindhanur	9,077.41	1,271.23	8,324.98	18,673.62
Manvi	15,613.66	2,616.24	11,888.43	30,118.33
Devdurga	48	96	77	221
Raichur	1,192.5	563.29	3,548.47	5,304.26
Total	25,931.57	4,546.76	23,838.88	54,317.21
Bellary Dist				
Hospet	2,486.99	442.39	365.51	3,294.89
Bellary	11,536.65	2,039.01	3,339.05	16,914.71
Siruguppa	5,146.87	288.8	4,292.83	9,728.5
Total	19,170.51	2,770.2	7,997.39	29,938.1
Grand Total	52,018.59	8,345.84	35,850.86	96,215.29
Bhadra Command Area				
High	2,317	836	18,692	
Normal	1,509	807	10,527	
Total	3,826	1,643	29,219	

Source: Tungabhadra Command Area Development Authority and Bhadra Command Area Development Authority

1.5 Which sector and/or problem has been the major ‘driver’?

List the drivers (river commission, state etc; power industry, agriculture, etc) and describe what they have influenced. Drivers can be those who recognise the problem or are of cause of the problem or those who are trying to solve it.

Those who recognise the problem – Pollution Control Boards, Community, NGO’s, Department of Mines and Geology, Ground Water Board, Water Resources Department.

- PCB’s have been monitoring the water quality samples regularly and are also responsible to warn the polluters if there is violation. However, they have not been able to influence major policy decisions at large as the approach has not been at a basin level. (However, during visit to their office at Bangalore – WP 7 group, they were keen to be involved and were willing to co-operate)

- NGO’s have been able to protest against the release of industrial effluents and bring about control and effective monitoring of effluents. Fishing communities have been a part of such agitations.

Those who are the cause of the problem: – Farmers who do not follow the recommended cropping pattern, and water usage, Industries who contaminate, Corporations who have not installed Treatment plants for Towns.

Those trying to solve it – Command Area Development Authority, NGO’s, Innovative farmers

Although the functioning of the WUA’s are not that effective, efforts towards implementation is on.....something more here..

1.6 Any pressures that have caused major water (use) conflicts?

Describe the major conflicts and its spatial extent (only intra-sectorial, local, commune, province, state or transboundary). Note, some management plans includes conflict matrices (conflict matrices are prescribed in the EU Water framework directive). Also describe the way the conflicts has been handled and if it has been solved. Major knowledge gaps could be included (e.g., lack of tools and evidence about the impact of the conflict/problem).

Conflicts in the Tungabhadra basin are due to increased demands for water by various sectors. As we already know, the Krishna Basin (TB is a sub-basin within the Krishna Basin) is a closed basin where most of the water is used. Any new demands for water in the basin have to be met by reallocating water from other sectors. This creates a problem, since reallocation would mean cutting down the water quotas from certain sectors that could lead to conflicts. The major sectors in the TB are agriculture (irrigation), drinking water for urban areas and industries. Water use conflicts in the TB is politically a very sensitive issue leading to demonstrations by farmers and legal disputes between the neighbouring provinces Karnataka and Andhra Pradesh that share the TB water. The following list shows some specific conflicts that exist in the TB catchment.

Agriculture – conflicts between farmers at the Head and -tail end
<ul style="list-style-type: none"> Rice farmers have become the economically dominant group who can influence the irrigation and drainage authorities. Head reach farmers (with a high percentage of??) double-crop rice and have enough influence to claim more water than they need. Tail end farmers, get little irrigation water, or polluted drainage water, with unreliable flow, and exposed to flooding.
Agriculture versus Industries
<ul style="list-style-type: none"> If the demand for water by industries is not met it leads to closure of industry and loss of livelihoods and employment in the basin Agriculture against industry – Stock water affecting villages although allocated Complaints regarding pollution leading to fowl smell and health problems. Air pollution and demand for higher compensation.
Agriculture and Drinking Water
<ul style="list-style-type: none"> Competing interests Agricultural and Horticultural farm owners and town water supply ...which towns and when???
Agriculture and Fishing
<ul style="list-style-type: none"> Pesticide Pollution leading to fish kill. (where??) Illegal Pumping is more, affecting fishing community.
Industries and Fishing
<ul style="list-style-type: none"> 50 plus villages indicated fish kill due to industrial effluents (data and source??) Uncertainty of water spread area lead to threatened livelihood
•
Environment and Environmentalists
<ul style="list-style-type: none"> Closure of KIOCL (what is this??)– to conserve Kudremukh National Park HPF and Environmentalists – still on. Expansion of Harihara pollution of water and higher consumption of water by factory MPM – local opposition – Shimoga and Bhadravathi
Fishing and Drinking Water
<ul style="list-style-type: none"> Typical CPR problem, No stocking of sufficient fingerlings. Shortage of water in summer due to drinking water demand in Davanagere.
Department and Farmers
<ul style="list-style-type: none"> Davanagere - Irrigation Department - Non collection of water tax, Excessive system

<p>losses, Illegal operation of motors along canals. Only 15 lakhs collected out of 65 lakhs, Modernization is under implementation, Interference of Politicians</p> <ul style="list-style-type: none"> • <u>Opposition for Upper Bhadra</u> - Project would submerge 19 villages, including 8,482 acres of forestland and will destroy the entire ecosystem of Mandagaddhe. Socio-economic impacts is not serious but Environment will get affected.
Interstate Conflicts
<p><u>RDS Canal Dispute</u> - The dam built as part of the Rajolibund Diversion Scheme (RDS) canal constructed on the River Tungabhadra in 1954, concerns the permission to construct a mini hydel project at the lower end of the dam in the river basin, upstream of the RDS. It surfaces each time there is water scarcity and is later ignored when it rains. It has been alleged that Karnataka is utilising more water from the RDS canal for cultivation, owing to which farmers of Andhra Pradesh are facing severe water crises.</p>

Handling conflicts – Example - Harihar polyfibres – There was a PIL filed against the industry. NGO's were involved, agitations were taken up. However, with the installation of the Effluent Treatment Plant, they have curtailed pollution largely. However, the problem does surface during summer. Currently, a Committee is formed where a member of the industry, NGO, community, Department are formed and review the status.

1.4a Any new initiatives to protect or conserve the basin environment? List and describe possible initiatives (an example in Europe is the water framework directive).

Initiatives in Tungabhadra have been at different locations and not as a basin as a whole. Individuals, NGO's, Departments in co-ordination with Religious institutions etc.

a) *Fish Sanctuaries (Matsya Dhama- .local name)*

Fish Sanctuaries are prohibited locations for fishing located at 4 different locations along the river Tunga at Sringeri, Hariharapura, Balehonnur monitored and managed by different religious institutions (Sringeri Mutt, Sri Mutt, Dharmasthala Manjunatha Trust). The Fisheries department aims to protect endangered fish species and promote eco-tourism. The religious institutions have contributed financially apart from taking care of the maintenance. The religious institutions and the Fisheries Department have good rapport in managing this initiative.

b) *Bhadra Wild Life Sanctuary*

Bhadra Wild Life Sanctuary is located in the tropical forests of the Western Ghats in Chikmagalur district. It is about 275 kms north of Bangalore and covers an area of 492.46 Sq. km. It was declared as the 25th Project Tiger of India in 1998. Home to a large variety of flora and fauna and it is regarded as one of the best Wildlife Sanctuaries in India. Various initiatives are taken to protect the sanctuary from forest fires and encroachments.

c) *Private initiatives*

In the basin, some private initiatives can be observed, Dr. Prafulla Chandra an innovative farmer), and environmentalist; owns 40 acres of farm at Hosahalli, located 6 kms from Shimoga township, popularly known as the Farm University. He has developed several equipments appropriate to farming which aid in minimizing water use and optimization of economic benefits. His collection also includes many simple and useful technologies for not only conserving precious natural resources but also recycling of organic waste, preserving eco system, sustaining fertility and productivity of soil. His farm is popular among farmers, agriculture students, academicians and policy makers from India and abroad. To educate and disseminate his ideas across farmers he has started "*Devangi Agricultural Research and Extension Centre*" at his farm.

- 1.4b Have any new national parks or biosphere reserves been established in the basin? By whom?? Any major watershed/soil and water conservation projects been taken up in the basin?? The impacts and status

Kudremukh National Park

The Government of India, established the Park in 2002. The area adjacent to the park was primarily an iron ore-mining area owned by the government-, the Kudremukh Iron Ore Company Limited (KIOCL). It was closed down in December 2005 as a result of the area being declared as a national park. The flora consists of mostly evergreen and semi-evergreen forests near the coastal plains on the western portion and the shoal-grassland habitat at elevations above 1,400 m on the Western Ghats.

Kuvempu bio-diversity Park

Karnataka Biodiversity Board was set up in 2003 with a mission to target conservation, sustainable utilization and equitable benefit sharing. It has set up over 575 biodiversity management committees in local bodies of 15 districts and the first state to take up this activity. Among them, in the homage to the National poet and naturalist, Shri. Kuvempu, Bio-park in Shimoga is being developed as a model heritage site. Kuvempu Biosphere reserve at Kuppalli is spread across 6866 acres, and 3230.50 acres has been declared as Biosphere reserve.

- 1.5 Has there been an increase or a reduction in the forest cover in the catchment ? Try to find support for your argument with statistics.

Below some more detailed questions about various specific environmental issues in the basin

- 1.6 Any major watershed/soil and water conservation projects been taken up in the basin?? The impacts and status

The watershed development approach, as implemented in Karnataka, consists of the following components – (a) Human resource development (b) Soil and land management (c) Water management (d) Afforestation (e) Pasture/fodder development (f) Livestock management, rural energy management and (g) Farm and non-farm value addition activities.

This system has led to overall development of the human resource and environment in the watershed. The Soil and Water Conservation Department (National Water Shed Development program,??)has has multi-disciplinary technical experts drawn from Agriculture, Horticulture and Forest Departments through various sector schemes from the Central, State and District level governments.

The broad objectives of the Watershed Programmes are:

1. Conservation, development and sustainable management of natural resources including their use.
2. Enhancement of agricultural productivity and production in a sustainable manner.
3. Restoration of ecological balance in the degraded and fragile rainfed eco-systems by greening these areas through appropriate mix of trees, shrubs and grasses.
4. Reduction in regional disparity between irrigated and rainfed areas.
5. Creation of sustained employment opportunities for the rural community including the landless

In the Tungabhadra Catchment area 3.232 lakh ha . of priority areas have been treated since inception of the River Valley Project Scheme which accounts for 64.38 per cent of the total priority area of 5.02 lakh ha. Identified as high and very high priority as in 2001, further 138 watersheds have been saturated out of 154 watersheds. The districts of Bellary,Haveri,Chitradurga, Koppal and Davanagere in the TB catchment are included in the River Valley Project.

- 1.7 To what extent is the management of surface and ground waters integrated? (question from D6.3)

Is such integration required in national policy or other legal documents, and can integration of surface and ground waters be found in recent main management plans? How well is the need for joint management of surface and groundwater understood by managers etc.

In TB, the concept of integration is new to water managers, and it has for the first time been specified in the National Water Policy (2000) and the Karnataka State Water Policy (2002). Section 6.1. in the Karnataka State Water Policy indicates as follows:

“Water resources planning, development and management will be carried out adopting an integrated approach for a hydrological unit such as River basin as a whole or for a sub basin, multi-sectorally, conjunctively for surface and ground water incorporating quantity, quality and environmental considerations. Development projects and investment proposal will be formulated and considered within the framework of river or sub-basin plan so that the best possible combination of options can be obtained for poverty alleviation, increasing incomes and productivity, equity, reduced vulnerability to natural and economic risks and costs. Solutions to water allocation and planning issues will be found adopting a demand management approach”.

Although it is understood and is stated as the future vision, implementation is not happening in a basin perspective. Traditionally, water management has been very sectoral in India and it had more emphasis on creating infrastructure (dams, irrigation channels,) and technologicval interventions. The departments have conflicting interests and often find it difficult to integrate their interests with a common a goal.

1.8 To what extent are water related ecosystems protected and restored? (question from D6.3) Are water related ecosystems rare or threatened by extinction in the basin; have the state signed international or national conventions to protect such environments such as the RAMSAR convention?

Refer – 1.4a

1.9 Have management plans for vulnerable riverine vegetation zones and species been established and implemented? If yes, which species or vegetation zones are covered in management plans, provide a brief description of the plans (time period, responsibility, object).

In TB, management plans do not exist at the catchment level. The Kudremukh National Park has a management plan that specifies certain measures to check the exploitation of the forests and wildlife within the park. This is according tot the Indian Wildlife (Conservation) Act, 1972., where conservation is seen as the main objective and no development activity is permitted within the park area unless permitted by authorities. Similarly, other protected areas within the TB catchment habe similar management plans prepared by the Forest Department.

1.10 Have there been a reduction or /increase in flow volume/water level over the last 10-20 years?

Try to find support for your argument with statistics
(statistics from the dam authorities can be of help here)

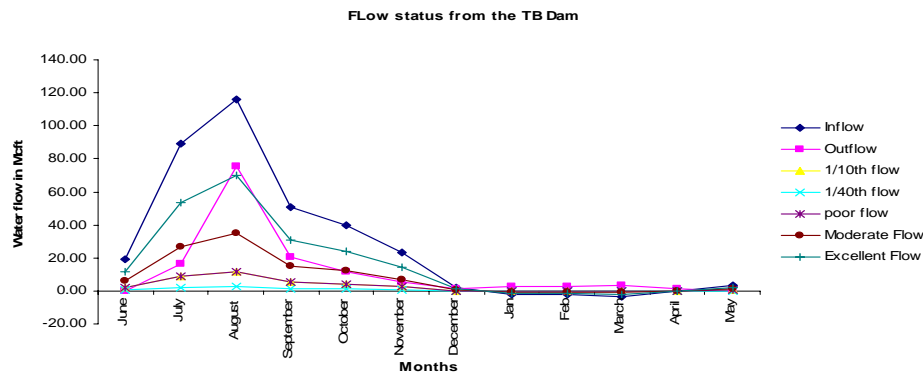
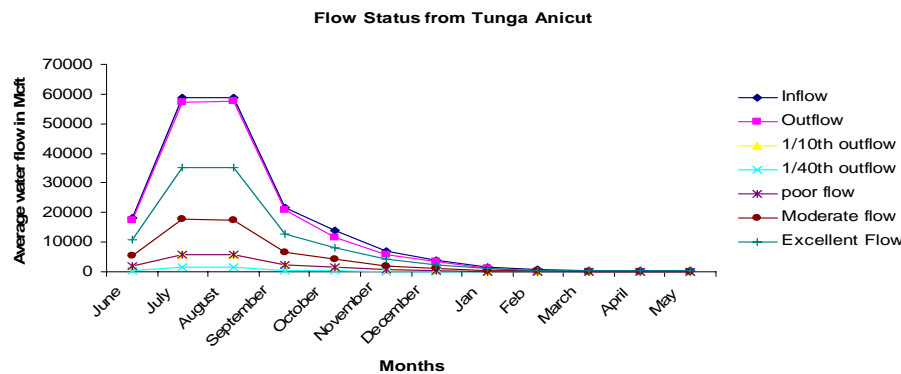
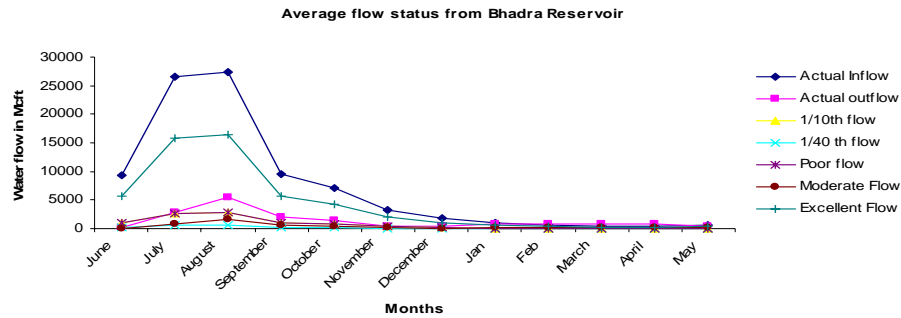
In the TB Basin, based on the water flow and presence or absence of water obstructing structures, the entire Tungabhadra river can be divided into three regions, viz. Region of Surplus, Controlled Flow and Deficit Region. Each region has its own characteristic and is given below based on the services provided.

Summary of present ecosystem services by Tungabhadra river has been summarized in Table 25

Flow status in the River Basin

The average flow status from the Bhadra reservoir of 33 years has been shown in fig 1, During the monsoon season it flows at a moderate level. In non-monsoon periods where the inflow is reduced completely, the outflow from the reservoir is significant. This is due to the commitments with the downstream user communities. The average flow status of Tunga Anicut has been shown in Fig 2. In Tunga Anicut, as Anicut, cannot arrest water completely than the utilization through canals, all the

months of monsoon has surplus water flow the status of flow is excellent. From the month of June to January it flows in excellent condition for the downstream, only in the month of May that the water flow is reduced to minimum flow to the downstream. Other than all the months are above the poor condition and not exceeded moderate condition. The water Flows from the TB dam to the downstream have been shown in figure 7 (annexure 6), May and June months show less flow in the river. It is mainly due to the lean months and pre-monsoon periods, less water inflow and there may not be the sufficient water in the reservoir.



1.11 Are erosion and sedimentation monitored on a regular basis in the basin? Give a brief description of who is responsible, what is monitored, how frequent in time and space.

It is not monitored along the basin. Sedimentation is monitored annually at the reservoir site and

Water Resources Department is in charge of it.

1.12 Have there been established mechanism to license and control effluent discharges from point and non-point sources? Describe the mechanism, and inform of responsibilities.

The Karnataka State Pollution Control Board (KSPCB) for Prevention and Control of Water Pollution was constituted by the Government of Karnataka in 1974 in pursuance of the Water (Prevention and Control of Pollution) Act, 1974.

The Board is enforcing the following Acts and Rules

- The Water (Prevention and Control of Pollution) Cess Act, 1977, and as amended in 1991
- The Water (Prevention and Control of Pollution) Cess Rules, 1978

The following Rules framed under the Environment (Protection) Act, 1986 are;

- Hazardous Wastes (Management and Handling) Rules, 1989, and Amendment Rules 2000
- Environmental Impact Assessment Notification, 1994 and 1997
- Bio-Medical Waste (Management and Handling) Rules, 1998, and Amendment Rules 2000
- Recycled Plastics Manufacture and Usage Rules, 1999
- Municipal Solid Wastes (Management and Handling) Rules, 2000
- Ozone Depleting Substances (Regulation and Control) Rules, 2000

The Central Office of the Board is responsible for making general policies relating to enforcement of the above said Acts and Rules and it also carries out general administration and co-ordination with other agencies.

In the Tungabhadra Basin, the enforcement of related acts and rules are being implemented through regional offices located at Davanagere, Raichur, Shimoga, Bellary, Koppal and Chickmagalur. Regional laboratories have been set up at Raichur, and Davanagere

Pollution Control Board has an important role in the water quality maintenance of the river. River Basin has a large number of industries across the river bank and water withdrawals and waste releases are made directly to the river. They carry sample testing across the river Basin and monitoring the water quality near all the major industrial outlets. They have formed the Tungabhadra Welfare Committee to take care of the water quality and management of the river. The Board has filed a petition against the urban local bodies to adopt the treatment plants to treat the waste water before discharge into the river. KSPCB is performing well but they are not dealing with the community directly in any case. The community along the river bank from Bhadravathi to Holehonnur (12 kms) and Harihar to Medleri (14 kms) are not much familiar with the role of KSPCB and its function in the river water quality management. It is very difficult and not good to any Governing body to work without involvement of the local community. The Board has failed to create its identity in the community and create awareness among the community.

1.13 Is water quality monitored on a regular basis in the basin (including water temperature, nitrate pollution, phosphor pollution, pesticides, toxic chemicals, microbial pollution, organic matter, heavy metals, algae)? Give a brief description of who is responsible, what is monitored, how frequent in time and space.

KSPCB has established divisional environmental laboratories at Davanagere, Raichur, to provide scientific support to the Karnataka State Pollution Control Board in the area of environmental analysis and data gathering.

Functions of the laboratory are as follows:

-To evolve standardised methods for sampling and analysis of various types of environmental pollutants

- To carry out such investigations as may be directed by the State Government of Karnataka and/or Karnataka State Pollution Control Board to lay down standards for the quality of environment and discharge of environmental pollutants, to monitor the standards laid down.
- To send periodical reports regarding its activities to the Karnataka State Pollution Control Board
- To carry out other functions as may be entrusted to it from time to time.

26 parameters are analysed at the Board Environmental Laboratories for Water samples

Under river water quality monitoring programmes, the Board is monitoring and analysing river water samples under Global Environmental Monitoring System (GEMS), Monitoring of Inland Natural Aquatic Resources (MINARS) and Board's Programme. Five samples are covered under GEMS, 40 under MINARS and 19 samples under Board programme through out the state.

Under GEMS programmes, two locations have been identified for water quality analysis in Tungabhadra river viz., Ullanur and at Honnali bridge. The regional offices at Raichur and Davanagere are responsible for monitoring water quality by collecting samples once in a month. While under MINARS and Board programme, the number of water samples collected and analysed is six and eight respectively.

Pollution control Board is responsible for testing water quality, which is done for 26 parameters every month in 11 locations across the basin.

1.14 Existence of water quality standards, for effluent discharges, minimum river quality targets? If such standards exist, describe them.

There are various standards set up for allowable concentrations of and parameters related to pollution. The most relevant are the drinking water standards specified by IS 10500:1991 (See Table 1). More detailed standards are also recommended by the CPCB for 45 parameters (See Annexure 1).

Table : Standards prescribed for Drinking Water in India

Substance/Characteristics	Desirable/Essential	Highest Desirable Limit (ppm)	Max Permissible Limit in Absence of Alternative source (ppm)
Calcium	Desirable	75	200
Magnesium	Desirable	30	100
Iron	Essential	0.3	1
Chloride	Essential	250	1000
Sulphate	Desirable	200	400
Nitrate	Desirable	45	100
Fluoride	Desirable	1	15
Total Dissolved Solids	Desirable	500	2000
pH	Essential	6.5-8.5	No relaxation
Total Hardness	Essential	300	600

Source: Bureau of Indian Standards: IS 10500:1991

River waters and water bodies have been classified into 5 classes as follows:

- Class A: Drinking water source without conventional treatment but after disinfection
- Class B: Outdoor bathing
- Class C: Drinking water source with conventional treatment followed by disinfection
- Class D: Propagation of wild/aquatic life
- Class E: Irrigation, industrial cooling and waste disposal

The KSPCB data for 2005-2006 show that the river can be safely classed as Class C throughout the year, while many locations may also be classed as Class B for some parts of the year and only exceptionally can a monitored river be classed as Class A.

Water Quality Testing

Standards prescribed by PCB

Sl. No.	Parameter	Desired limit	Permissible limit
1	Odour	Unobjectionable	
2	Taste	Agreeable	
3	Turbidity	5	10
4	Total Hardness	300	600
5	Iron	0.3	1.0
6	Chloride	250	1000
7	Residual chlorine	0.2	-
8	Fluoride	1.0	1.5
9	Dissolved solids	500	2000
10	Calcium	75	200
11	Magnesium	30	100
12	Copper	0.05	1.5
13	Manganese	0.1	0.3
14	Sulphates	200	400
15	Nitrate	45	45
16	Phenolic compound	0.001	0.002
17	Mercury	0.001	0.001
18	Cadmium	0.01	0.01
19	Selenium	0.01	0.01
20	Arsenic	0.01	0.01
21	Cyanide	0.05	0.05
22	Lead	0.5	0.05
23	Zinc	5	15
24	Anemic detergent	0.02	1.0
25	Chromium	0.05	0.05
26	Mineral oil	0.01	0.03
27	Radio active pesticide	-	.001
28	Radio active material		
	Alpha- emitter	-	0.1
	β – emitter	-	1.0
29	Alkalinity	200	600
30	Aluminum	.03	0.2
31	Boron	1.0	5.0
32	Conductivity	2100	
33	Nitrogen	15	
34	DO mg/l	4	
35	BOD mg/l	0	
36	COD mg/l	0	
37	Sodium mg/l	200	
38	Feacal coliform	0	
39	Discharge		
40	Velocity		
41	TKN	100	
42	Total coliform MPN 100 ml	0	
43	Total fixed dissolved solids	2100	
44	Phosphate	5	
45	Free ammonia	5	

1.15 Does the Pollution Control board use the results of water quality to influence policy decisions to curb pollution, if no, what are the reasons?

No. As of now, their role is to monitor and curtail pollution and can file legal case against the polluters. The basin approach is missing.

1.16 Are flood risks taken into account in broader land / water use management and environmental impact assessments? If yes, the answer should preferably include references to a legal document. Documentation of projects where flood risks have been included in water management would also be appreciated.

It is considered in the Detailed Project Report of the Water Resources Department.

2. Water allocation in the basin should in principle have been agreed between all relevant stakeholders/sectors within a given framework

Example guiding questions:

2.1 What are the mechanisms that exist for water allocation in the basin, who is consulted and who makes decisions? (environmental, political, social and economic concerns)?

This operates at many levels. The bulk of the allocation is made by the government, but this mainly pertains to the water that it controls and can control access to. For example much of the surface water stored in reservoirs (dams) is fully under the control of the government. However, there is dispersed water extraction and use on a large scale, especially in the form of groundwater, which is uncontrolled and unregulated, though some of the state governments have come up with legislations to control groundwater extraction, not in terms of allocation. The main department responsible for water allocation is the Water Resources Department (earlier called the irrigation Department) though other departments like sanitation and drinking water, industries, agriculture, etc. are consulted.

On the whole there is a continuous process of pressure from below from different stakeholders on the state machinery at different levels, ranging from larger policy levels to grass roots permissions and allocations. There are often 'project' level interactions that are important and to some extent they act as sub-basin mechanisms because most irrigation/multipurpose projects define sub basins on different streams. And outside these are the extra-economic and extra-political mechanisms in which socio-economic and locational advantages are deployed along with the power of bribery and corruption to modify allocations in one's favour. [TB]

This characteristic mechanism may be called a model in which the stakeholder interaction is a vertical one with the state agencies at the top and other stakeholders individually and separately interacting with these agencies and attempting to fulfil their own interests. Typically absent in this is horizontal interaction between stakeholders.

Of late, this is being modified in many ways. Growing awareness of the environmental awareness, pressure from international agencies, the growth of civil society initiatives aimed at effective participation in the governance process and in the interests of sustainability and equity has moderated this process and has initiated some horizontal processes as well. [TB] Participative farmers' management enactments or administrative provisions of the same are part of these processes. [TB-AP & K] The process is perhaps farthest gone in Maharashtra with the enactment of the regulatory authority for water issues.

There are two important characteristics of the situation that has emerged. It is basically the same vertical model which incorporates some stakeholder interaction and feedback, but is still very far from being able to establish agreements on water allocation *between* stakeholders. The problem is *not* that the decisions are in the hands of the political establishment, but that it does not allow for sufficient stakeholder interaction to bring about agreement based on common agreed frameworks. Secondly, these interactions take place around units that are not very efficient from the point of view of water management. typically they are based on political units (the village panchayat, the taluka, the wards, the assembly constituency or a project, department etc.) Basin and sub basins as units are lacking.

This implies that we will have to look at project level plans as well as the plans of the different units and departments together to see what picture they make together. [PART 1?]

2.2 Are traditional water rights respected when allocation takes place?

Traditional water rights mainly operated on traditional water systems like tanks, phad systems, etc. Traditional water rights were generally mediated by village institutions for smaller scale systems. A good example of this is the tanks in the peninsular India. They also rested on semi-autonomous water systems. Smaller water systems have generally been incorporated in the lowest rung of the irrigation systems of the state. [In Maharashtra, Minor Irrigation, ZP and GP are the bodies]. There is pressure on traditional water rights from both sides: from below, from the changes in socio-economic relations between traditional water right holders themselves and from the state efforts to rationalise and

incorporate these systems into the pattern that governs the larger water system in the state. On the whole, explicit rights at the village level tend to be respected within the village and within the constraints of the situation of the water systems (less water, encroachments, increasing pressures of economic use etc. [TB] Sometimes when the government comes up with new projects in place of the old, traditional systems, as it happened with the phad system in Maharashtra, the traditional water rights come in conflicts with new rights. (Ref. article by Sane and Joglekar in the water conflict book on Phad system in Maharashtra; pp.89-96)

2.3 Are legal agreements between sectors respected?

Since the allocation is done mainly by the state, the internal relations between the different departments governing the different sectors come into play. Probably there are no explicit legal agreements between sectors, but the allocations made for different sectors are by and large respected since they are internal to the functioning of the departments. However these allocations can be reviewed during times of drought and scarcity where the priority is for drinking/domestic water.

2.4 How are disputes resolved, which sectors dominate and why??

In India, water is a state subject and the role of the central govt. is restricted to general water policy guidelines and planning and inter-state matters including inter-state water disputes. Therefore disputes fall into two classes: inter-state disputes and intra-state disputes.

Interstate disputes are handled by tribunals and processes set up by the interstate disputes act. TB is part of the Krishan river dispute and the TB Board has been explicitly set up for the purpose of implementing the provisions of the tribunal award. Disputes are generally resolved by n multipartite negotiations, failing which tribunals are set up. There are also legal avenues for approaching the courts. At any given moment all three mechanisms are active in the inter-state disputes. As was evident at the stakeholder meetings, the pushes and pulls on the allocation between Karnataka and AP, and within AP between the Telangana and other regions are quite active. The business of annual allocation of water between the AP and K regions is also an operation that is very often a police assisted operation.

Most of the intra-state disputes are handled through the political processes described above, which are akin to vertical stakeholder lobbying. There is detailed discussion about these issues in the Water Conflict.

So far as sectoral balances are concerned, most of the change in allocation takes the form of change from rural and within it mainly irrigation use to other uses. The National Water Policy and the State Water Policies give water use priorities across different sectors, but very often they remain on paper and do not have much of relevance in terms of actual water use planning and allocation. Thus industrial use dominates in long term planning, urban water use in both long term planning as well as in annual and seasonal allocations. Also the growing Special Economic Zones in the country is also pushing the water sector in favour of the industrial use. The height of this is the Maharashtra State Water policy (2002) actually confers second priority to industrial use and agriculture has been pushed to the third place. Recently the industrial use seem to be dominating the water Governments usually have powers to curtail other uses in order to ensure drinking water, especially for the cities and small towns. Also there is a whole section in the Water Conflict book on inter sectoral allocations and the issues involved.

2.5 Defined roles of government (central and local)

2.6 Existence of legislation advocating Dublin principles?

No. There is no such legislation. However, recent enactments and policy statements show that a shift is indeed taking place towards incorporating some of the concerns expressed in the Dublin principles. This is more of at the level of rhetoric [describe on the basis of the state and central water policies].

2.7 Numbers of instances when water service providers experience a raw water shortage?

There is now a chronic and perpetual water shortage in many spheres.

2.8 Do the water allocation build on local knowledge?

From above, very little. Trend is towards excluding these knowledges, both because they are valued differently and also because the context of their application has also undergone rapid change rendering them inefficient in meeting the requirements of the new context. In the area of micro watershed development and traditional systems there is more talk of traditional and local knowledge.

Examples of indicators:

Do any allocation plans or agreements exist in the basin?

Yes. Krishna Tribunal award and TB Board Act. Also though not an integrated plan. Every department has its plan drawn up every year as also a 'vision' for the coming years. Since the time period of the Krishna Tribunal Award has elapsed the allocations between the three states are presently being re-negotiated.

Are traditional water rights referred to in the regulation documents?

As mentioned earlier traditional water rights operate only in traditional systems. Regulation is also new concept. In Maharashtra there is a water regulatory authority, which might come up soon in other states too. Very often in the case of irrigation water the water rights are defined in terms of area-crop basis. In the Maharashtra case some rights have been mentioned and even some areas excluded – for example, the PIM act has excluded systems which are being managed by traditional institutions (for instance the Malgujar tanks in Vidarbha have been excluded from the jurisdiction of newly set up WUAs under the PIM act, instead can continue with their traditional institutions) and areas where there is block system as in the case of Pravara system in Ahmednagar district their allocations have been protected.

Are there examples of collaboration between formal and informal institutions?

First of all we should have a clear understanding on what one call formal institutions and what are informal. In India by formal institutions we mean any institution created or established under the rule of law (legislative act etc.). In other words it has some sort of sanction from the state and the state can regulate its functioning. For example the different tiers in the Panchayati Raj system are all formal institutions. Also all organisations and institutions registered under an Act is a formal institution. Thus any institution/organisation that is not registered or set up under the legislative Act is an informal one. For example a youth club in a village is an informal institution. For example WUAs set up under the PIM Act or registered under the Cooperative Societies' Act are formal institutions. On the other hand a social movement trying to organise farmers on the issue of water which is not registered may be an informal organisation. Also institution can mean a set of practice, custom, rules and regulations which constrain one's behaviour and actions. In this sense also there can be formal and informal institutions. By and large the interaction between formal and informal institutions is limited. In fact interactions among different government departments which are formal institutions and are connected with water or river basin issues are also limited. The formal institutions interact with informal institutions only under pressure. For example if a farmers movement resort to agitational means then the concerned department or government agrees for discussion and dialogue.

3. Transboundary management in the basin - Tungabhadra River

Saravanan, V. S., Peter Mollinga, ZEF-Bonn Germany

Guiding questions:

3.1 Does the basin have any transboundary issues/problems?

1. Sharing of Tungabhadra water (discussed in detail below).

3.2 Does any legal agreement exist between different provinces or countries that share the water resources at basin level (for e.g the Bachawat Tribunal in TB) (a table of such agreements, year constituted, by whom??, current status?? Etc)

Use of Tungabhadra river water was put forward by Arthur Cotton first as early as 1859, as part of what would now be called a ‘master plan’ to link all major Indian rivers from north to south and east to west. Core objective was to create navigation facilities, but the canals were simultaneously meant to be irrigation canals. In the report of the Directors to the First Ordinary Meeting of the Madras Irrigation and Canal Company (MICC) in October 1859 describes sharing of Tungabhadra water through right and left bank canal (cited in Mollinga, 2003:97-98).

1. An Irrigating and Navigable Canal proceeding from the southern side of the Toombuddra [=Tungabhadra] River, and passing through the extensive and naturally fertile districts of Bellary, Kurnool, Cuddapah and Nellore, where it will join the East Coast Canal, and thus form a continuous water communication between the central Provinces, and Madras; taking its supply from the Rivers Toombuddra and Pennar, and other streams within its range, and also from large tanks or reservoirs in their neighbourhood and:-
2. A like ?? canal leading off from the opposite [=left] bank of the Toombuddra at the same point as the first, passing through the Raichoor Doab, the southern portion of the country lying between the Kistnah [=Krishna] and Toombuddra Rivers. (MICC 1859: 3)

A map of this plan we have been unable to find, but the first, right bank canal encompasses, apparently in a form of a single canal, the present right bank canals on the Tungabhadra river downstream from the Tungabhadra dam site up to the confluence of the Tungabhadra river with the Krishna/. The most downstream of these is the Kurnool-Cuddapah Canal (K-C Canal), the only canal that was actually built finally by the MICC in the 1860s, and which became a great failure in terms of revenue collection, agricultural irrigation and navigation (Deakin, 1893; Atchi Reddy, 1990). It was built way before the Tungabhadra dam was constructed (between 1945 and 1953) and diverted water from the Tungabhadra river by a pick up weir. It has in recent years been rehabilitated/modernised by the Government of Andhra Pradesh, with Japanese financial and technical assistance. The two main canals on the right bank directly taking water from the dam are the Tungabhadra Right Bank Low Level Canal and the Tungabhadra Right Bank High Level Canal. The second canal mentioned by Cotton is the present Tungabhadra Left Bank Canal, starting from teh Tungabhadra Dam. The latter three canals were investigated and designed in the 1930s and early 1940s.³⁶ The two right bank canals engineers by Madras Presidency engineers (Mehta, 1933; Thirumalai Iyengar, 1945; Raghavan 1947a, 1947b, 1947c) and the left bank canal by engineer of the Nizam’s Dominions

³⁶ Apart from these new canals, there is also a set of small diversion channels along this part of the river, the so called Vijayanagar Canals, built under the Vijayanagar Empire in the 13th to 16th centuries. As compared to the new canals the irrigated areas are very small, and they have also been partly integrated into the Tungabhadra project area. We also leave aside the Rajolibanda Diversion Scheme (RDS), a smaller canal on the left bank constructed after Independence, and now an inter-state canal between Karnataka and Andhra Pradesh (Ramamurthy, 1995).

(Hyderabad Princely State) (Gopalan, 1934). The engineers from Madras and Hyderabad were in agreement on the technical dimensions of the Tungabhadra project by the early 1930s. It took the two governments till 1944 to reach political agreement on the sharing of the waters on a 50/50 basis.

The Tungabhadra river was the boundary river between the directly British ruled Madras Presidency, where *ryotwari* tenure (individual land titles) had been introduced to stimulate modern agriculture, and the Nizam's Dominions, the Princely State of Hyderabad, where feudalism was the basis of agrarian relations. Madras was the paramount power, but needed the Nizam's collaboration for building a dam across the river. Negotiations on this stretched from the 1860s to the 1940s, in intervals, related to desires on either side to build smaller or larger irrigation systems. Initially Madras stopped about every single infrastructural proposal proposed by Hyderabad on the argument that it would reduce water supply to the fertile Krishna delta area, which was part of Madras Presidency. When the prospect of a large dam on roughly the present site came into perspective (around 1900) the collaboration of Hyderabad State was particularly important and sensitive, as the dam site on the Hyderabad side was part of the feudal estate (*jagir*) of the Salar Jung family, providing the Prime minister in the Nizam's Dominions government. During the protected negotiations, Hyderabad State slowly developed civil engineering capacity to design a large project on the left bank within its territory – in 1934 that design had actually been made and agreed upon with Madras engineers. Hyderabad did not intend to share the Tungabhadra waters other than on a 50/50 basis, and finally Madras had to accept.

Interests on the Madras side were ambivalent. Tungabhadra river waters went to the economically immensely successful and important Krishna delta, where rapid agricultural intensification happened through irrigation, starting in the second half of the 19th century, through the famous construction of the *anicut* (weir) at the head of the delta by Cotton in the mid-19th century. However, the Madras Presidency districts of Bellary, Kurnool and Cuddapah were extremely drought prone and heavily suffered from famines in the latter quart of the 19th century – with hundreds of thousands of people succumbing in such famines. There were regular calls to construct a so-called protective irrigation system in this region, to give a more secure base to agriculture through the provision of supplementary irrigation, and thus avoid social unrest/secure political stability (Famine Commission, 1880, 1881, 1898). In the immediate aftermath of famines such plans appeared on the agenda, with time, they tended to disappear again with commercial/revenue interests gaining the day on the Madras side. The protective irrigation systems were financially much less attractive options for a government to spend resources on than the so-called productive systems like those in the Krishna delta. Moreover, the K-C Canal episode of the 1860-1880s and experience with similar systems in the Bombay Presidency had shown that supplementary irrigation of 'irrigated dry', local crops did not attract farmers. The systems were heavily underutilised (Bolding, Mollinga and van Straaten, 1995).

The Madras ambivalence explains much of the very long drawn negotiations on the sharing of the Tungabhadra waters in this downstream part of the basin. Finally, however, first technical and then political agreement was reached a few years before Indian independence (in 1947), and building of the large Tungabhadra project started. The dam was completed in 1953, that is, first water was released for the first time then. The inter-state sharing issue was further complicated after independence through the redrawing of state boundaries, finally on linguistic lines in 1956. The dam at Mallapuram came to be located in Karnataka state (which was the earlier Mysore Princely State plus a number of additional districts in the Krishna/Tungabhadra basin). However, a substantial part of the irrigated area created under the Tungabhadra dam came to be located in the State of Andhra Pradesh (comprising most of former Hyderabad, but importantly, Raichur district, the location of the dam, going to Karnataka, and parts of the Madras Presidency, including the Krishna delta and the districts of the K-C Canal). Thus was created an inter-state project. Though there were intense negotiations on water sharing in the post-independence period, which were only finally resolved by the Krishna Water Disputes Tribunal

in the early 1970s, the allocation pattern agreed upon by the Madras and Hyderabad engineers in the early 1930s basically remained intact. The guardian of the agreement that was reached is the so-called Tungabhadra Board, which oversees the distribution of the Tungabhadra reservoir water to the two States of Karnataka and Andhra Pradesh. Allocation of water for hydropower generation at the dam is part of the agreement. The Board is staffed by engineers from both States and has been working very effectively and without much controversy (Lakshminarayana, 1990; Mollinga, 2003)

The Krishna Water Disputes Tribunal (also called as Bachawat Award after the Tribunal's Chairman) allocated water for both left and right bank canal at about 100 TMCft (Thousand Million Cubic feet), which was to be reviewed in 2000. The Tribunal allocated the quantum of water, but not the rules governing the distribution. The allocations have been calculated on the basis of 75% dependable flow in the river, meaning that on average one in four years there will be less water available. The Award is a static allocation pattern; it has no procedural component for dealing with such 'distribution of scarcity' issues. Three additional limitations of the award were noted (Venot, et al., 2007): (i) It neglected the relationships between surface and groundwater systems. (ii) The Award though calls for different beneficial uses (such as domestic, industrial, municipal, power generation and so on) it does not mention the relative share of these different uses. (iii) Need to investigate the return flows from large irrigation projects for establishing a sustainable allocation framework. On 4 August 2004, A New Krishna Water Dispute Tribunal was constituted, which is expected to reach decision in the course of 2008.

3.3 Are there examples where legal agreements between different sectors or provinces have not been respected?

The Krishna Water Dispute Tribunal gives quantitative yearly allocations of water: for example to the Tungabhadra Left Bank Canal it has allocated 100 TMCft per year as the basic 75% dependable allocation. There are no procedural mechanisms for dealing with scarcity conditions. It is such situations that generate public conflicts. However, it needs to be stated that such conflicts have been very rare in the past decades in this particular case. This unlike the Cauvery case, and the distribution between Tamil Nadu and Karnataka, with the Mettur Dam being the releasing point from one state to the next. However, Krishna and Tungabhadra basins are closing, through greater surface diversion, and subsurface extraction. The effects of this are particularly felt in reduced water supply to the Krishna delta, rather than in the Tungabhadra tributary basin itself. As it happens, due to technical problems with the construction of the canals, the Tungabhadra canals have never in their history drawn their full entitlements (Left Bank Canal has drawn 70-80% of the entitlement only from the beginning for instance as the canal was unable to take more water; see Mollinga, 2003). Even this allocated amount was never exceeded in the distribution. Issues are now occurring through the intensive development in the Krishna main river part of the basin (involving Maharashtra, Karnataka and Andhra Pradesh), and within Andhra Pradesh inter-regional issues are emerging (delta vs. upland part of the basin in this state, and within that upland part).

Rather than the Award not having been respected (which is an issue that arises mostly at the point of planning and constructing of new dam projects), the main issue in our analysis is that neither the existing Award, nor any other agreement, provides practical *procedural* arrangements for negotiating allocation and distribution under varying and changing circumstances. The mentioned weaknesses of the Award are the core issue, rather than the question of keeping or not keeping to its provisions. Given the present setup of the Tribunal process to renegotiation it is unlikely that much will change in this respect.

Day-to-day conflicts in water resources management occur one level below that of the basic allocation across projects in the Award. Water distribution within, say, the Tungabhadra Left

Bank Canal is heavily contested (Mollinga, 2003), and available evidence suggests that this is a very common phenomenon.

3.4 What is the general role of different agencies in negotiations (central, state, court of law, informal bodies)

The role of different agencies can be in two forms. The first is of formal type when the negotiations are constituted as per the Inter-State Water Dispute Act (ISWD) for constituting the Tribunal. In this there is involvement of the Central government officials as part of the Tribunal, and the respective State governments. The second forms involve short term and crisis management response to concrete issues to solve *ad hoc* problems, which are likely to increase due to river basin closure/increasing extraction and diversion. In the Tungabhadra basin, these play out at lower levels than that addressed by the Bachawat Award. In this there are many players. These players negotiate on the quantum of water in seasonal and shorter cycles, usually concentrated in specific periods or places of high demand (summer season rice cultivation with canal closure imminent; overlap period of cropping seasons, concentrated extraction of drinking water for cities from irrigation systems; and so forth).

3.5 Do the states conduct appropriate environmental impact assessments when planning new activities on transboundary waters? (question from D6.3).

In Tungabhadra basin no substantial new transboundary plans have been designed and implemented, as most of that space is already occupied by the present Tungavhadra Dam project, and the canals below it, after which Tungabhadra joins Krishna river. These projects/canals date from before the age of EIA.

3.6 Have basin/bilateral agreements been fully transposed at the national / provincial / local level? (question from D6.3)

No. The agreements at the Tungabhadra are all negotiated directly by states, with Central government basically mediating. The procedure for this is Centrally stipulated in an Act of Parliament, but for each basin there are separate processes (Tribunals)

3.7 Are neighbouring states obliged to notify and consult each other of planned measures? (question in the template for D6.3)

Yes, each state have an obligation to notify and consult each other of planned measures (as per various dispute tribunals), as per the Inter-State Water Dispute Act.

3.8 Do watercourse agreements oblige states to accompany such notification with available technical data and information, including the results of any environmental impact assessment? (question in the template for D6.3).

This is a difficult question to answer. Project proposals are accompanied by technical data, and there is a CWC (Central Water Commission) checking procedure – large projects need Central approval. At the same time States treat data very secretly, and a lot of confusion tends to exist around it. For instance, when requested by the Tribunal, States tend to produce contradicting/non-matching sets of data, which then involves extensive negotiation to align these.

3.9 Are states obliged to exchange data and information? (question in the template for D6.3)

No. To our knowledge there is no statutory requirement for States to exchange data and information in general.

4. Stakeholder involvement

Example guiding questions:

4.1 What initiatives have been taken up the state agencies to involve stakeholder and end users in water management (in planning, basin management plan preparations, land, water and irrigation management initiatives, new policy changes)?

There is a trend towards increasing the involvement of users/stakeholders/rights holders. PIM legislation is one example. Also pre-enactment consultation processes have been wider, in some cases they have been initiated where earlier there were no such processes in place. However, these efforts are limited and often are not driven by internal conviction and will but by external pressures from international agencies and civil society initiatives.

However, there is no stakeholder involvement in the formal sense. There are no specific stakeholder forums set up and even if some civil society group or academic institutions take the initiative to set up a multi stakeholder forum the government is not bound to participate, very often they do not participate and often the decisions taken in the Stakeholder Forums are not binding on the government.

4.2 How does this function in reality? What do the stakeholders feel about it?

Most stakeholders are still in a lobbying framework of mind. They are unsatisfied by their piece of cake but not necessarily the process. Stakeholders do not have access to information and data, and as said above stakeholder consultation and dialogue is not mandatory. There is no level playing field as the government departments and their institutions always have an upper hand and they dictate things. The only stakeholder consultation which is mandatory is the environmental impact assessments and under this the concerned department is supposed of organise public hearings in which any stakeholder can put up his/her viewpoint in theory. The experience so far is that EIAs are not done properly in an impartial manner.

Raju's PIM work is all relevant here.

4.3 Is there a standardized framework for stakeholder involvement with operational guidelines that has to be followed?

No. As said above, there is no formal sanction for stakeholder involvement and hence there are no frameworks presently. Some of the recent policy documents talk about the need to involve stakeholders. But as mentioned above there are spaces opening up for greater participation of users like participatory irrigation management and WUAs, or for drinking water it is there are water committees, etc. Most of these are also in the evolving stage. This has its drawbacks but also its advantages, in that there are more opportunities to shape the evolving structure to the specific regional and sectional needs.

4.3 b IF such exist, Is the framework satisfactory? – does it ensure transparency of the process?, is it open for anyone?, does it ensure participation from the poor, marginalized groups, women?

There are no frameworks so the question of satisfactory or not satisfactory does not arise. However, some of the participatory initiatives in the water sector like WUAs, water samities (pani samitis) have provisions for the participation of women members, tailenders, etc. However, membership to WUAs is limited to those who have land in the service area of irrigation projects.

4.4 Enforceable and adequate right of access to information (including environmental information)

Recently RTI has been enacted in many states. Manasi, look for RTI evaluations for Karnataka. The general trend is that though new avenues have opened up, routine processes have become more difficult. Also if the civil society groups can exert enough pressure then data and information are shared. In Maharashtra during the last few years the water resource department publishes water audits which is open to the public and get data regarding the filling of major and medium projects and the utilisation of the water.

Examples of indicators:

Special provisions made for participation of stakeholders (budget, forums, training, workshops, etc.)

As said earlier. In case of TB, the agitation against Grasim has led to the establishment of a watchdog committee type of forum where stakeholders can come together. and of course striver initiated processes are also there.

Sometimes the office bearers of WUAs are taken for exposure trips and training programmes are organised for them.

5. Capacity building is the key to effective IWRM

Example guiding questions:

5.1 What initiatives have been taken up by the state agencies for capacity building of stakeholders in water management

In most of the states there is a dedicated institution set up by the government for training. They are called water and land management institute (WLMIs). Both Karnataka and Andhra Pradesh have WLMIs.

The WLMIs organise training programmes especially for the office bearers of WUAs. First is PIM. Again Raju's work is the best source on this.

There is dispersed effort on the part of many development agencies as well as state agencies on better water management, organic farming, etc. These are mainly local and small scale. Some networking but not much. Also the training is more related to procedural issues of running and managing WUAs and very often little about IWRM.

5.2 Has any special budget been allocated by the water resources dept. or other relevant agency for capacity building

Yes. PIM info again Raju's work will indicate what the level of cost is. Also for other programmes. Each department has earmarked budget items for this. Though the funds may be small and there is lack of coordination. If all such funds are lumped together, may form sizeable.

5.3 What is the priority given by the state agencies?

5.4 How effective are these training programs (in terms of content, quality,)

Very often the emphasis of these training programmes is on procedural issues and not much on substantive issues related to IWRM.

5.5 What do the stakeholders feel about it?

Examples of indicators:

Special provisions made for participation (budget, forums, etc.)

Any training institutes set up, or special training programs designed (for e.g in TB basin special courses are set up for farmers to educate about Participatory Irrigation Management)

7. Water should be treated as having an economic and social value

Guiding questions:

7.1 What initiatives are present to treat water as an economic and social good? Is this regarded as an important principle in the basin? In such case by whom?

Water is still considered as a social good in the first place and then as an economic good.

7.2 Are the human and the animal health situation along the river basin carefully monitored? Describe how they are monitored and who is responsible for the task.

Primary Health Centres as providing service for both humans and animals are there, records are maintained but not monitored.

7.4 How effective are the emergency alleviation and response systems in limiting risk and protecting people, property and the environment? Describe the response system, and its efficiency.

Response is there but it is not that effective.

7.6a Is there pricing of water, or any such initiatives coming up??

Pricing of water exists for Agriculture, Industries and Drinking water.

7.6b Do farmers pay for water used? Do households pay for water?

Farmers pay for water but it is irregular.

Households also pay for water. However, the charges are based on flat rates in most of the towns, few towns do have meters. So, most of the times, the operations and maintenance costs are not covered.

7.6c Are some categories of water users exempted from paying water use tariffs (E.G., In TB, the socially backward groups are exempted from paying membership fees to WUCS)

In urban towns, some areas where slums are located are provided with public taps for which they are not charged.

7.7 Are traditional water uses allowed in the basin?

Yes

7.8 Does the law provide an effective emergency alleviation and response systems in limiting risk and protecting people, property and the environment?

Karnataka State National Water Policy 2002 focuses on several aspects, the ones that are applicable to the above are

Protecting environment

Catchments of the storages supplying water to urban centers will be protected from environmental degradation and industrial pollution. Steps shall be taken to ensure that effluents are treated to acceptable level standards before discharging them in natural streams.

Coastal Management Plan

A comprehensive coastal management plan will be prepared keeping in view the environmental and ecological impacts and future developmental activities regulated accordingly.

Rainwater Harvesting and Water Conservation

The efficiency of utilization of water will be improved and awareness about water as a scarce resource fostered. Rainwater harvesting and water conservation will be encouraged. Conservation consciousness will be promoted through education, regulation incentives and disincentives.

Ecology

Catchments of the storages supplying water to urban centers will be protected from environmental degradation and industrial pollution. Steps shall be taken to ensure that effluents are treated to acceptable level standards before discharging them in natural streams.

Ground Water Recharge

Periodical reassessment of the groundwater potential on a scientific basis will be undertaken. Exploitation of groundwater resources will be regulated so that it does not exceed the recharge capabilities. Ground water recharge project will be formulated and implemented.

Catchment and Command Area Treatment

Reduce siltation of dams through soil conservation and afforestation measures. Undertaken in co-ordination with the Forest Department and the Directorate of Watershed Development, measures for protecting the environment and improve the quality of life by planting different types of trees suited to the particular area. Allow water users organization to plant trees in the command area handed over to them for management and to share the benefits accruing with the Government.

Ground Water Recharge

Periodic reassessment of the groundwater potential on a scientific basis will be undertaken. Exploitation of groundwater resources will be regulated so as not to exceed to recharge capabilities. Ground water recharge project will be formulated and implemented.

Eco-Tourism

Efforts to restore natural landscape, develop habitat to attract inland and migratory birds, beautify landscape around shores and islands will be made. Eco-interpretation centres will be created to bring awareness and to educate society to protect and manage precious natural resources especially exit of life - Water

Disaster Management

Disaster Management strategy for drought and floods will be formulated.

8. Water management and Gender

Guiding questions:

8.1 a Do any initiatives exist in the basin that encourage women in water management? If yes, describe the initiatives

Yes, women are encouraged and made compulsory to be members formally in

- Water Supply and Sanitation Committee

Watershed Committee for management of watersheds

- Water Users Association

- Self-help groups

8.1b If so, how does it work , is this real or just on paper?? E.g. Women Self Help groups

It is mostly on paper except for exceptional cases where women are active members. It is their husbands usually who play their role.

8.2 To what extent are women able to exercise their right to participate in planning ? (question from D6.3)

As mentioned earlier, women are not able to exercise their right in planning directly. As the men are mostly landowners, women do not participate vocally. However, there is some understanding when it comes at the household level between men and women regarding consultation of crops, seeds etc but is absent at the community level.

8.3 Is women representation compulsory in water user societies (In TB, WUCS management should involve one women member)

Yes, it is compulsory.

Over the past decade the need to involve women and men in PIM at all levels of governance is becoming prominent. Action plans and recommendations have called for efforts to strengthen women's capacity to implement and manage water projects as well as provide them with equal access to information and decision-making channels. Participatory irrigation management is viewed as an opportunity that creates a context for mainstreaming women's participation and gender equity in irrigation management thereby reducing the risks of gender biases. Women undertake most agricultural occupations than men in addition to other livelihood activities. Therefore it is emphasized that the involvement of women can make activities more effective, inclusive and equitable (Raymond, 2004). A study conducted in Andhra Pradesh and Madhya Pradesh came with some interesting findings:

- The AP FMIS Act, 1997 has provided that every WUA should consist of all water users who are landowners in a water user's area.
- Very small percentage of women are landowners, thus denying them their rights. The situation is the same in Madhya Pradesh also; in the 1999 Act, only land holders had rights to vote. Very few women headed households had land in their name, thereby depriving women representation at the WUA level.
- In Madhya Pradesh, 98 and 830 women had been elected as presidents and members respectively of WUAs normal through electoral process in the study area; however, women occupied the present positions in WUAs at the behest of their male members, who were motivated by their self-interest of acquiring de facto powers.
- Women were not actively involved in playing their role as members.
- Women were not directly involved in irrigation activities. They did not perceive any direct and immediate benefits to women agriculturists, although all of them agreed that benefits would accrue to the family in terms of more assured irrigation and increased production. Their stake in irrigation management and participation in the WUAs was questionable.
- Amendments were suggested in Madhya Pradesh to have voting rights to both husband and wife and to recognize all voters as members. During the elections held in February 2006, 30 women were elected as presidents at WUA level, and 300 women as territorial committee members.

Are NGOs strong and include gender perspective

Yes, NGOs are strong and bring up gender perspective, however due to the vastness of the basin, the issues and problems are location specific. For example, during opposition of effluents from Harihar polyfibres being released into the river, it was one of the women activists, Mrs. Shobha Karajgi who played an important role in protesting and also involving and educating other women around. However, it is location specific, she will not be involved in the issues on other parts of the basin, or probably, at times will not be aware of the problems of the whole basin.

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Annex 2: IWRM assessment of planning documents in the river basins: Glomma, Sesan, Tagus – Spain and Portugal, Tungabhadra

Planning documents in the Glomma river basin; The Upper Otta case

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The Upper Otta concession is seen in relation to superior planning documents: - **“the Master Plan for Water Resources in Norway and the Protection plan”**.

Protection Plans. During the conflicts in the 1960s the idea of a protection plan started. A committee was established to prepare a proposal for a protection plan for river systems. Their proposal was accepted by Parliament in 1973. This plan was succeeded by three other protection plans, the last one was accepted by our Parliament in 1993. In 2003-2004 a Parliamentary bill suggested to supplement the “Protection plan IV” with 64 other water courses for protection. 341 river systems are now protected against further hydropower development. However, some of these rivers had developed hydropower by the time the protection plan was accepted. Such power plants and reservoirs could of course continue to run and be maintained.

The “Upper Otta project” was not in conflict with the protection plans.

Master Plan for Water Resources in Norway.

The main objective of the Master plan is to achieve a nationwide collective management of the river basins based on a set of economic, social and environmental considerations. The Master Plan states which projects should be considered first for a licence when development is necessary. It also specifies which water courses should preferably be reserved for other uses than hydro-power development. In the spring 1985 the government presented The Master Plan for Water Resources in Norway to the Parliament. The Master Plan can be described as a national coordinated plan for the management of watercourses. The plan includes a great number of watercourses and for each of them a hydropower project was worked out. Subsequent impact analyses were then carried out, taking into account a number of other user interests in the watercourse.

The main report presents a national plan for the management of watercourses based on a set of economic, social, and environmental considerations. For the master plan 16 user interests/topics for study were defined. These were: hydropower, nature conservation (including flora), outdoor recreation, wildlife, fishing, water supply, protection against water pollution, preservation of ancient monuments, agriculture and forestry, reindeer cultivation, prevention of flooding and erosion, transport, formation of ice and the temperature of water, climate, mapping and data, regional economy. For each water course and hydro-power project the impact on the defined user interests were assessed and the results presented in the reports on water courses. It was considered particularly important to ensure that all affected parties were given the opportunity to read the reports and submit their comments. The municipality, local interest organizations and relevant developers received both individual reports on water courses and finally the Master plan for comments.

The development of a “Master plan” started around 1980 as a result of the conflicts between environmental interests, hydropower developers and the authorities. The aim here was to put all remaining hydro power projects into two categories, category I, projects with minor conflicts, and projects that can be considered for a licence immediately, and category II, those to be dealt with at a later date, due to the large degree of conflict with other users or because the high costs involved. The Master Plan was accepted by Parliament in 1986 and been updated a couple of times since. In Norway we developed a large part of our hydropower potential before establishing the Master Plan.

The Øvre Otta case (transference of water from the Breidals magazine to the Raudalsmagazine in Skjåk municipality), was classified in Catalogue I, projects, all of which can be considered for licence immediately.

The Upper Otta project:

The Upper Otta project concerns in this report, the concession procedure for the construction and operation of hydropower stations in the Upper Otta area. The first notification and later application was put forward in 1992 and included transfer of water from several rivers (the of impact included: the main river Otta, and the smaller connecting rivers, Føysa, Tora, Vulu, Mosagrovi, Måråi, Åfotgrovi, Blankåi, Glitra and Framrusti) to the Glitra hydropower station and the Øyberget hydropower station (which were to be constructed) (Fig. 1). Two existing magazines (The lake Breidalsvatnet and the lake Raudalsvatnet) were included in the plans. No other magazines were to be constructed. This application was refused, and another application for a reduced alternative - to about half the original project; i.e. transfer of water from the lake Raudalsvatnet to “*Framruste power station*”, and from here to the lake Pollvatnet; transfer of water from the lake Heggebottvatnet where the water level is increased with 4 meters to “*Øyberget power station*”, and from here back to the Upper Otta river downward the water fall Dønfossen was put forward (fig 2). The Parliament granted concession according to the “Watercourses regulation act” to the power companies in 2001 for this application. This report documents the concession process.

The construction area concerns all water courses and water falls related to the hydropower development and is placed within Skjåk municipality in Norway (Oppland county). The hydropower development is estimated to generate a power production of 1049 GWh/yr. The construction period was estimated to take 3.5 yr. Total costs for the hydropower development including the construction of the power lines is estimated at 2 billion kroner. The building of the power lines will occur in “Skjåk”, “Lom” and “Vågå” municipalities. The building of the power lines needs concession according to the Energy law. The hydropower developers thus had to apply for a licence according to the Energy law as well. However, these documents and their assessment are not included in this report. Note that the issue of the power lines regardless of the different concession processes were regardless an important matter in this concession. This was likely due to people’s perception that granting a licence to the construction of the hydropower station, means accepting the whole part of the hydropower development (which of course includes the construction of the power lines). The construction of the power lines had according to some people perhaps the strongest impact on the environment and recreation. Also of importance, is that the municipalities with power lines only, did not receive any economic compensation / license tax etc

Early 1996, the power companies “Kraftlaget Opplandskraft”, “Tafjord kraft AS” and “Glommen and Logen brukseier forening” put forward a licence application for the Upper Otta project (the second application) (A license is a document which grants special permission to a specified company to develop and run power stations and dams specified in the license, including conditions and rules of operation, A license can also be defined as permission granted by the authorities to cause damage to the environment. However, the damage should be less important compared to the advantages of the project. The damage should not be larger than necessary, and may be mitigated at acceptable costs). The application comprised development and operation of the power plants Glitra and Øyberget, and transfer of several watercourses in Upper Otta to the already existing regulation reservoirs in

Breidalsvatnet and Raudalsvatnet (Fig. 2). (Glommen and Logen had already a reservoir licence for parts of the area and an additional regulation licence could enhance the production capacity in the envisaged power plants, and subsequently in all the power plants down the Lågen river and later on the Glomma river).

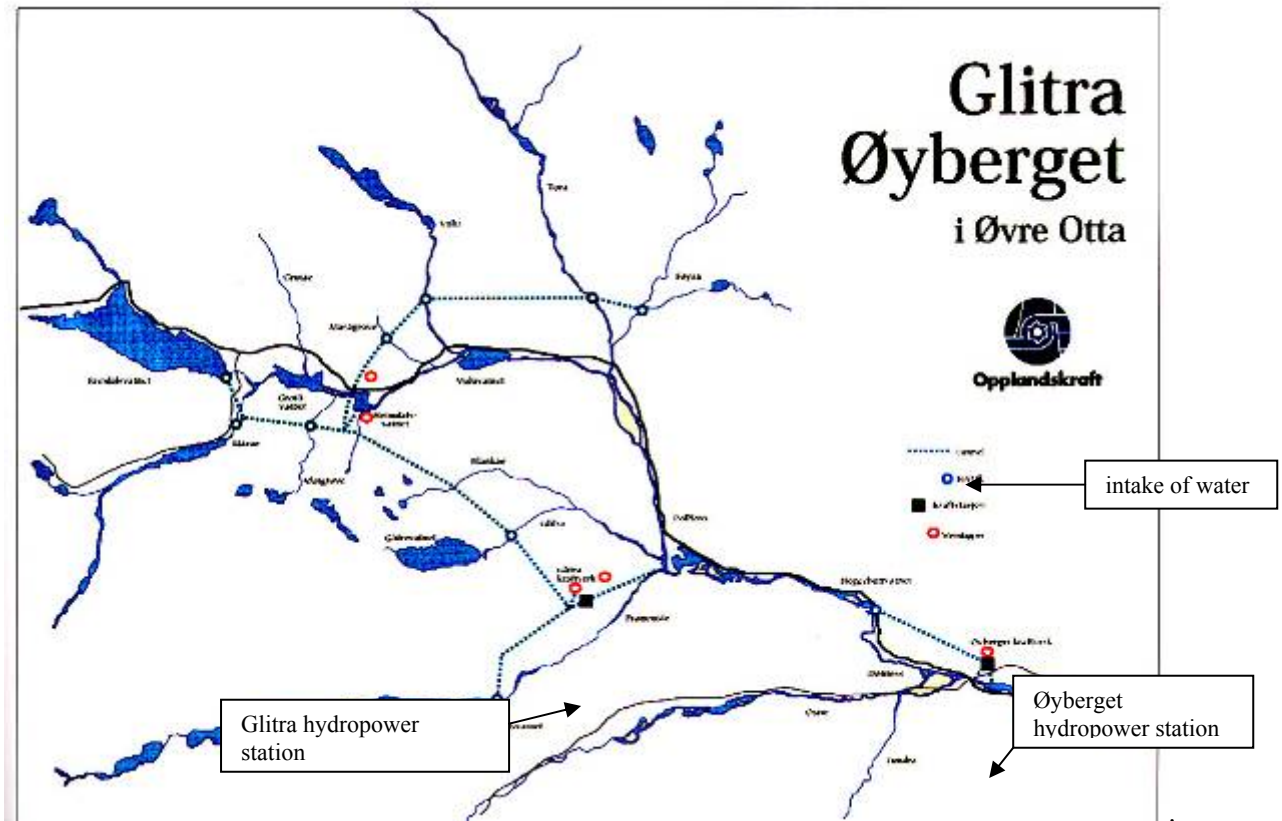


FIGURE 1 : map of original plan for hydropower development. The dotted lines represent the tunnels for transfer of water. The rivers from where the water is taken will then have a reduced water flow.

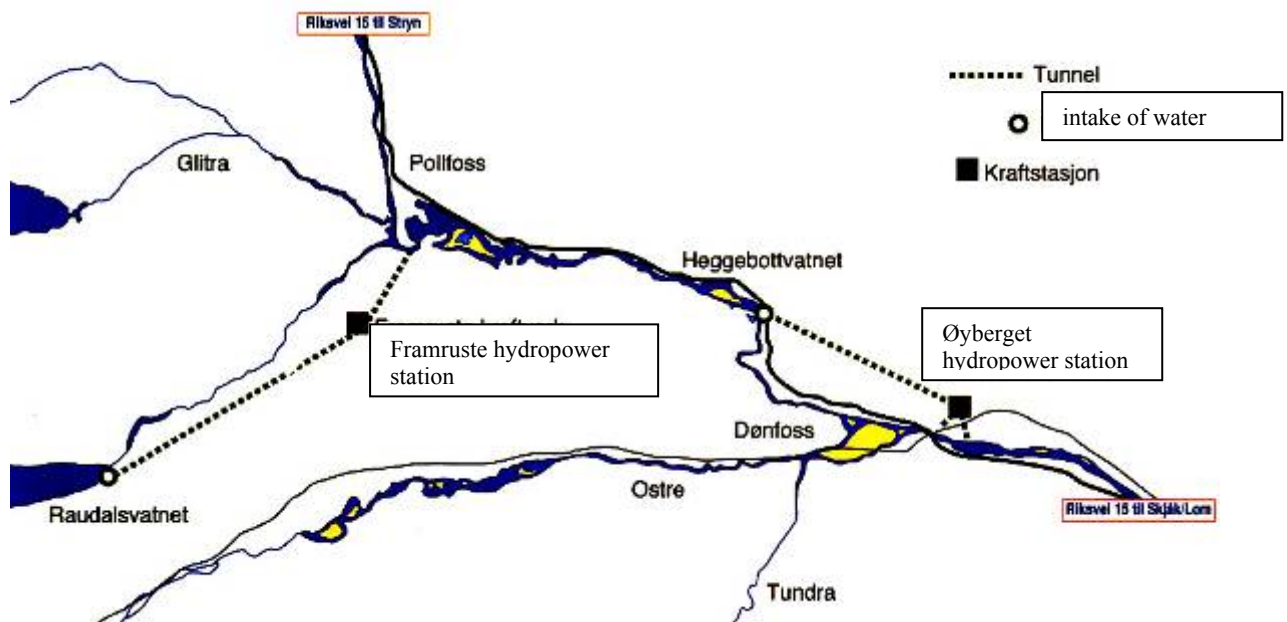


FIGURE 2: : *the plan that was granted a licence for hydropower development. The dotted lines represent the tunnels for transfer of water. The rivers from where the water is taken will then have a reduced water flow.*

A1 What are the main objectives of the plan? – list the main objectives of the plan, both the objectives of the master plan, and the objectives of the regional management plan.

The main objective of the project (concession) is to generate as much hydropower as possible for the hydro companies/the owners of the hydropower station, and for Norway, at the lowest environmental costs. Indirect-objectives include providing income for the Municipalities through taxes and licence fees (concession fees), generate employment and increase the economic activity in the area. Skjåk municipality was offered a 10% ownership in the hydropower station which they of course accepted. This offer was put forward for Skjåk to be in favour of the development.

A2 Do the objectives cover both socioeconomic and environmental concerns? List both the intentional and the unintentional objectives. An objective might be to reduce the negative impacts of the regulation, then the described negative impacts must be listed.

The Øvre Otta concession.

The objectives of the project cover socio-economic concerns in a narrow sense, namely to develop hydropower and earn money. A socio-economic advantage that follows the project is flood control and generation of employment, in particular in the building phase of the project. General socio-economic and environmental concerns are attempted through the reduction of the projects negative consequences for human recreation, and the natural environment.

Negative impacts:

- The water flow in parts of the Otta river will be reduced causing negative consequences for fish and aesthetic components. This will particularly be noticed in the winter season by ice cover.
- The regulation will reduce the recipient capacity of the river related to the capacity to receive effluents from households and agriculture. Negative impacts due to the reduced river flow on botanical occurrences.
- Negative impacts on the vegetation along side the river stretch with reduced water flow, as they have adapted to the existing water level and ground water level through the year will be negatively impacted. The increase of the water level in the lake Heggebottvatn with a maximum level of 4 m will destroy a swamp forest type, and a great part of the plant species diversity will be harmed.
- Reduced living areas / habitats for birds and animals, the negative impacts can mainly be attached to the planned damming of the forested small island in Heggebottvatnet.
- Reduced benthic fauna, (bottom dwelling), it is expected that the frequent regulation of the water will result in a lower bottom dwelling fauna.
- A NIJOS report state that reduced water flow in the river will have local consequences for ground water level. The report concludes that the impacts of a reduced ground water level on the farmers living in the area are modest since most farmers in the area have irrigation.
- Relatively few negative consequences for fish, and fishing activities.
- Hunting: During the construction period, the construction activity will potentially influence hunting opportunities in the Framruste valley. The most affected activity will be

big-game hunting for moose, deer and reindeer. The main reason for negative impacts on hunting is related to noise and increased level of activity from vehicles and construction workers. Populations of wild game may avoid these areas, reducing the quality of hunting opportunities.

- Recreation and tourism; – the reduced water flow, in particular summer and autumn will be perceived negatively for those who visits the area.
- Hikers on the trail between the Framruste mountain pasture and the unstaffed cabin Skridulaupbu, can be disturbed by noise and traffic during the construction period. The Grotli area will suffer from lower water level in lake Breiddalsvatnet and increased road traffic during the construction period (this part was rejected in the final concession). Reduced water level in the lake will during the construction period have impacts on fishing activity in this lake, complicate launching of boats, and visually for those who use the surrounding area of the lake and cabin owners with view to the lake.
- Roads and deposits will be projected as wounds in the landscape.
- Reduced water in the water fall "Dønnfossen" is negative both for locals and tourists. (*Dønnfossen was rejected in the final concession*).
- Power lines; two alternatives and each with negative impacts. The forest alternative, a line through the forest was planned close to the settlement area (was not approved of). With regard to the mountain alternative, the power lines would impact areas with conservation values, i.e. areas with living habitats for reindeer. These power lines were seen as having an essential impact for nature, environment and society.

A3 are these goals/objectives linked to specific strategies to achieve the goals? The objectives include both main objectives of the plan, as well as the objectives to reduce negative impacts, identified strategies should be described.

The Upper Otta concession

An important strategy to reduce the socio-economic and environmental impacts is the concession process, i.e. the hearing from all parties involved, all stakeholders, and the impact assessment. The object of the hearing aims to ensure that all (negative) aspects impacts of the regulation for all parties are put forward. All reports were sent for hearing to stakeholders, municipalities, hydropower companies, and local organisations. Participation from the municipalities was considered particularly important. The Impact assessment programme of the concession process further shed light on various negative impacts of the regulation. The impact assessment programme is decided by the Norwegian water resources and energy directorate (NVE) in collaboration with the Ministry of environment.

Specific strategies:

- The damming level was changed / reduced during the application concession process from 6 meter to 4 meter.
- The strategy related to ice: not specific strategy other than to monitor the ice conditions and adaptation of the situation at all cases. Det skal påsees at flømløp og tappeløp ikke hinders av is el.
- Fish and fauna - Fishing and hunting: the water levels in the lakes between the lake Breiddalsvatnet and the lake Heggebottvatnet will be artificially high due to threshold dams.
- Environmental flow, it is here assumed that the level of environmental flow ensures a continuous fishing, and maintenance of the sites flora and fauna. The recipient capacity of the water flow should be sufficient for human activities in the area (i.e. an increase in human activates should be allowed within the planned recipient capacity). Note, that the concession gives room for investigations (by the Norwegian water resources and energy directorate, NVE) in the area during operation of the hydropower station. In the case of inappropriate conditions according to the licence rules, NVE has the authority to ask the hydropower companies to operate / act according to their decision.
- Scars made by the construction will be replanted in consultation with a landscape architecture.
- The form of Buildings will be drawn by an architect to fit the landscape in the best way.

- Power lines gates (?) will be treated in a separate assessment in an application according to the Energy law. The original planned 300 KV power lines would generate considerable changes on the landscape. The power line trace was to be placed in an area, or border to an area suggested for permanent protection. These plans were changed during the licensing process and the power lines would be built for 132 kV. An alternative with less impact on the landscape.

Other requirements in the concession:

Concessionaires must ensure that the hydropower station is in good shape, must keep protocols to document the manoeuvres, and water levels. If required, notes of precipitation, temperatures, snow shall be taken. If the regulations cause harmful impacts for common interests, then changes in the regulation can be decided.

A4 are the goals integrated or are they in opposition? Describe which objects are in opposition and why.

The Upper Otta concession

The goals are partly in opposition: 1. the main goals lead to negative environmental impacts; 2. the goal to increase economic activity is opposed to the tourism business. It is expected that the tourism business will be reduced because of the regulation.

A5 are goals / strategies in line with, integrated with other national goals? (such as PRSPs)? Name the objects and describe how it integrates with other national goals.

The Upper Otta concession

The concession is in line with national goals, as the Parliament several times have expressed a wish to better utilize already regulated areas. National goals include the reduction of environmental impacts, but not to stop hydropower development. The concession also applies to the Master plan as it was classified in Catalogue I, projects, all of which can be considered for licence immediately (see page 2 for more information of the Master plan).

The plan does not go against the Convention of biodiversity, or any other conventions.

B Basin description and impact reports

B1 Does the basin description include a description of- and impact reports of environmental factors (including all biotic, a-biotic and polluting sources)

B1.1 Have the main different vegetation zones (alluvial and terrestrial) in the river basin been mapped and described? Substantiate the answer and List negative and positive impacts.

Vegetation types on areas that were impacted by the regulation have been mapped. This has been performed by the respective (Norwegian forest and landscape institute, NIJOS) and NINA (see references). The conclusion made by NINA is as follows: The planned development will only slightly impact important geological, botanical, wild life, fresh water biology occurrences. However, the report states that surveys are too spread out and too short to state how the regulation will impact the botany in the area. Some areas are of value for botanical occurrences and wild life.

The regulations will impact the plankton societies. The species composition is not expected to change much, but the structure of the population will likely be changed.

B.1.1a Do the report/planning document in particular pick up the issue of vulnerable or threaten botanical species ?

Yes, no such species have been identified in the report. (One nationally vulnerable lichen has been identified in the area, but this species is not locally rare). Note, however, that the report states that the area has not been surveyed in detail.

1.2 Do the report /planning document describe the fauna, and the *impact* of the regulation on the fauna? [Describe the impact of the regulation on the fauna](#)

B1.2a for birds?

Birds have been registered along side the water course and in the area where “massetippene” will be placed (NINA 2003). The increase of the water level of the lake Heggebottvatn will remove nesting places for ducks and waders.

The power lines will pose a potential danger of increased mortality for birds due to collision with the lines.

B1.2b for the benthic fauna? (bottom dwelling) and plankton

The benthic fauna has been registered by Norwegian institute for water research (NIVA). The regulation will result in reduced water level fluctuation and a certain increase in the temperature (not everywhere). This might result in an increase in the production and in the species richness of bottom dwellers and craw fish. Species which are adapted to the present conditions will likely be reduced, while other species will increase.

B1.2c for mammals?

Mammals have been registered in relation to the then possible hydropower development of the Upper Otta river. The increase of the water level of the lake Heggebottvatnet will reduce the pasture for moose.

-The development will not in any particular degree occupy areas which to day are being used for hunting or reduce the stock of important game species.

B1.2d for reptiles?

No information provided for this species group, this also includes insects..

B1.2 e for fish? [In particular provide in the answer conditions which cause reduced spawning conditions or migratory constraints.](#)

Report on conditions for fish, spawning conditions and migration has been provided by Brabrand, University of Oslo. Fishing in the lake Ruadalsvatnet has shown that the fish stock is relatively good when seen in relation to the great regulation height and the low temperature of the water. The hydrological changes will make the Upper Otta river a smaller river, this is anticipated to lead to changes in habitats in particular for larger fish, as they demand deeper holes.

Have the sensitivity of the different ecosystems in the river basin been evaluated?

Yes, as part of the different reports.

B1.1b Have vulnerable or threatened vertebrate or invertebrate species (fauna; fish, birds, reptiles, amphibians, mammals, macrophytes) in the area impacted by the regulation been registered?

There have not been registered rare or vulnerable plants, animals or birds in the area. A considerable local climatic change is not expected.

B1.3 Are the geology and the landscape in the area described and impacts identified?

B1.3a geology (soils?)

The soil has been mapped along side the river on places that will have changed water level as a result of the regulation. , and in the area that will be dammed in relation to the lake Heggjebottvatnet.

- The report describes the rock formation, the geology, the fluvial-geomorphology and the main aspects of the landscape. The mountain ranges are seen to have national value, while a several smaller areas are seen to have local value. The regulations will not impact essential geological values. The main impact is related to values of adventure and recreation in the area.

B1.3 b Landscape - Describe the briefly the landscape and the impact of the regulation.

The main impact on the landscape is related to the power lines of the regulation. The original planned 300kV power lines would generate considerable changes on the landscape. The power line trace will be placed in an area or border to areas suggested for permanent protection (protection plan IV) and a national park. The landscape in the area is flat and open so the line will be visible over large areas.

The original plans were changed during the licensing process, and the power lines will presently be built for 132 kV. An alternative with less impact on the landscapes.

B1.4 Description of the hydrology / hydro-morphology of the basin for the following elements :

B1.4a– Do the plan include a description of change in river water flow, (portion of the river with changed water flow after a regulation or urbanisation, change in water flow in relation to flood, normal water flow and low water flow)?

- Yes, targets for environmental flow have been determined. .
There have not been any particular targets set for flood control in the plan.

B1.4b Do the plan include a description of human made physical barriers or other physical change of the river bank or river basin (ex lowering of lakes, drainage, vegetation removal) in the basin and the impact? Describe the change and the impact.

The water level in the lake Heggjebottvatnet will increase with 4 meters, the impacts for birds, animals and flora has been described. Scars in the area related to construction work, the generation of tunnels and consequent masses has been described.

B1.4c Do the plan describe sedimentation and erosion patterns in the basin, and the impact of the regulation on these two aspects? Describe change and impact.

There is a report on erosion and land slide. The report states that there is no risk for erosion (only minimal erosion) nor land slides.

B 1.4c Do the plan includes a description of temperature changed due to ice-regime or others? Describe the change and the impact.

There is a report on ice and water temperature. The report provides: 1. an overview over water flow and the tap conditions in the water course of to day, and 2. a description of present ice and water temperature conditions.

B1.5 Ground water

The groundwater level in a river corresponds with the water level in the river. A reduction in the water flow can lead to a reduced groundwater level with implications for plant growth i.e. the plant roots might not reach the zone with capillary water.

B1.5a Have wells and springs in the basin been registered and described

No, there is no record on this in the reports. However, the area does not have wells or springs.

B1.5b Have the impact on the ground water been evaluated? [Describe the impact.](#)

Reduced water flow in the rivers will have local impacts on groundwater levels. The report identifies areas that will have such impacts, and sectors that will be impacted (forestry, agriculture and pasture). However, the regulation will have modest impacts on these sectors.

424 daa of agricultural area may be impacted by reduced ground water level.

B 1.6 Are the climate in the basin described?

B1.6a Temperature patterns? [State the description](#)

B1.6b Precipitation patterns? [State the description](#)

The climate was described in the Master plan for the Upper Otta project, chapter 1 “climate”.

Water quality and pollution

B1.7a Do the plan include a description of the water quality in the basin and the impact of the regulation ? [Describe the status and the foreseen impacts.](#)

According to nitrate pollution; Phosphor pollution; Pesticides; Toxic chemicals; Microbial pollution; Organic matter ; Heavy metals; Algae

Water quality and water supply, water pollution has been investigated by Norwegian institute for water research (NIVA), in an impact assessment related to the hydropower development in the Upper Otta river (NIVA 1993).

The report described the pollution status and the freshwater biological situation in the areas of impact, as well as the recipient capacity.

Skjåk municipality is an area with livestock and drain from manure. The Upper Otta river is the recipient for drainage from agriculture.

The proposed hydropower construction will not have essential consequences for the river, with regard to hygienic water quality, and the pollution situation in general. This is however, under the assumption that present level of settlement and activity pattern does not change. The recipient capacity will be reduced in the river stretches; Heggebottvatnet-Dønfoss, and Raudalsvatnet - Pollvatnet. This must be considered in the case of new settlements.

B1.7a Are pollution point sources described in the planning document? [List and describe the pollution point sources with impact on the basin, describe the recipient situation of the river /lake?](#)

There is no pollution point sources/industry in the area.

B1.7 Do the basin description include description of non point sources – industry, agriculture, forestry, mining activities, polluted sediments, transport, [List and describe the pollution non point sources with impact on the basin, describe the recipient situation of the river](#)

Non point-polluting sources have been approached on general terms related to estimation of recipient capacity of the river.

B1.3 g Are flood data recorded in the basin description?

No report on the flood situation has been made. However, the regulation will have a flood reducing effect.

A water course regulation will in many cases have a moderating effect. The rule for water course regulation says that floods shall not increase after a regulation.

B2 The socio-economic situation

B2.1a Has a population survey been performed in the area of impact? [State in the answer what has been surveyed and what has not been surveyed.](#)

A list of land owners impacted by the regulation / project has been made. The list is made based on economic maps, local people with knowledge of the area, and the state register of properties.

B2.1 b Does the plan provide information concerning the income distribution of people impacted? [Describe the income distribution.](#)

No information concerning the income of people is provided in the report, or as a background for decision making.

B2.1c Do the plan include an evaluation of the impact of the regulation on the economy in the area? [Describe how the regulation impacts the economy on the area of impact.](#)

The amount of income from the project is estimated. The stable income from the project after the construction period, when the hydropower is running consists according to the rules of the present: tax on income and capital, property taxation, and concession fees. It is however, expected a general increase in economic activity in the area as a result of the construction period and the general running of the project.

(Communal taxes according to present tax system (1998-99):

Capital tax : 5.5 million kr. / year

Income tax: 3.7 mill. kr. / year

Property tax: 7.7 mill kr. / year

Concession fee: constitute 2.0mill. kr. / Year..

A possible negative impact on the economy in the area, however, is reduced tourists in the area. See more, point B2.2c, negative impacts on tourism. This aspect is mentioned but impacts have not been evaluated in economical terms.

B2.1 c Does the plan describe the impact on employment /occupation in the basin? [Describe the impact.](#)

The construction period requires an increase work force in the area, however, a relatively large part of this force are expected to arrive to the area together with the contractor. However, this district has recruited many employees for such work and it can be expected that several local inhabitants will work at the construction. The project will provide increase employment within commerce, sawmills/timber business, engineering workshops and transport. It is stated in the report that, "according to experience it can be anticipated an increase in employment in the area of 10-25%. However, the employment will be temporary and end after the construction work of about 3.5 years. There will be few permanent in relation to employment within the hydro power stations (service).

B2.2 Does the plan describe the impact on the different land use sectors in area?

B2.2a on agriculture in the area of impact? [Describe the agricultural setting and the impact.](#)

A Norwegian forest and landscape institute (NIJOS) report state that reduced water flow in the river will have local consequences for ground water level. The groundwater level in a river corresponds with the water level in the river. A reduction in the water flow can lead to a reduced groundwater level with implications for plant growth i.e. the plant roots might not reach the zone with capillary water. he

report concludes that the impacts of a reduced ground water level on the farmers living in the area are modest since most farmers in the area have irrigation.

Skjåk municipality is an area with livestock and drain from manure. The Upper Otta river is recipient for this drainage. The proposed hydropower construction will not have essential consequences for the river, with regard to hygienic water quality, and the pollution situation in general.

Forest: impacts on forestry has been recorded for all planned “tipp-areal”, roads, power lines, the area being dammed, as well as areas alongside the river with large change in water level, the regulation will impact xx area of forestry.

The regulation will in general have little impact on the access to pasture in the area, however, in a otherwise barren area, the good pastures mean much.

B2.2 b Does the plan describe the impact on the industry in the area of impact ? ? [Describe the industrial setting and the impact.](#)

There is little industry in this area, thus the industrial setting has not been described related to the Upper Otta project.

B2.2c Does the plan describe the impact on the tourism in the area of impact ? ? [Describe the tourist setting and the impact.](#)

The tourist industry will be negatively impacted by the hydropower construction/development. It is the relatively untouched nature that is central in the recreation products. Several of the companies operate on part time, and the tourist industries have in general small economic margins. The negative impacts will in particular occur for the business around Polfoss and Dønfos which are closely connected to the Upper Otta River. Experiences from other areas (Holmengen 1992) show that this sector is quite vulnerable for changes in nature quality. The Polfoss water fall was not part of the final concession.

B2.2d Does the plan describe the impact on the recreation the area of impact ? ? [Describe the Recreational setting and the impact.](#)

B2.2c/d will be answered together as this for the Glomma much is the same. The recreation may perhaps be referred to as a local impact, while tourism has a more regional/national/international setting.

Seen overall, the channelling of water between the two lakes will probably have quite limited, lasting impacts on leisure activities in this area. It is only the water-related activities, such as fishing or e.g. boat rafting in the area between Lake Bredidalsvatnet and the estuary from Framruste hydropower station that will be affected by this development. During the construction period, the construction activity will potentially influence hunting opportunities in Framruste valley. The most affected activity will be big-game hunting for moose and deer. Reindeer hunting will experience little disturbance, in the area around Raudberget, but it is unclear whether this will lead to be any negative impacts at all. The main reason for negative impacts on hunting is related to noise and increase level of activity from vehicles and construction workers. Populations of wild game may avoid these areas, reducing the quality of hunting opportunities. Hikers on the trail between the Framruste mountain pasture and the unstaffed cabin Skridulaupbu, can be disturbed by noise and traffic during the construction period. The Grotli area will suffer from lower water level in lake Breiddalsvatnet and increased road traffic during the construction period. Reduced water level in the lake will during the construction period have impacts on fishing activity in this lake, complicate launching of boats, and visually for those who use the surrounding area of the lake and cabin owners with view to the lake.

A development will have great negative consequences for outdoor life and parts of tourism in the area. The area has a great regional and local value for various forms of recreation and leisure.

B2.2e Does the plan describe the impact on the cultural heritage / cultural monuments in the area of impact ? ? [Describe the cultural setting and the impact.](#)

Of registered preserved cultural monuments only a few was in the original plans in conflict with the development plans. However, in the final concession plans the hydropower development does not impact these areas.

B2.2f Other

Nothing.

B2.3 Does the plan include a general description of the socio-economic history of the area? [Describe the history](#)

The Master plan for the Upper Otta: Chapter 1; nature and society: geology, climate, water temperature and ice, vegetation, *human population and settlement, industry and employment, municipality resources.*

The socio-economic situation was illustrated in not in a particular report with socio-economy as the main focus, but aspects are covered in the report by NINA; impacts for recreation.

The local population in Skjåk have traditionally been connected to use and harvest of natural resources locally and in the mountain area. The natural environment is an important factor for the well being. It is likely that the municipality's rich and relatively untouched nature is an important assumption for the identification in the area (bosetting and stedstilknytning).

These conditions are not covered sufficiently according to this report by NINA. Important themes are economic valuation of harvest-recreation condition and impact of psycho-social conditions connected to hunting and fishing.

The damming of the lake Heggebottvatnet has been chosen such that permanent houses will not be impacted.

B2.4 a Does the plan include a description of the different sectors use of water (including marginalised groups poor and women)? The spatial and temporal variations in water cycle elements, such as water resources availability (m3/person/year), water use (litres/person/day). [Describe the different sectors use of water.](#)

Forest: impacts on forestry has been recorded for all planned tipp areas, roads, power lines, the area being dammed, as well as areas alongside the river with large change in water level. Change in water flow can lead to reduced productivity of about 1400 daa of forest. Most of this is older pine forest with medium low productivity class.

The regulation will in general have little impact on the access to pasture in the area, however, in a otherwise barren area, the good pastures mean much.

The regulation will in general have little impact on the farmer's use of water as most farmers have irrigation systems.

B2.4b If good drinking water is scarce, does the plan describe allocation efforts? [Describe the drinking water allocation efforts.](#)

Drinking water is not scarce. With regard to allocation efforts: considerations to drinking water go before any other considerations according to “Water resources Act”.

B2.4 c Does the plan describe the quantity of water for irrigation by different user groups? [Describe the irrigation measures.](#)

This has not been described in the plan. However, all farmers have their own irrigation systems. Act. No 82 of 24 November 2000 relating to river systems and groundwater (Water resources Act). – A landowner along a river system may without license abstract water for his household and domestic animals on the property. If there is shortage of water, the landowners along the river system have equal rights as needed to abstract water from the following purposes according to the following ranking: 1. permanent household, 2. domestic animals.

Anyone may use the river system for: 1. abstraction of water without digging trenches or using permanent pipe or engine power.

When the water authorities consider an application for a license for supplying water or draining, they should by public or individual notification seek to establish whether the measures can also meet the needs of other interested parties.

B2.5 a Does the plan describe equity aspects among water using sectors? [Describe these equity aspects.](#)

No this has not been described. The Act. No 82 of 24 November 2000 relating to river systems and groundwater (Water resources act), are meant to guide such aspects; “Anyone may use the river system for: 1. abstraction of water without digging trenches or using permanent pipe or engine power”. Act. No 82 of 24 November 2000 relating to river systems and groundwater (water resources act). – A landowner along a river system may without license abstract water for his household and domestic animals on the property. If there is shortage of water, the landowners along the river system have equal rights as needed to abstract water from the following purposes according to the following ranking: 1. permanent household, 2. domestic animals.

Anyone may use the river system for: 1. abstraction of water without digging trenches or using permanent pipe or engine power.

B2.6 Do the planning document include a review of the impact of the regulation on human activities, use of natural resources described (including consequences of the regulation for fishing, game hunting, recreation ? [describe the impact on the human activity.](#)

Yes, see B2.2

B2.4 Are possible conflicts approached and described?

Conflicts have been approached in the impact assessment, all comments received must receive a response from The Norwegian water resources and energy directorate (NVE).

Some hearing comments have demanded that the project should be presented for the Parliament anew., while NVE see the project as within the frames the Parliament made in 1999 for the use of water resources for power generation in the Upper Otta river.

Several hearing comments focus on lacking studies related to impacts of the hydropower development, in particular the impact for tourism. (However, the impacts for tourism /recreation were assessed through several reports attached to the application of 1996.

Several pose questions regarding the need for more hydropower and focus on our level of energy use and alternative ways to generate electrical power. Opinions on this matter are referred to, but the subject has not been approached.

C Have stakeholders been involved in the planning process or preparation of the documents or agreements?

Have stakeholders been involved in identifying the problem?

C.1a have stakeholders (private, public and civil society) been involved in the planning process?

[Describe how they have been involved.](#)

Stakeholders have been involved during the hearing process. Prior to the hearing process, a notification is sent to the central and local authorities and the public for consultation. This notification was sent to all parties of impact. All households in the construction municipality were given a pamphlet. Local people may also study the plans at the local post office, library or town hall. When and where the local plan may be studied is advertised in the local newspaper. After a hearing period of minimum 6 weeks, the impact assessment programme is discussed with the Ministry of Environment. After a quality control in The Norwegian water resources and energy directorate (NVE) to check that the application and IA-reports are in accordance with the guidelines and the IA-programme, they were sent on a new public consultation (to all parties of impact and all bodies entitled to comment. All households were sent a new pamphlet which described the plans and a number of meetings were arranged. Opinions concerning the application and IA-reports are sent to NVE within a fixed time period not shorter than three months. The ministry of petroleum and energy puts NVE's recommendation out for a new limited consultation including the ministries and the municipalities involved.

The applicants distributed in total 8000 pamphlets, and 2000 examples of a book which described the construction plans and the process.

The Norwegian water resources and energy directorate (NVE) received 57 hearing notes to the application and the impact assessment for the power lines.

The white paper concerning hydropower development in the Upper Otta river include hearing notes from municipalities, the county governor in Oppland, DN, Riksantikvaren, statens vegvesen, Norges geologiske undersøkelser og Bergvesenet, LD, Luftfartstilsynet, Statens naturforvaltningsråd, Norges naturvernforbund, og Natur og ungdom, Samarbeidsrådet for naturvernsaker, naturvernforbundet Oppland og naturvernforbundet Vågå, Friluftslivets fellesorganisasjon, Miljøstiftelsen Bellona, Reiselivsbedriftenes landsforening, Vern Øvre Otta, Skjåk allmenning, Vågå jeger og fiskarforening, Grunneier organisasjoner / private grunneiere, private grunneiere, privatpersoner.

The Norwegian water resources and energy directorate's (NVE) directors and staff meet the local people, politicians and NGOs on the site to hear their opinion and make a final inspection. NVE's recommendation to the Ministry of Petroleum and Energy (OED) contains a brief review of the application, conclusions of the IAs, and opinions from the applicant and the NVE's evaluation and conclusion. NVE is obliged to comment on every question raised during the hearing. The recommendation is available for the public.

C1b. Have marginalised groups; poor, ethnic groups and women (gender) been involved? [Describe how they have been involved if they have been involved.](#)

There has not been arranged, organised any particular initiatives to reach marginalised groups. However, open meetings (many attended, but few asked questions), and neighbourhood meetings (people asked question and provided comments) were arranged in all three municipalities. Generally it can be stated that through the license process all possible stakeholders were given information, and right to comments. Information concerning the project has been distributed to all.

C2 Did the stakeholders have possibilities for financial support to attend meetings? [Describe in what way?](#)

Local meetings were arranged, i.e. there is no need for financial support. It is possible for municipalities, organizations, and associations to apply for financial support within appropriate dimensions. The developer must by. This is not possible for individuals.

C 3 Was there decentralised localisation of meetings to facilitate participation? [Describe how.](#)

Neighbourhood meetings (people asked question and provided comments) were arranged in all three municipalities.

C 4 Have the project management/ project expertise included interdisciplinary representation (natural and social sciences)? [List the expertise included and describe how it has been used if possible.](#)

Yes interdisciplinary project expertise has been represented, perhaps a little weak on social sciences. Reports on socio-economic conditions were included in the Master plan (see page 2 of this document). The reason why it is a bit weak on social sciences was due to a limited number of landowners in the area (the municipality is the main landowner). The experts listed have provided expert reports on the mentioned conditions/aspects in the Upper Otta area. These reports have made the basis for decision making, and summaries from each report is included in the recommendations made by The Norwegian water resources and energy directorate (NVE), and in the final concession from the Parliament.

NVE, Norway's water and energy resources

- Ice and water temperature,
- Ground water aspects

NIVA, Norwegian institute for water research:

- Water quality, water supply and water pollution
- Undersøkelse av vannkvalitet og ferskvannsbiologiske forhold

The Norwegian forest and landscape institute:

- Impact for agriculture, forestry and pasture.

The Norwegian directorate for Nature management;

- Impacts on recreation and nature study/ natural science and geology
- Botany
- Wildlife and game
- Freshwater biology

Brabrand, University of Oslo:

- Fish and fishing

Oppland county the culture department, Skjåk municipality

- Cultural heritage impact analysis

The Master plan for the Upper Otta

- Chapter 1; nature and society: geology, climate, water temperature and ice, vegetation, human population and settlement, industry and employment, municipality resources.

C5 Were information to stakeholders provided in the relevant channels? [List the channels used, and describe how they will reach stakeholders, and which stakeholders](#)

The notification and the IA-program are sent to central and local authorities and the public for consultation. 8000 pamphlets were sent to households in the area. Local people may study the plans at the local post office, library or town hall. When and where the plans may be studied is advertised in the local newspaper. The Norwegian water resources and energy directorate (NVE) organize one or more (two was organised) public meetings in the project area to give information about the licensing process and the project plans.

C6 Were information of project given in advance to stakeholders? [Describe the information process.](#)

Three public consultations, and full transparency in the process are basic elements in the democracy. A notification which contains a description of the project plans, including alternatives, a general description of the area and conclusions about any environmental reports related to the project is sent to all concerned parties to make comments on the project and the proposed IA programme. This first hearing period covers a minimum 6 weeks. The second hearing includes comments to the application and the IA-reports and covers at least three months. NVE is obliged to comment on every question raised in a hearing.

C7 Were information of the project given in local languages, and in an understandable manner? [Describe the situation.](#)

Information of the project was given in a popular manner, in a language that everyone can understand. The notification is worked out by the developer (future applicant) and contains a description of the project plans, including alternatives, a general description of the area and conclusions about any environmental reports related to the project. This notification is an invitation to all concerned parties to make comments on the project and the proposed IA programme.

C8 Do the problem identification reflects the water user interests in the basin? [Describe how it reflects or do not reflect the water use interest.](#)

The problem identification related to the hydropower development of the Upper Otta river reflects the water user interests in the basin through the hearing consultations of all parties of concern. All comments are included in the recommendation from The Norwegian water resources and energy directorate (NVE).

C9 Does decision making follow principles of democracy (i.e. ...)? [Describe how it does follow such principles or why it does not follow principles of democracy.](#)

Yes, it follows principles of democracy. The hydropower legislation and the licensing process, including three consultations and full transparency in the process are important aspects in a democratic society.

C10 Which sectors dominate/influence the documents most and what sectors are poorly represented and what sectors not included at all? [Describe the situation.](#)

The Norwegian Water and Resources and Energy directorate (NVE) dominates the process as they are responsible for the administration of Norway's water and energy resources. NVE also has the authority to control the license conditions and rules of operation. OED The municipality's view is important for NVE. The ministry of Petroleum and energy (OED) should also be mentioned as it is a competent authority. All other sectors have the right to comment.

C 11 Were water allocation agreed among stakeholders ? [Describe the situation](#)

Were the regulation agreed?

Skjåk municipality was in favour of the development (the construction work occur in Skjåk municipality, - and also the income generation – licence tax, but also as a owner of the hydropower station (10%)), Lom, Vågå and Sel (very little impact on this municipality) municipalities were against. The last three municipalities will have power lines, but no economic profits. Nature and recreation NGOs were against the development. The opposition towards new large reservoirs and regulation schemes in the Jotunheimen mountain area was fierce, while the developers argue for "clean energy" and the use of our natural resources for economic purposes.

The regulation process ended with a compromise, as only half the original plan was granted a license.

D What are Governance concerns of the plan/planning process?

D.1 Which institutions have been involved in the planning process ? [List the institutions involved and describe how they have been involved.](#)

1. *The Parliament* : The applicants can in the case of rejection of a proposal demand a handling in the Parliament. The OED, and the government rejected the Upper Otta hydropower development plans 23rd of February 1998. With another hearing in the Parliament, a concession was granted but for a about half the original project (June 7th, 1999).

2. The Government- The government through relevant ministries will have their say in the different hearings processes. All were positive to the development. The ministry of Environment was perhaps caught by the placement of the project in category I (projects that could be developed), as the ministry was leading this work.

2. The ministry of Petroleum and energy (OED): The OED is the competent authority which decides whether EIAs shall be required for projects. The competent authority shall process the notification and the EA- statement. This includes determination of the content of the study programme and approval of the EA-statement. The competent authority shall co-ordinate processing pursuant to EIA regulations in line with special legislation: provide correct information to the developers, the related authorities and the public, make the related authorities and the public, make the overall evaluation and determine the conditions. The Norwegian Water and Resources and Energy directorate is responsible for the operating these regulations, while OED makes the "final decision" based on the work of NVE. A possible twist regarding the understanding of the regulations are decided with binding effect by OED.

3. The Norwegian Water and Resources and Energy directorate (NVE) is subordinated to the Ministry of Petroleum and Energy, and is responsible for the administration of Norway's water and energy resources. NVE also has the authority to control the license conditions and rules of operation. The licensees have to pay NVE the full costs for this kind of supervision and control. The Norwegian Water and Resources and Energy directorate is responsible for the operating these regulations, while OED makes the "final decision" based on the work of NVE.

4. The ministry of Environment (MD) – The developer proposes an impact assessment programme, after a hearing period of minimum 6 weeks the IA programme is discussed with the *ministry of environment* and determined by NVE.

5. The directorate and ministries (environment, pollution, cultural heritage, mining, roads, agriculture) – shall provide expert comments and propose conditions.

6. The country governor / the county - shall conduct on the process involving local experts and politicians.

7. The Municipalities – makes the plans and the EIAs available for the local population. The municipality shall conduct an evaluation process involving local experts and politicians submit their comments to NVE and the county.

D2a What governance levels are included in the planning process? (supra-national, national, state, province, districts, lower levels)

Municipality level (Skjåk municipality, Lom municipality, and Vågå municipality)

Regional level; the county governor,

State /National level: the Ministry of petroleum and energy, and the Ministry of environment, and The Norwegian Water and Resources and Energy directorate (NVE).

D2b Has there been a decentralised planning process ? If no, argue for the point of view, if yes described how it is decentralised.

The planning was initiated partly by local power companies, the power companies “Kraftlaget Opplandskraft” and “Tafjord kraft AS”. The third hydropower company the “Glommen and Logen brukseier forening” is not local. The Norwegian Water Resources and Energy Directorate, principal actor in the planning process is not local, but various local parts have been active in the whole process. NVE has appointed one concessionaire in the given geographical area as the grid company responsible for the study. The responsible analysing grid company has the liability to coordinate the concessionaires

Planning areas

There are established 18 planning areas in Norway, 17 regional areas who comprise planning in the regional grids [33 kV – 132 kV] and one for planning of the national grid [132 kV – 420 kV]. Generally the areas follow the county borders, but there are some exceptions.

D 3. Are the objectives of the plan linked to an institutional framework/legal framework? Describe how they are linked to an institutional / legal framework (for more explanation see brief example from Glomma below).

In 1990 the licensing procedures were co-ordinated with the Planning and Building Act, with respect to provisions about notification and Impact Assessments (IAs). This means that the Norwegian licensing procedures for hydropower development also adhere to European Union Directives. (Most recent regulations of May 1999).

The procedures may be rather complex, however projects with less average energy production than 40 GWh/year, may have less complex procedures without notification.

The procedures require that the relevant authorities and public are involved in the process at different stages. For smaller projects without notification time for the licensing process takes from one year to five years, with two/three years on average. For bigger projects with notification the procedures take from two to six years or more. The time needed for approval depends on how controversial the project is, the time used on EIAs, the working capacity of the competent authorities and whether the fixed time limits for comments on the notification and the EIA can be met.

The institutional framework/legal framework includes the “licensing procedures for hydropower development in Norway that had to be followed for the Upper Otta project included the following aspects:.

Notification. The *notification* is worked out by the developer (future applicant), and contains a description of the project plans, including alternatives, a general description of the area and conclusions about any environmental reports related to the project (in Norway these could be reports made for the master plan). The developer shall also propose an IA programme following the notification. At this stage the developer should not start making any IAs, but the notification is an invitation to all concerned parties to make comments on the project and the proposed IA programme.

Public consultation/public meeting. The notification is then sent to central and local authorities and the public for a consultation. Local people may study the plans at the local post office, library or town hall. When and where the plans may be studied is advertised in the local newspaper. NVE will organise one or more public meetings in the project area to give information about the licensing process and the project plans. It is important to tell the public that at this stage we would like to receive opinions as to alternative plans and possible conflicts related to these plans or parts of the project. Comments on special rights/use of water and area are also of great interest. Separate meetings to inform local administrations and politicians may also take place.

Determination of IA study programme. After a hearing period of a minimum of 6 weeks the IA programme is discussed with the Ministry of Environment (ME) and determined by NVE. The IA-programme may contain one or more topics within the following main subject areas: environment, natural resources and community issues.

Application and IA report. The applicant determines the start of the next stage. He is responsible for the IAs and their quality standards. He may carry out some of the IAs himself or hire experts. At this stage co-ordination and close co-operation between both technical and IA experts is crucial for developing the best hydropower projects or alternatives. It is also of great importance to involve the local people at this stage. After quality control in NVE to check that the application and IA-reports are in accordance with the guidelines and the IA-programme, they are sent on a new public consultation. The application should also contain a proposal for rules of operation for the reservoir and power station.

Public consultation/public meeting. The consultation also involves the central and local authorities concerned as well as the public. Opinions concerning the application and IA-reports are sent to NVE within a fixed time period not shorter than three months. At least one public meeting may also take place in the project area. The applicant is given the opportunity to make comment on the other opinions.

IA-report approval and NVE's overall evaluation. Before the overall evaluation starts, NVE must approve the IA-reports, and confirm that no further IAs is required. At this stage NVE has the application, the IA-reports, the opinions from the concerned authorities and the public together with comments from the applicant. This is the first chance in the process to make an overall evaluation. Before making the final decision NVE's directors and staff meet the local people, politicians and NGOs on the site to hear their opinions and make a final inspection. NVE's recommendation to the Ministry of Petroleum and Energy (OED) contains a brief review of the application, conclusions of the IAs, and opinions from the public consultation, comments from the applicant and NVE's evaluation and conclusion. The evaluation consists of a discussion of all the costs and benefits of the project including environmental issues. It is obvious that environmental aspects have become more important over the years, and both the developers and the authorities are required to operate within certain unwritten environmental standards. We are obliged to comment on every question raised during the hearing. In our conclusion we may choose between alternatives, reduce the scope of the project or even propose rejecting the application. However, we cannot expand the project outside the range of the application. NVE's recommendation is available for the public.

Conditions. NVE's recommendation for a license also contains a set of conditions regulating the whole "life" of a license: From approval of detailed construction plans regarding landscape, environmental and safety aspects, plant maintenance and even closing down the plant. Owing to these conditions the developer must also take precautions regarding preservation of cultural heritage, pollution and other environmental issues. This could involve constructing weirs, building fish ladders, correcting river courses and removing vegetation from regulated zones. In addition there are requirements as to how the constructions are to be carried out and adapted to the landscape. Finally, the conditions also include construction deadlines and a general cleaning up of the area.

The State Company and companies owned by municipalities and counties receive their licenses for an unlimited period of time. Private companies (more than 1/3 of the shares) receive their license for maximum 60 years with reversion to the state at the end of the period. The entire power station, dams etc. must be delivered to the state in a proper condition without compensation. The conditions can be revised 30 to 50 years after the license has been granted.

The owners of the power stations are also obliged by these conditions to pay annual fees to the municipalities and the state. In addition they may also be obliged to establish special funds to encourage local industry. Along with property and income taxes this makes some of these hydro power municipalities wealthy.

The owners of all power plants who use water from reservoirs and who have a license according to the Acquisition Act are obliged to deliver power (10 %) at non- or low-profit cost to the local municipalities. This was originally intended to secure the local power supply, but is now seen as a form of compensation for permission to use the resources and environmental disadvantages. In addition it provides the municipalities with an opportunity to earn extra money by purchasing energy on the market.

Failure to adhere to the agreed conditions can result in a fine and repeated violations may result in withdrawal of the license. Our experience is that the companies seldom violate the conditions. However, the free energy market, and near shortage in the market seems to have tempted some companies to operate on the margin of what is permissible regarding required water levels in reservoirs or minimum water flows.

Rules of operation. NVE also makes proposals for rules of operation, which may differ, from the applicants' proposals. At a minimum the highest and lowest regulated water levels in the reservoirs have to be stated. Other restrictions such as seasonal variation on the quantity of by-pass water and minimum water flow at any place in the river system in question may be stated if necessary. Examples of very detailed restrictions for the downstream water flow can be found. Compensation water is intended to preserve some of the life in the rivers and the character of the landscape often in combination with weir pools. Fish and fishing, especially involving salmon and trout are often seen as important to preserve. Pollution may be a factor when deciding the value and variation of the compensation water. A number of different user interests may also be considered, such as irrigation, boating, rafting and swimming.

The rules of operation also include rules for flood operation. The main principle is, if possible, the natural flood discharges and increased flood water levels must not increase.

Changes in operation, water levels and water flows must be logged for documentation and control by the authorities. Sometimes the first 5 years of operation are used as an experimental period to optimise the rules of operation for multipurpose use. The rules of operation can also be revised 30 to 50 years after the license is granted.

NVE also has the authority to control the license conditions and rules of operation. The licensees have to pay NVE the full costs for this kind of supervision and control.

Handling by Ministry. NVE's recommendation signed by the Director General and all documents are passed over to the Ministry of Petroleum and Energy (OED). The Ministry puts NVE's recommendation out for a new limited consultation including the ministries and municipalities involved. The larger projects are prepared for discussion by our Parliament. The Ministry alone processes smaller projects, and licenses are granted by the King and the Government. Normally there are merely changes in the final license compared with NVE's recommendation.

Compensation for property and rights of use. The developers are obliged to negotiate with the right holders, or acquire the right to expropriate. The principle is that the right holders are entitled full compensation normally an amount of money (annually or one-off payment). If the negotiations fail, a court of appraisal determines the compensation.

D 3b. Are objectives linked to regulations or law? [Provide a brief explanation of this relationship :](#)

An objective of the project is to reduce socio-economic and environmental impacts. This objective is supported by several laws:

The Upper Otta hydropower development needs a licence according to the Water Resources Act. The purpose of the act is to ensure socially proper use and management of river systems and ground water.

The Plan and building act - In 1990 the licensing procedures were co-ordinated with the Planning and Building Act, with respect to provisions about notification and Impact Assessments (IAs). This means that the Norwegian licensing procedures for hydropower development also adhere to European Union Directives. These procedures require that the relevant authorities and public are involved in the process at different stages. The Impact assessment and the notification and hearing help ensuring that negative impacts are identified. Identification of negative impacts is necessary for actions of measure.

The Energy Act The power line construction and adaptation to regional power system plan needs concession granted from the Energy Act.

Cultural Heritage Act: Negative impacts on cultural monuments or heritage are linked to the law on Cultural Heritage Act – the construction work shall not be in conflict with registered or automatically protected cultural monuments.

Pollution control Act: Negative impacts leading to pollution (either) are linked to the “Pollution control act”. Both the construction and the running of the power stations need licence accordance to the Pollution control Act.

Wild life Act: Negative impacts on the natural environment are linked to : the “Wildlife act”; Wildlife and habitats of wildlife shall be managed in such a way that the productivity of nature and the diversity of species may be preserved. Within this framework, wildlife may be harvested for the benefit of agriculture and outdoor recreation.

Disease control Act:

The purpose of this act is to protect the population from communicable diseased by preventing their occurrence and hindering them from spreading among the population, and by preventing such diseases from being brought into Norway or carried out of Norway to other countries. The Act shall ensure that health authorities implement the measures necessary to control communicable diseases and coordinate their efforts to control such diseases. It has not been necessary to use this Act in relation to the Upper Otta hydropower development, but could be used in relation to recipient rules of the Otta river.

Environmental Information act, The purpose of this Act is to ensure public access to environmental information and thus make it easier for individuals to contribute to the protection of the environment, to protect themselves against injury to health and environmental damage, and to influence public and private decision-makers in environmental matters. The Act is also intended to promote public participation in decision-making processes of significance relating to the environment.

Nature Conservation Act: natural habitats and wild flora and fauna are national assets that must be protected. Any disturbance of or intervention in the natural environment should only take place on the basis of long-term, all-round management of natural resources, which takes into account the preservation of the natural environment

Act 47 of 15 May 1992 relating to salmonids and fresh-water fish etc. The objective of the Act is to ensure that natural stocks of anadromous salmonids in Norwegian internal waters,, Norwegian territorial waters and the Norwegian Economic zone of the Norwegian mainland. This law has been passive in relation to the Upper Otta hydropower development.

The developers need a license according to the Act of 10 June 1977 No.82 relating to motor traffic on uncultivated land and in watercourses, related to motor traffic when construction and running the hydropower station.

- Oreignignsloven – Aquisition act??

D 4 Are the documents listed in table 1 the basis/background for decision making or the results of decision making (to what extent, – a table can be presented showing the type of documents or laws or

policy etc, their legal binding nature, when was the document prepared, by whom, was it a participatory process, how are the documents used)

Documents
White paper number 50 1997-98; concerning hydropower development in “Øvre Otta”.
Parliamentary bill number 49 (2004-2005); Om løyve til overføring av vatn gjennom bygging av ein tunnel mellom Breidalsvatnet og Raudalsvatnet.
The master plan
The protection plan
Otta-utbyggingen (1. byggetrinn) 1978, foreløpige vurderinger av nødvendige minstevannsføringer i Øvre Otta m/bielver. (NIVA).
Breidalsoverføringen Konsekvenser for vannkvaliteten i Øvre Otta (Rapport lnr 4756-2003 NIVA)
Overføring av vann fra Breidalsmagasinet til Raudalsmagasinet, Øvre Otta. Konsekvenser for friluftsliv. NINA oppdragsmelding 804.
Inst. S. nr. 200 (1998-1999) Innstilling fra energi og miljøkomiteen om kraftutbygging i Øvre Otta.
Melding 2003, Breidalsoverføringen, overføring av vann fra Breidalsmagasinet til Raudalsmagasinet. Informasjon om igangsatt planlegging i Skjåk kommune.
Fiskeribiologiske undersøkelser med Breidalsoverføringen i Øvre Otta, 2004.
Høring av foreløpig terskelplan for Breidalsoverføringen, Øvre Otta (2008)
NVE Bakgrunn for vedtak Opplandskraft DA og Tafjord kraftproduksjon AS. Søknad og konsekvensutredning for 132 kV kraftledning Framruste –Øyberget – Vågåmo.
NVEs merknader til redusert utbygging i Øvre Otta

D5 What IWRM principles have been included (e.g., Dublin and/or GWP; see questions under 1) below).

- I. FRESH WATER IS A FINITE AND VULNERABLE RESOURCE, ESSENTIAL TO SUSTAIN LIFE, DEVELOPMENT,
- II. WATER DEVELOPMENT AND MANAGEMENT SHOULD BE BASED ON A PARTICIPATORY APPROACH, INVOLVING USERS, PLANNERS, AND POLICY MAKERS AT ALL LEVELS AND THE ENVIRONMENT
- III. WATER HAS AN ECONOMIC VALUE IN ALL ITS COMPETING USES AND SHOULD BE RECOGNISED AS AN ECONOMIC GOOD
- IV. Women play a central part in the provision, management, and safeguarding of water;

The points, one-three are explicitly included in the licensing process, while point IV concerning women is not explicitly included in the documents. This is due to an assumption that women are approached similarly as with men.

D 6a. Is there an adequate understanding of the constraints in the planning documents – political, financial and managerial to effective implementation? [Argue for your point of view.](#)

The planning documents include a summary from all bodies entitled to comment, these include experts on the relevant themes. This should then include an adequate understanding of constraints to the planning.

D6b Where such constraints have been identified, are appropriate measures for overcoming them proposed? [List constraints and describe measures](#)

The main constraint was related to the environmental consequences of the hydropower development, by reducing the development about 50 % such the impacts were reduced as well. For more see: A2 and A3..

The owners of the power stations are also obliged by conditions to pay annual fees to the municipalities and the state. In addition they may also be obliged to establish special funds to encourage local industry. Along with property and income taxes this makes some of these hydropower municipalities wealthy. Skjåk municipality was ensured a permanent right to 7% of the power from station, in addition to tax fees. The municipalities demands that construction work and the development must provide spill over effects for the local society, through employment and other initiatives, and income to private and public sector.

D 6c. Is there adequate monitoring to assess whether implementation is in line with plans? [What monitoring has been prescribed?](#)

The power companies are obliged to record changes in operation, water levels and water flows. Sometimes the first 5 years of operation are used as an experimental period to optimise the rules of operation for multipurpose use. The rules of operation can also be revised 30 to 50 years after the license is granted.

NVE The Norwegian water resources and energy directorate has the authority to control the license conditions and rules of operation. The licensees have to pay NVE the full costs of this kind of supervision and control.

D 6.d Are finances established to ensure monitoring?

The developers will finance a long-standing project to register and monitor the reindeer in the Otta valley – to study if a possible effect of the upgrading of the power lines between the municipality Skjåk and the Finndalen valley (from 66 kv to 132 kv) impact the reindeers use of areas nearby the power lines.

References

Glommen og Laagens brukseierforening 2003. Melding og Breidalsoverføringen. Overføring av vann fra breidalsmagasinet til Raudalsmagasinet. Informasjon om igangsatt planlegging i Skjåk kommune. NIVA rapport LNR 4756-2003 Breidalsoverføringen Konsekvenser for vannkvaliteten i Øvre Otta. NIVA 0-108/78 Otta-utbyggingen. Foreløpige vurderinger av nødvendige minstevannføringer i Øvre Otta m/bielver. Minstevannføringer i Otta vinter 9m³/s, sommer 26m³/s, underforutsetning av relativt naturlige vannføringsvariasjoner over året ble det antydnet at verdiene for minstevannføring kunne settes noe lavere vinter 6m³/s, sommer 20m³/s.

Undersøkelse av vannkvalitet og ferskvannsbiologiske forhold april 1993.

NIVA 1986 Konsekvenser for vannkvalitetsutviklingen i Gudbrandsdalslågen/Mjøsa av reguleringsinngrep i Øvre Otta.

NINA 2003, Overføring av vann fra Breidalsmagasinet til Raudalsmagasinet, Øvre Otta. Konsekvenser for friluftsliv.

Norwegian forest and landscape institute NIJOS rapport nr. 8/92 Kraftutbygging i Øvre Otta vurdering av konsekvensar for jordbruksareal, skogbruksareal og utmarksbeite.

Brabrand 2004. Fiskeribiologiske undersøkelser i forbindelse med Breidalsoverføringen i Øvre Otta. Rapport (universitetet i Oslo, zoologisk museum, laboratorium for ferskvannsekologi og innladsfiske).

Forberg, Sæbjørn 2005. Lokale ringverknader av Øvre otta-utbygginga i Skjåk, Lom og Vågå.

Hansesveen, H og Helgås, G. 1997, Estimering av miljøkostander ved en vannkraftutbygging i Øvre Otta: en betalingsvillighetsundersøkelse. Hovedoppgave i økonomi og ressursforvaltning – NLH
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St. melding nr. 50 (1997-98) Om kraftutbygging i Øvre Otta.

Planning documents in the Glomma basin; The implementation of the Water Framework Directive in Hunnselva

Ingrid Nesheim, The Centre for Development and The Environment University of Oslo

Hunnselva and the Water framework directive and the implementation in Norway.

Directive 2000/60/EC of the European Parliament and of the council of 23 October 2000, establishes a framework for Community action in the field of water policy for all of EUs member states. Norway is not a member of the EU, but will implement the directive as a member of EFTA. The Water framework directive will be included in the EFTA agreement in 2008. Norway decided as a voluntary action to implement WFD in 2007 to 30 pilot studies in Norway, where the Hunnselva water body is one of these pilot studies.

This implies that management plans must be agreed and approved in 2009, and actions must be implemented during 2012. The monitoring programs will start in 2012 for the other river basin districts in Norway; WFD will be implemented along with the second planning period in the EU countries.

The first planning period in Norway is 5 years, while it is 9 years for the EU countries. Basically, the other EU countries have had longer time to implement the directive in their countries, and for the characterization of the water bodies. This has had implications for the thoroughness of the implication in Norway.

Norway started this process late due to political disagreements of finances, position, determination of directives etc. This first planning period can be seen as training period.

The implementation plan

- The Hunnselva water course was characterized 31.12.07, and the “project management” is about to determine the action plans for the area. However, this has not yet been determined.
- An overall water management plan shall be developed including an action plan before the end of 2009 for every water region.
- The action plan to be determined shall be implemented starting from 2010.
- And, initiatives, actions must be accomplished by 2012.
- The objectives set in the action plan shall be achieved 2015.

The implementation of the WFD in Hunnselva in Norway is based on interviews with the county governor in Oppland, contact person Ola Hegge, and Odd Henning Stuen (leader of Vassdragsforbundet). “Vassdragsforbundet” is central in the implementation of the WFD. The county governor is the authority for the related water region in the country.

A1 What are the main objectives of the plan?

The main objectives of Hunnselva

The objectives for the implementation of the WFD in Hunnselva is minimum good ecological and chemical status, this is the overall objective of the plan. Minimum means that those water bodies that have a higher standard shall not have reduced standard as a result of future actions or management.

The Water Framework Directive

The purpose of the Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater.

EU passed October 23rd 2000 the Water Framework Directive. Norway is presently implementing EUs Water Framework Directive which applies to all EU / EFTA countries. All EU and EØS countries shall according to the directive have countries have the same quality goals for its water resources, and the work should be organised about the same way. All water resources in the EU/EØS-area shall have a good ecologic and chemical status within the time frame. According the agreed agreement, all water areas shall be characterised within 31.12.09, management plans for the whole water region will be approved within 31.12.15, and the objectives must should be reached within 31.12.21. The WFD gives a framework for water quality objectives. Regional management and actions plans must be made in order to reach the objectives, and the necessary knowledge must be generated in order to do the work. The directive determines guidelines or frames for how to restore good ecological condition. The directive gives guidelines for administrative solutions, characterization of ecological conditions, to set environmental goals, monitoring, actions and economical measures/instruments, reporting and international cooperation. It is an objective to reverse a negative development, and in the longer run to re-establish natural aquatic environments for the best of society.

Specific objectives:

1. A general protection of aquatic ecology,
2. Specific protection unique and valuable habitats,
3. Protection of drinking water resources and protection of bathing water.

All these objects must be integrated for each river basin. It is clear that the last three – special habitats, drinking water areas and bathing water – apply only to specific bodies of water (those supporting special wetlands, those identified for drinking water abstraction, those generally used as bathing areas). In contrast ecological protection should apply to all waters. A general requirement for ecological protection and a general minimum chemical standard was introduced to cover all surface waters. These are two elements “good ecological status” and “good chemical status”. The objectives for good water quality are clearly defined with physical, chemical and biological parameters.

A2 Do the objectives cover both socioeconomic and environmental concerns?

Implementation of WFD in Hunnselva:

The main objective is primarily to consider the environmental aspects of the water course; however there are exceptions for other interests of the society. Actions to improve the ecological and chemical status of the water course shall be decided as long as they do not have great negative economic consequences.

Relevant examples in the Hunnselva water body are:

- Strongly modified water bodies, such as the water course in the city of Gjøvik
- Agriculture, tillage
- Hydropower
- Consideration of infrastructure
- Sanitation,
- Sewage,

The Water Framework Directive:

The WFD reflect that good quality water is a valuable common resource which must be managed in a cross sectoral sustainable way, and that good quality water is minimum good for human activity, health and development.

Socioeconomic concerns are covered directly through their consideration of flood protection and drinking water. Flood protection and drinking water are considered essential on their own terms they are overriding policy objectives. Socio-economic concerns are considered indirectly as good quality water is a valuable common resource. There is no poverty and development focus in the directive, there are no allocation aspects or distribution aspects in the directive, nor equity or power relations among gender, or other marginal groups.

Environmental concerns: The main focus of the directive is environmental concerns for the common good. Effluents shall be avoided and gradually reduced. Spill of prioritized hazardous chemicals shall stop. The directive also provides mechanisms for renewing these standards and establishing new ones by means of prioritisation mechanism for hazardous chemicals. Good chemical status is defined in terms of compliance with all the quality standards established for chemical substances at European level.

A3 are these goals linked to specific strategies to achieve the goals?

Implementation of WFD in Hunnselva, overall strategy to achieve goals:

The plan shall according to the directive rotate every six year; with characterisation of conditions; plans; actions; monitoring; and characterisation (A four stage cycle shall be implemented every 6 year).

1. Characterize present ecological and chemical status

2. Develop a management plan which includes an action plan to achieve goals (where good ecological status has already been achieved, this shall not be reduced. Water bodies which are marked by social activities, f. ex water course developed for hydropower, ports and channels, can be defined as strongly modified. In such cases, less strict requirements applies i.e. the objective is no longer good ecological status, but good ecological potential. If, it is judged as impossible or too expensive to achieve the goal of good status or good potential, exceptions can be decided. New activity or new interventions can be implemented, even if this means reduction of ecological status. The condition is that the benefit for the society is greater than the loss of environmental quality and actions will be evaluated given specified criteria. For all actions, cost benefit evaluations shall be considered.

3. Perform actions (Actions shall be implemented to achieve at the minimum «good chemical status », and «good ecological status», and eventually achieve «good ecological potential», in the water bodies before 2015

4. Monitoring of actions and status

(And again: 1. characterize present ecological and chemical status, 2. develop management plan, 3. perform actions, 4 monitoring).

The implementation plan for Hunnselva

The Hunnselva water course was characterized 31.12.07, and the “project management” is about to determine the action plans for the area. However, this has not yet been determined.

An overall water management plan shall be developed including an action plan before the end of 2009 for every water region.

- The action plan to be determined shall be implemented starting from 2010.
- And, initiatives, actions must be accomplished by 2012.
- The objectives set in the action plan shall be achieved 2015.

Strategy for the implementation of the directive:

- First objectives are established for the river basin as outlined in the previous section. Then an analysis of human impact is conducted so as to determine how far from the objective each body is. If the existing legislation solves the problem, well and good and the objective of the framework directive is attained. However, if it does not WFD should be followed. The water framework directive asks for a plan, the plan – a detailed account of how the objectives set for the river basin (ecological status, quantitative status, chemical status, and protected area objectives). The plan will include all the results of the above analysis: the river basin's characteristics, a review of the impact of human activity on the status of waters in the basin, estimation of the effect of existing legislation and the remaining gap to meeting these objectives, and a set of measures to fill the gap.

Strategy for ground water: WFD strategies to prevent and control pollution of *groundwater*; There is a prohibition of direct discharges to groundwater, and (to cover indirect discharges) a requirement to monitor groundwater bodies so as to detect changes in chemical composition, and to reverse any anthropogenically induced upward pollution trend. Taken together, these should ensure the protection of groundwater from contamination, according to the principle of minimum anthropogenic impact. Quantity of ground water: For good management, only that portion of the overall recharge not needed by the ecology can be abstracted, this is the sustainable resource, and the directive limits abstraction to that quantity. The directive provides a framework for integrated management of groundwater and surface water for the first time at European level.

Strategy against pollution of surface water: WFD article 16 – strategies against pollution of water: A set of procedures for identifying that point for a given body of water, and establishing particular chemical or hydromorphological standards to achieve it, is provided together with a system for ensuring that each member state interprets the procedure in a consistent way (to ensure comparability). Environmental objectives: member states shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water; they shall protect, enhance and restore all bodies of surface water, for artificial and heavily modified bodies of water with the aim of achieving good surface water status at the latest 15 years after the date of entry. Achieving good ecological potential and good surface water chemical status at the latest 15 years

Management strategies to achieve goals:

Holistic water resource management and clear responsibilities.

A set of reporting routines to visualise activities, and to follow the water quality development of water bodies, to explain eventual lack of actions, to inform and involve the public / stakeholders.

Public participation is seen as an important strategy for the implementation of the directive. “The greater the transparency in the establishment of objectives, the imposition of measures, and the reporting of standards, the greater the care member states will take to implement the legislation”.

Public participation: decisions on the most appropriate measures to achieve the objectives in the river basin management plan will involve balancing the interests of various groups. The economic analysis requirement is intended to provide a rational basis for this, but it is essential that the process is open to the scrutiny of those who will be affected. An economic analysis of water use within the river basin must be carried out. Adequate water pricing acts as an incentive for the sustainable use of water resources and thus helps to achieve the environmental objectives under the directive. Member states will be required to ensure that the price charged to water consumers, such as the abstraction and distribution of fresh water and the collection and treatment of waste water reflects the true costs.

A4 are the goals integrated or are they in opposition?

Implementation of WFD in Hunnselva

The main goals of the directive "good ecological status / potential are not in conflict. However, the rules of exceptions can be in opposition to the main goal, (i.e. new activities or new interventions can be implemented, even if this means reduction of ecological status if the benefit for the society is greater than the loss of environmental quality.

Water Framework directive:

The WFD aims at being a holistic directive across sectors and across geography. It aims at good environmental status; however, sustainable livelihood is not a primary goal of the directive.

A5 are goals / strategies in line with, integrated with other national goals? (such as PRSPs)?

Implementation of WFD in Hunnselva

Yes, goals of WFD are in line with other national goals: this can be exemplified by the 19 underlying directives:

Biodiversity, The priority on biodiversity

Water Framework Directive

The goals / strategies are in line with, integrated with other national goals such as:

B Basin description

Implementation of WFD in Hunnselva

The characterisation of the Hunnselva water body was completed 31.12.2007. Most of the information provided is based on earlier work. The results from the characterisation is not yet available for the public, and following information is thus based on interviews with one central key person employed by the county governor (Ola Hegge) and another key person (Odd Henning Stuen) which has a key role in the implementation of the WFD.

Water Framework Directive:

The WFD: article 5, characteristics of the river basin, review of the environmental impact of human activity and economic analysis of water use. Characterisation of surface water body types- member states shall identify the location and boundaries of bodies of surface water and shall carry out an initial characterization of all such bodies as rivers, lakes, transitional waters, or coastal waters or as artificial surface water bodies or heavily modified surface water bodies.

Member States shall identify, within each river basin district: all bodies of water used for the abstraction of water intended for human consumption providing more than 10 m³ a day as an average or serving more than 50 persons,

B1 Does the basin description include a description of- and impact reports of environmental factors (including all biotic, a-biotic and polluting sources

B1.1a Have the main different vegetation zones (alluvial and terrestrial) in the river basin been mapped and described? Substantiate the answer and List negative and positive impacts.

Implementation of WFD in Hunnselva

Presence and absence of river border vegetation, and forest along the river has been recorded (not type of vegetation, only presence absence).

Terrestrial vegetation zones are not a quality element in the WFD.

The composition and abundance of aquatic flora and phytoplankton must be registered.

* As the action plan has not yet been decided, it is not possible to list impacts.

Water Framework Directive

The directive states that member states shall identify the location and boundaries of bodies of surface water and shall carry out an initial characterisation of all such bodies in accordance with the following methodology. The River basin management plans shall cover the following elements: - a general description of the characteristics of the river basin district, including – mapping of the location and boundaries of water bodies, mapping of the ecoregions and surface water body types, , identification and mapping of protected areas as required by article 6 and annex V.

B.1.1b Do the report/planning document in particular discuss evaluate the issue of vulnerable or threaten botanical species?

Implementation of WFD in Hunnselva

The interviewees did not know of any threatened botanical species in the area. “If such had been known, it had been included in the characterisation report”. (there have not been performed botanical registrations in the area for this work, but the area is generally well known. It is however, not clear if other botanical registrations have been consulted.

* As the action plan has not yet been decided, it is not possible to list impacts.

Water Framework Directive

Member States shall ensure the establishment of a register or registers of all areas lying within each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water. They shall ensure that the register is completed at the latest four years after the date of entry into force of this Directive.

There is no particular focus on vulnerable or threatened species; however, the composition and abundance of aquatic flora and phytoplankton must be registered.

B1.2 Do the report /planning document describe the fauna and the impact of the regulation on the fauna? Describe the impact of the regulation on the fauna

B1.2a for birds?

Implementation of WFD in Hunnselva

Birds are registered in the area, but this is not a quality element in the WFD. Impacts of environmental flow for water living birds will be evaluated related to action plan. The EU bird directive was not mentioned by the interviewees.

* As the action plan has not yet been decided, it is not possible to list impacts.

The Water Framework Directive refers to this directive as counting;
The Birds Directive (79/409/EEC) (1);

B1.2b for the benthic fauna? (bottom dwelling)

Implementation of WFD in Hunnselva

Benthic fauna is a quality element in the WFD. “The deadline has been very short, so all registrations are based on existing sources, or earlier knowledge.

Water Framework Directive

-composition and abundance of benthic invertebrate fauna

B1.2c for mammals?

Implementation of WFD in Hunnselva

No mammals have not been registered. This is not a focus, and not a quality element in the WFD.

B1.2d for reptiles?

Implementation of WFD in Hunnselva

No, same with reptiles as for mammals

B1.2 e for fish? In particular provide in the answer conditions which cause reduced spawning conditions or migratory constraints.

Implementation of WFD in Hunnselva

Fish is an essential quality element and this has been registered in the area. More specifically: - which fish species; and a description of the condition, ecological status related to problems, such as invasive species, migratory constraints, recruiting, nutrition, pollution,

Water Framework Directive

Composition and abundance and age structure of fish fauna.

B1.2f Have vulnerable or threatened vertebrate or invertebrate species (fauna; fish, birds, reptiles, amphibians, mammals, macrophytes) in the area impacted by the regulation been registered /evaluated?

Implementation of WFD in Hunnselva

Vulnerable or threatened species has been evaluated with regard to: It is a particular focus on “river mussels”, and the fish “big trout”. “Hunnselva” has a stock of river mussels which may be lost, and the water region puts great emphasise on securing the stock through its work with the water directive. Actions to secure the stock will be included in the action plan (to be decided in 2008). To improve the basis for deciding the necessary actions, the water region has asked The Norwegian institute for natural research (NINA) for assistance. NINA has suggested additional investigations to provide more scientific knowledge. The water region has applies for money for the investigations. It is related to the implementation of the WFD possible to apply for a grant for monitoring and problem characterisation in those water regions that are included in the first planning period.

Water Framework Directive

There is no particular focus on vulnerable or threatened species; however, the composition and abundance of aquatic flora and phytoplankton must be registered.

B1.3 Are the geology and the landscape in the area described and impacts identified?

Implementation of WFD in Hunnselva

The marine border in the area has been recorded, and it is also surveyed what is calcareous rich and calcareous poor geology types in the area.

Water Framework Directive:

The geology should be characterised, mentioned are calcareous, siliceous, organic,

The summary of the register required of the river basin management plan shall include maps indicating the location of each protected area and a description of the community, national or local legislation under which they have been designated.

B1.3a geology (soils?)

Implementation of WFD in Hunnselva

Soil is not a quality element in the WFD, but it is relevant as part of the evaluation of actions (such as erosion from cultivated land).

Water Framework Directive:

B1.3 b Landscape - Describe the briefly the landscape and the impact of the regulation.

Implementation of WFD in Hunnselva

Landscape is not described as part of the plan.

Water Framework Directive:

There is no particular emphasis on the landscape in the characterisation.

B1.4 Description of the hydrology / hydro-morphology of the basin for the following elements

Implementation of WFD in Hunnselva

According to the directive the following elements should be described:

- Morphological conditions
- River depth and width variation
- Connection to groundwater bodies
- River continuity
- Structure and substrate of the river bed
- Structure of the riparian zone

B1.4a– Does the plan include a description of change in river water flow, (portion of the river with changed water flow after a regulation or urbanisation, change in water flow in relation to flood, normal water flow and low water flow?

Implementation of WFD in Hunnselva

Water Framework Directive:

According to the directive the following elements shall be described:

- Quantity and dynamics of water flow,

B1.4 b Are flood data recorded in the basin description?

Implementation of WFD in Hunnselva

Flood data has not been recorded as flood is not a quality element. But, flood as a possible consequence of actions will be considered in the action evaluation as a constraining factor (but not as a goal).

B1.4c Do the plan include a description of human made physical barriers or other physical change of the river bank or river basin (ex lowering of lakes, drainage, vegetation removal) in the basin and the impact? Describe the change and the impact.

Implementation of WFD in Hunnselva

The morphological condition to the water course has been characterised; i.e. it is described whether a river stretch is natural or if channels have been made. It is also described whether border vegetation has been removed.

B1.4d Do the plan describe sedimentation and erosion patterns in the basin, and the impact of the regulation on these two aspects? Describe change and impact.

Implementation of WFD in Hunnselva

It is stated if the sedimentation / erosion processes are natural or not. If these processes have been changed due to human behaviour it is described, if it is natural - the environmental goal has been achieved and the process is not described.

B 1.4e Does the plan include a description of temperature changed due to ice-regime or others? Describe the change and the impact.

Implementation of WFD in Hunnselva

Water temperature is not very relevant in Hunnselva and is not described.

Water Framework Directive

A characterization of temperature is an optional factor in the directive,
- Thermal conditions

B1.5 Ground water

B1.5a Have wells and springs in the basin been registered and described

Implementation of WFD in Hunnselva

Yes wells and springs has been listed and described but not characterised. There are only a few, 2-3 larger ground water occurrences. These have not been characterised, little knowledge exists. Ground water has not been an important focus in the implementation of the directive.

Water Framework Directive:

Member states shall carry out an initial characterisation of all groundwater bodies to assess their uses and the degree to which they are at risk of failing to meet the objectives for each ground water body under article 4.

B1.5b Have the impact on the ground water been evaluated? Describe the impact.

The impact on the ground water has not been evaluated. There is little use of ground water in Hunnselva. The interviewees noted, however, that diffuse pollution load from roads ought to be evaluated.

Water Framework Directive:

Member states shall identify the location and boundaries of ground water bodies, the pressures to which the groundwater bodies are liable to be subject including diffuse sources of pollution, point sources of pollution, abstraction, and artificial recharge

B 1.6 Are the climate in the basin described?

B1.6a Temperature patterns? What has been described?

Implementation of WFD in Hunnselva

No, temperature patterns have not been described.

Water Framework Directive:

A description of temperature patterns is an optional factor in the directive.

B1.6b Precipitation patterns? What has been described?

Implementation of WFD in Hunnselva

No, precipitation patterns have not been described.

Water Framework Directive

A description of Precipitation patterns is an optional factor in the directive.

Water quality and pollution

B1.7a Do the plan include a description of the water quality in the basin and the impact of the regulation? Describe the status and the foreseen impacts.

It is not possible to describe the impact of actions in the plan as these have not yet been decided.

According to nitrate pollution

Nitrate pollution has been categorised and characterised. Sources are also described.

Water Framework directive,

Yes there is a nitrate directive

Phosphor pollution

Implementation of WFD in Hunnselva

Yes, phosphorous pollution is characterised. Sources are evaluated (agriculture, sewage, scattered settlement).

Water Framework directive

Pesticides

Implementation of WFD in Hunnselva

Yes, pesticides are characterised. The characterisation concluded lack of knowledge. Problem characterisation as an action will start. The interviewees:” do we have a pesticide problem?

Water Framework directive

Toxic chemicals

Implementation of WFD in Hunnselva

Yes toxic chemicals has been evaluated, - sources, industry, existing and earlier deponi. It is not clear what impact the road may have on toxic chemical diffuse pollution; there is a need for problem characterisation. There is a need to survey what is known, and what is not known.

Water Framework directive

Microbial pollution

Implementation of WFD in Hunnselva

Bacterial pollution has been characterised. The area, “Vestre Toten” use Hunnselva for purified sewage, agriculture, the cottage area contributes as well.

Organic matter

Yes

Heavy metals

Yes, as toxic: (Yes toxic chemicals has been evaluated, - sources, industry, existing and earlier deponi. It is not clear what impact the road may have on toxic chemical diffuse pollution, there is a need for problem characterisation. There is a need to survey what is known, and what is not known.)

Algae

YES for all aspects.

OTHER?

Water Framework Directive:

Transparency

Acidification status

Nutrient conditions

Oxygenation conditions

B1.8a Are pollution point sources described in the planning document? List and describe the pollution point sources with impact on the basin, describe the recipient situation of the river /lake?

Implementation of WFD in Hunnselva

Pollution point sources are described. The institute “The Norwegian centre for soil and environmental research” has described the different pollution point sources, but consequences for the water course have not been described. It is however, desirable to do this in relation to the action plan. Pollution point sources: The “Vestre Toten use Hunnselva for purified sewage, the industry,

Water framework directive

The river basin management plans shall according to the directive cover a summary of significant pressures and impact of human activity on the status of surface water and groundwater including: estimation of point source pollution.

B1.8b Do the basin description include description of non point sources – industry, agriculture, forestry, mining activities, polluted sediments, transport, List and describe the pollution non point sources with impact on the basin, describe the recipient situation of the river

Implementation of WFD in Hunnselva

The Norwegian centre for soil and environmental research has made a report of non-point pollution sources in the area. ????? -- more will come

Water framework directive

The river basin management plans shall according to the directive cover a summary of significant pressures and impact of human activity on the status of surface water and groundwater including: estimation of diffuse source pollution, including a summary of land use, estimation of pressures on the quantitative status of water including abstractions, analysis of other impact of human activity on the status of water. .

B2 The socio-economic situation

B2.1a Has a population survey been performed in the area of impact? State in the answer what has been surveyed and what has not been surveyed.

Implementation of WFD in Hunnselva

Number of inhabitants connected attached to municipal sewage, and number of people not connected. Number of people connected to municipal drinking water and number of people not connected to municipal drinking water.

In the economic analysis a survey of the different inhabitants use of water has been provided, i.e. number of people supplied by ground water, number of people supplied by disinfected surface water as main source of water, number of inhabitants attached to municipal water supply,

Number of inhabitants connected to the municipal sanitation with chemical cleansing
Number of inhabitants connected to the municipal sanitation with bio-chemical cleansing
Number of inhabitants connected to the municipal sanitation.
Number of

Water Framework Directive

In relation to the required estimation of the volume, prices and costs associated with water services, and population survey must be undertaken.

B2.1 b Does the plan provide information concerning the income distribution of people impacted? Describe the income distribution.

Implementation of WFD in Hunnselva

No.

Water Framework Directive

No such information is asked by the directive. The directive has no social focus.

B2.1c Do the plan include an evaluation of the impact of the regulation on the economy in the area? Describe how the regulation impacts the economy on the area of impact.

Implementation of WFD in Hunnselva

An evaluation of the impact of proposed actions for the management/action plan, will be done on a later stage through cost benefit analysis of actions.

Water Framework Directive

No such information is asked by the directive. The directive has no social focus. The closest related focus is stated: - Adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

B2.1 c Does the plan describe the impact on employment /occupation in the basin? Describe the impact.

No.

Water Framework Directive

No such information is asked by the directive. The directive has no socioeconomic focus. The closest related focus is stated: - Adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

B2.2 Does the plan describe the impact on the different land use sectors in area?

B2.2a on agriculture in the area of impact? Describe the agricultural setting and the impact.

Implementation of WFD in Hunnselva

Some aspects of impact of agriculture have been described: quantity of shit, number of cows, number of meat producing cattle, area of grain, and area of grass field. Cost benefit analysis will be used to evaluate the environmental impact of agriculture related to other interests of society.

Water Framework Directive

No such information is asked by the directive. The directive has no socioeconomic focus. The closest related focus is stated: - Adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

B2.2 b Does the plan describe the impact on the industry in the area of impact?? Describe the industrial setting and the impact.

Implementation of WFD in Hunnselva

The impact on the industry in the area is indirectly described through point pollution, but this has not yet been quantified. This will be part of the cost benefit evaluation of actions to improve the ecological condition.

Water Framework Directive

No such information is asked by the directive. The directive has no socioeconomic focus.

The closest related focus is stated: - Adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

B2.2c Does the plan describe the impact on the tourism in the area of impact?? Describe the tourist setting and the impact.

Implementation of WFD in Hunnselva

No, the plan does not describe the impact on the tourism in the area. Tourism is not important in the river basin district.

Water Framework Directive

No such information is asked by the directive. The directive has no socioeconomic focus.

The closest related focus is stated: - Adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

B2.2d Does the plan describe the impact on the recreation the area of impact?? Describe the recreational setting and the impact.

Implementation of WFD in Hunnselva

The impact on the recreation has not yet been described, but this will be done through the cost benefit analysis related to recreational fishing, The “hunting and fishing association” is relatively strong in the area.

Water Framework Directive

No such information is asked by the directive. The directive has no socioeconomic focus.

The closest related focus is stated: - Adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

B2.2e Does the plan describe the impact on the cultural heritage / cultural monuments in the area of impact?? Describe the cultural setting and the impact.

Implementation of WFD in Hunnselva

The impact on the cultural heritage /cultural monuments is not a focus in the directive; the plan does not describe the cultural heritage /cultural monuments in the area. However, this is part of other interests of society and can be considered as rules of exceptions. Whether this will be considered will

depend on the representation of interest groups, but also the Cultural heritage law. It might be imagined that some cultural heritage restoration projects can be in conflict with the environment goal of good ecological status.

Water Framework Directive

No such information is asked by the directive.

B2.3 Does the plan include a general description of the socio-economic history of the area? Describe the history

Implementation of WFD in Hunnselva

No.

Water Framework Directive

No such information is asked by the directive. The directive has no socioeconomic focus.

B2.4 a Does the plan include a description of the different sectors use of water (including marginalised groups, poor and women)? The spatial and temporal variations in water cycle elements, such as water resources availability (m³/person/year), water use (litres/person/day). Describe the different sectors use of water.

Implementation of WFD in Hunnselva

Yes, the plan include a description of the different sectors use of water (not marginalised groups as this is not relevant – no marginalised groups in the area). Water is used for drinking water, as recipient, as an energy source, as process water for the industry, it is used to irrigate agriculture. Drinking water is first priority, recipient is second priority. Hydropower uses the largest volume of the water, then drinking water and then irrigation for agriculture. Water is also considered in the plan as livelihood for plants and animals.

Water Framework Directive:

Estimation and identification of significant water abstraction for urban, industrial, agricultural and other uses, including seasonal variations and total annual demand, and of loss of water in distribution systems.

Article 36, -- an economic analysis of water use. Member States should identify waters used for the abstraction of drinking water and ensure compliance with Council Directive 80/778/EEC of 15 July 1980 relating to the quality of water intended for human consumption.

B2.4b If good drinking water is scarce, does the plan describe allocation efforts? Describe the drinking water allocation efforts.

Implementation of WFD in Hunnselva

No, (however, the Norwegian Water resources act puts first priority on drinking water among sectors. Thus this applies in Norway).

Water Framework Directive

No such information is asked by the directive. The directive has no social distribution focus.

B2.4 c Does the plan describe the quantity of water for irrigation by different user groups? Describe the irrigation measures.

Implementation of WFD in Hunnselva

”This would be relevant for agriculture, but this is not yet specified. It would be relevant to specify irrigation quantity for grass fields, berries, grains. This is related to the need and requirement for environmental flow in the river basin”.

Water Framework Directive:

The directive asks for the amount of water abstraction by different user groups, there is however, not asked for the specific amount used for irrigation.

B2.5 Does the plan describes equity aspects among water using sectors? Describe these equity aspects.
Implementation of WFD in Hunnselva

No.

Water Framework Directive

No such information is asked by the directive. The directive has no social distribution focus.

B2.6 Do the planning document include a review of the impact of the regulation on human activities, use of natural resources described (including consequences of the regulation for fishing, game hunting, recreation? describe the impact on the human activity.

Implementation of WFD in Hunnselva

A review of the impact of human activities will be made on a later stage of implementing the WFD, related to the action plan – and problem identification. The problem identification involves identification of sources of the problems – which action contribute to the problem, what is the quantity/level/range of the problem and whom/what is the impact.

Water Framework Directive:

The closest related focus is stated: - Adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle. Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

B2.4 Are possible conflicts approached and described? Describe the conflicts.

Implementation of WFD in Hunnselva

Possible conflicts are approached and will be further described in the plan. Conflicts include: pure and dirty water, biotope actions and flood security infra structure. Energy and environmental flow.

Water Framework Directive

No such information is asked by the directive. The directive has no social distribution focus.

WFD economic analysis – estimate the volume, prices and costs associated with water services,

C Have stakeholders been involved in the planning process?

Have stakeholders been involved in identifying the problem?

C.1a have stakeholders from the three civil societies (private, public and civil society) been involved in the planning process?

Implementation of WFD in Hunnselva

Yes stakeholders have been involved. But not as much as wanted by the project managers (the interviewees). The limited time factor has been constraining. It has also been difficult to gain peoples interest.

With more time, greater effort could have been used to involve people and to gain peoples interest. Political anchoring in the municipality varies; some municipalities are interested while others have not shown a lot of interest. The municipal administration is generally involved. In the river basin district working group – important interest groups are included: hydropower, industries, land owner association, the hunting and fishing association, The Norwegian water resources and energy directorate.

Vestere toten jeger og fisk,
Gjøvik fiskeforening.

Water Framework Directive:

The directive encourage the active involvement of all interested parties in the implantation of the directive, however, it is not specified a need for involvement from specific groups.

Member states shall encourage the active involvement of all interested parties in the implementation of the directive, in particular in the production, review and updating of the river basin management plans. Member states shall ensure that for each river basin district, they publish and make available for comments to the public including users:

Member states shall encourage the active involvement of all interested parties in the implementation of this directive, in particular in the production, review and updating of the river basin management plans.

-On request access shall be given to background documents and information used for the development of the draft river basin management plan. Member states shall allow at least six months to comment in writing on those documents in order to allow active involvement and consultation.

The directive states that in every water region, there must be a river basin district committee chosen to treat all essential questions. The directive determines who should be members in the river basin district committee.

C1b. Marginalised groups; poor, ethnic groups and women (gender) been involved?

Implementation of WFD in Hunnselva

Such marginalised groups do not exist in the area.

Water Framework Directive:

The directive has no measures strategies directed towards marginalised groups.

C2 Possibilities for financial support to attend meetings?

Implementation of WFD in Hunnselva

No, financial compensations.

Water Framework directive:

The directive does cover such distributional measures. ????

C 3 Decentralised localisation of meetings to facilitate participation?

Implementation of WFD in Hunnselva

Yes, there is decentralised localisation of meetings. Meetings are localised in the centre of the impacted municipalities.

Water Framework directive:

It states in the directive that participation is important and in particular the municipalities, however, there are no guidelines or related to decentralised localisation of meetings.

C 4 Have the project management included interdisciplinary representation (natural and social sciences)?

Implementation of WFD in Hunnselva

Main emphasis on disciplines of natural science. More emphasis on social science disciplines will be related to the cost benefit analysis as part of the evaluation of actions for the action/management plan. Interdisciplinary representation is also seen by the interviewees as gained by the representation of a hydropower developer, the industry, municipal representatives (municipal representatives must think for the wide range different of social interests.

Water Framework directive:

The directive does not in particular require interdisciplinary representation, but the required actions in the directive will entail interdisciplinary representation.

C5 Were information of on the selecting of stakeholders provided in the relevant channels?

Newspapers, community councils etc?

Implementation of WFD in Hunnselva

Public meetings, people are asked (emails) to come. The meetings are not announced public. The people who attend do not attend as individuals, but as representatives from associations, companies etc. All associations, companies /industries have had the possibility to attend.

The implementation of WFD can be seen as the implementation of a planning tool. If some of the actions in the decided action/management plan (WFD) have a major impact on society, this would require a hearing process according to the “Plan and building act”, involving the public in a wider sense (for a closer description of this process, the Upper Otta case can be reviewed (part C).

Water Framework directive:

It states in the directive that participation is important, but it is not specified how information should be given. Member states shall ensure that for each river basin district, they publish and make available for comments to the public.

C6 Were information of project stakeholder given in advance, (what is needed)

Implementation of WFD in Hunnselva

Information about the process is given in Meetings, letters, web site, minutes (available on the web site), newspapers, local TV.

Water Framework Directive:

Member states shall ensure that for each river basin district, they publish and make available for comments to the public,

a timeable and work programme for the production of the plan, including a statement of the consultation measures to be taken, at least three years before the beginning of the period to which the plan refers,

an interim overview of the significant water management issues identified in the river basin, at least two years before the beginning of the period to which the plan refers.

Draft copies of the river basin management plan, at least one year before the beginning of the period to which the plan refers.

C7 Were information of the project given in local languages, and in an understandable manner?
Implementation of WFD in Hunnselva
Yes

Water Framework Directive:

Information about the project was given in the national language, the directive is translated (or parts of it / a summary are translated. The English language however, is a well known and understood language.

C8 Do the problem identification reflects the water user interests in the basin? Describe how it reflects or do not reflect the water use interest.

The different interests in the river basin district are represented by an interest group representative in the different committees /reference groups (See also D1). However, as the action plan has not yet been decided, it is not possible to describe how it reflects the different water user interests in the basin.

Water Framework Directive:

The problem identification is how to achieve good quality water bodies, this is an interest of the water use interests by several, but parts of the population emphasizes hydropower development and are not perhaps willing to pay for the restoration of water bodies. The main goals of the directive has been agreed to it is not any thing the public in Norway has the option to protest against.

C9 Does decision making follow principles of democracy (i.e. ...)? Describe how it does follow such principles or why it does not follow principles of democracy.

Implementation of WFD in Hunnselva

It follows principles of democracy as decision making is based on a participatory approach with representation of stakeholders and interest groups in the different committees and reference groups (see D1 for more detailed description). The cost benefit analysis required as part of the determining the action/management plan, of which purpose is to highlight positive and negative impacts of actions for the different interest groups of society can also be seen as a principle of democracy.

Water Framework Directive:

It emphasises a participatory approach, thus it follows the principles of democracy.

C10 Which sectors dominate/influence the documents most and what sectors are poorly represented and what sectors not included at all? Describe the situation

Implementation of WFD in Hunnselva

The municipality sector dominates, and the county governor. The county governor is responsible for the different policy instruments. (this is according to the interviewees).

Water framework Directive:

The economic and the environmental sectors dominate the documents, while the social distribution aspects are poorly or not included at all.

C 11 Were water allocation agreed among stakeholders? Describe the situation

Implementation of WFD in Hunnselva

As the action plan has not yet been decided, it is premature to tell whether water allocation has been agreed among stakeholders.

Water Framework Directive:

This is not emphasized in the directive, but water allocation is not particularly relevant in Norway, as there is enough water for everyone. Drinking water goes before anything.

What are Governance concerns, Is the plan likely to be effectively put into practice?

D What are Governance concerns of the plan/planning process?

D.1 Which institutions have been involved in the planning process? List the institutions involved and describe how they have been involved.

Implementation of WFD in Hunnselva

State level:

The Ministry of environment (the MD) have the national responsibility to implement the EU water framework directive in Norway. The MD is responsible for the reporting to the EU. MD work in close cooperation with other ministries such as the Ministry of petroleum and energy, the Ministry of fisheries and coastal affairs, Ministry of health and care services, Ministry of agriculture and food, and the Ministry of transport and communication to implement the WFD. The ministries have the responsibility to determine the management, juridical and economical settings for the work, and the responsibility to ensure that the necessary instruments for the implementation of the action programs are available and matched so that the environmental goals can be achieved.

The different directorates related to the mentioned ministries have central tasks related to the WFD. The ministries have established a group of the directorates for this purpose:

The group of directorates consists of representatives from the following directorates: Directorate for nature management, Directorate of fisheries, Norwegian institute of public health, The Norwegian coastal administration, Norwegian food safety authority, Norwegian water resources and energy directorate, Norwegian pollution control authority, Norwegian agricultural authority, Norwegian public road administration. This group shall facilitate the implementation of the directives requirements of characterization and mapping, determine environmental goals, and contribute to the development of monitoring programmes. This group will further consult the implementation of the directive on regional level and participate in European collaboration of the directive.

Directorate for nature management (DN). The directorate has the responsibility to arrange for regional and local processes, with special emphasis on coordination of sectors and overall participation of groups. Norway on the state level (DN) also participates in work groups in the EU to ensure adaptation to conditions in Norway. The implementation in each country is monitored /followed by the EU commission and EFTAs monitoring organ (ESA).

National reference group

It has been established a national reference group which consists of representatives stakeholder organizations/associations. The main task of this group is to provide views and advice to the directorate group.

Regional level:

The county governor is the authority in the respective river basin districts (Norway has been divided into nine river basin districts). (Coastal waters shall be identified and assigned to the nearest or most appropriate river basin district).

The county governor is the authority in the river basin district to coordinate the river basin district committee, the regional reference group, and the river basin district working group for each river basin district. The county governor (the river basin district authority) shall coordinate, guide the work, ensure inter-disciplinary solid work, and ensure that deadlines are kept. A reference group to the river basin district committee is established to include impacted stakeholders, private and public user interests.

The county governor coordinates the work to ensure that the status in of all river basins is registered in a database (Vann-Nett). It is allocated a relatively small budget (from state level) to carry out this work. And it is assumed that each responsible authority should take responsibility financially. It is in the state budget for 2008, allocated some money to the Directorate for nature management and Norwegian pollution control authority, and to the river basin district authorities (the county governor).

The county governor develops an overall regional management plan based on the work by the river basin committees in each water region. This plan is then presented for the county for agreement. Approved management plans shall be the basis for activities and operations, and serve as a guideline for municipal and national / state planning. The present responsibilities in relation to laws and acts continue.

River basin district committee (VRU) collaborates with the river basin district authority (the county governor) to implement the WFD. The river basin district committee consists of representatives from sectoral authorities, county authorities, municipalities and is lead by the river basin district authority (the county governor). (en § 22).

River basin district working group a group to provide input to the work to develop the management plan – action plan on regional level. Typical inputs from this group are related to the characterization work, and the evaluation of measures. It is the river basin authority (the county governor) that provides the setting and guides the organisation of this work in the river basin districts – and ensures that this is done in a disciplinary proper way and within deadlines.

River basin district working committee: where appropriate the river basin district authority / river basin district committee can appoint a particular working committee which consists of a selection of the representatives from the river basin district committee.

Regional reference group

A consulting organ for the river basin district authority / the river basin district committee consists of stakeholders and user interests in the river basin. Is nominated by the river basin district authority and is supposed to be closely connected to the river basin district committee.

Local level

The Municipalities are included in river basin committee, and participates in the work to characterize and define environmental objectives, participates in the work to consider actions, and contributes with local knowledge and history.

River basin districts, water bodies shall be defined and characterised, including an assessment of human impacts on water bodies and an economic analysis of possible actions. Based on this management plans with environmental goals must be developed and an action program agreed upon.

Private actors are included in reference groups, while the public authorities are included in the river basin committees.

D2a What governance levels are included in the planning process? (supra-national, national, state, province, districts, lower levels)

Implementation of WFD in Hunnselva

State level, regional level and municipal level. See D.1!

Water Framework directive:

The implementation of the water framework directive in Norway requires participation from the state level, the regional level, and the municipality. It seems that the authority is placed on the regional level (the county governor is the regional water authority).

D2b Has there been a decentralised planning process? If no, argue for the point of view, if yes described how it is decentralised.

Implementation of WFD in Hunnselva

There has been a decentralised planning process. The planning process is based in the in the county governor (regional level) and in the local level in the different municipalities of impact. The county governor steers and leads the work, while the municipalities is actively in the different committees – defining environmental objectives and characterising the river basin district

Water Framework directive:

The WFD requires a decentralised planning process.

D 3. Are the objectives of the plan linked to an institutional framework/legal framework? Describe how they are linked to an institutional / legal framework (for more explanation see brief example from Glomma below).

Implementation of WFD in Hunnselva

The directive can be seen as a legal framework it self. For more information see D3.

Water Framework directive:

The directive can be seen as a legal framework it self. The framework states that each member state shall carry out an assessment of the susceptibility of the surface water status of bodies to the pressures identified above. For those bodies identified as being at risk of failing the environmental quality objectives, further characterisation shall where relevant be carried out to optimize the design of both the monitoring programmes.

D 3. Are objectives linked to regulations or law? Provide a brief explanation of this relationship (for more information see brief example from Glomma below).

Implementation of WFD in Hunnselva

The water framework directive is established with authorisation in three Norwegian laws;

The plan and building act.

Water resources act

The pollution control act

The water framework directive is further an overlying directive over 19 other Norwegian directives:

Water Framework Directive: the directive provides an umbrella that covers other EU directives with impact on water management. The main other EU directives constitute the following:

Measures required under the following Directives:

(i) The Bathing Water Directive (76/160/EEC);

(ii) The Birds Directive (79/409/EEC) (1);

- (iii) The Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC);
- (iv) The Major Accidents (Seveso) Directive (96/82/EC) (2);
- (v) The Environmental Impact Assessment Directive (85/337/EEC) (3);
- (vi) The Sewage Sludge Directive (86/278/EEC) (4);
- (vii) The Urban Waste-water Treatment Directive (91/271/EEC);
- (viii) The Plant Protection Products Directive (91/414/EEC);
- (ix) The Nitrates Directive (91/676/EEC);
- (x) The Habitats Directive (92/43/EEC) (5);
- (xi) The Integrated Pollution Prevention Control Directive (96/61/EC).

D4 What IWRM principles have been included (e.g., Dublin and/or GWP; see principles in part II)..

Implementation of WFD in Hunnselva & Water Framework Directive:

1. WATER AS A FINITE SOURCE, PROTECTION OF THE CATCHMENT AND ENVIRONMENT

Yes, this is included in the WFD!

2. WATER ALLOCATION IN THE BASIN SHOULD IN PRINCIPLE HAVE BEEN AGREED BETWEEN ALL RELEVANT STAKEHOLDERS/SECTORS WITHIN A GIVEN FRAMEWORK

Yes, this is included in the WFD!

3. TRANSBOUNDARY MANAGEMENT IN THE BASIN

This is not really an issue in the WFD.

4. STAKEHOLDER INVOLVEMENT

Yes, this is included in the WFD!

5. CAPACITY BUILDING IS THE KEY TO EFFECTIVE IWRM

Capacity building is not an issue of the WFD

6. EFFICIENT USE OF WATER IS ESSENTIAL AND AN IMPORTANT MEANS TO RESOLVE WATER CONFLICTS

As the cost benefit analysis is a basis for all actions to be decided in the management plan an important tool of the WFD, this principles can be said to be included in the WFD. It is also worth mentioning the statement in the WFD that “actions to improve the ecological and chemical status of the water course shall be decided as long as they do not have great economical consequences”.

7. WATER SHOULD BE TREATED AS HAVING AN ECONOMIC AND SOCIAL VALUE.

This principles is only partially included in the WFD as the WFD has no social focus. However, it can be said to be partially included in the framework through “rules of exceptions” – new activities or new interventions can be implemented even if this means reduction of ecological status if the benefit for the society is greater than the loss of environmental quality, and “actions to improve the ecological and chemical status of the water course shall be decided as long as they do not have great economical consequences”.

8. WATER MANAGEMENT AND GENDER

Gender is not an issue in the WFD

D 5a. Is there an adequate understanding of the constraints in the planning documents – political, financial and managerial to effective implementation? Argue for your point of view.

Implementation of WFD in Hunnselva

As the management and the action plan has not yet been determined, this can not be stated.

Water Framework Directive:

Yes, this point has been emphasised in the directive.

D5b Where such constraints have been identified, are appropriate measures for overcoming them proposed? List constraints and describe measures

Implementation of WFD in Hunnselva

As the management and the action plan has not yet been determined, this can not be stated.

Water Framework Directive:

Yes, this point has been emphasised in ..

D 5c. Is there adequate monitoring to assess whether implementation is in line with plans? What monitoring has been prescribed?

Implementation of WFD in Hunnselva

No monitoring is not adequate due to insufficient economical resources (as the action plan has not yet been decided it might be premature to state this. This statement is based on the financial resources already allocated to monitoring in general.)

Water framework directive

The WFD: Member states shall ensure the establishment of programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district – for groundwaters such programmes shall cover monitoring of chemical and quantitative status.

River basin management plans shall cover the following elements:

A map and monitoring networks established for the purposes of article 8 and annex V, and a presentation in map from the results of the monitoring programmes carried out under those provisions for the status of surface water (ecological and chemical), groundwater (chemical and quantitative), protected areas.

The purpose of the monitoring is to find out the status in the water bodies and relate this to the requirements of the directive. The monitoring should also contribute with information of the effect of the prescribed actions and to what degree the objectives are reached.

For the monitoring as effective as possible, plans / programmes should be developed for the monitoring for every water region. The monitoring must be carried out in collaboration with central and regional authorities. Coordination with other earlier and progressing monitoring programmes must be ensured.

D 5.d are finances established to ensure monitoring?

Implementation of WFD in Hunnselva

Finances are established to ensure monitoring have been allocated over the Ministry of Environments budget. This issue has been an issue of discussion, other ministries has not been as willing to contribute with their part. Will the municipalities and the industry contribute? This is crucial for adequate monitoring.

Water framework directive

The directive does not say anything about finances.

Planning documents in the Sesan river basin; The National Hydropower plan Study,

D.K. Nhung, Institute of Geography, Vietnam

D5.1 Part I. Assessment and description of formal management commitments (these commitments include plans and ...

The IoG for Se San river basin have selected two documents for assessment:

National Hydropower Plan Study (NHP). The document was completed in 2001 by Electricity of Vietnam and SWECO International and published between EVN.

Vietnam has estimated hydro potential of about 14,000 to 17,000 MW. Until 1998 about 3,000 MW have so far been developed and about 1,300 MW are under construction or committed. Although planning of hydroelectric developments has so far been carried out in the context of overall water resource development planning in the river basin, it has lacked the rigor and cross-sectoral approach required by funding agencies in recent years.

The NHP is to provide the Government with alternative power system development strategies to decide on national long-term power demand. Objectives other than economic power development will be emphasised and evaluation of these strategies from viewpoints of laws and institutional responsibilities, economic efficiency, investment requirements, macro-economic issues, environmental and social impacts, will be continuously undertaken by the Government.

The study is carried out under the overall supervision of EVN. A steering Committee, chaired by the Ministry of Planning and Investment, has been appointed with members from relevant Vietnamese agencies.

The Study is carried out by Study Team consisting of key personnel from the Joint venture companies SWECO International, Statkraft Engineering and Norplan in close cooperation with the local sub-consultants, including IoG.

Se San river basin is one of the basins is covered by Phase I of the Study. Integrated Water Use and Water Resource Protection Plan of Sesan River Basin. Because this document has not yet been completed, we cannot use its data and information officially (according Vietnam regulation) for analysis and assessment. In addition we use plan of other river basin: "Integrated Water Use and Water Resource Protection Plan of Ma River Basin", because both are conducted by Irrigation Planning Institute and the same methodology. Recently in Vietnam there are some published WR plans, all of which focus on Irrigation Planning.

A1 what are the main objectives of the plan?

- National Hydropower Plan Study

The overall objective of the NHP Study has been to assess and rank potential hydropower projects in Vietnam from the following two perspectives:

- A Cross-Sectoral Approach that takes the form of a Ranking Study using an integrated assessment of the hydropower projects based on the technical and economic viability, including multipurpose aspects, and the environmental and social impacts
- A National Hydropower Development Plan based on generation system simulations to identify a sequential development of the studied hydropower projects to meet the growing power demand up to the year 2020, meaning that the appropriate timing and order of priority will be the governing factor.

- Integrated Water Use and Water Resource Protection Plan of River Basin

Based on socio-economic developing plan, the main objective of the plan is to generate irrigation works in the basin, namely:

- + Set up the water resource plans (water balance, water supply for industry and urban areas, water supply for agriculture, water drainage in the basin).
- + Water exploit in the main river and streams
- + Budget assessment
- + EIA
- + Establish a River Basin Organisation

A2 Do the objectives cover both socioeconomic and environmental concerns?

- National Hydropower Plan Study

The objectives of the Study cover both socioeconomic and environmental concerns

The socioeconomic concern is hydropower development. The various projects will have different impacts on socioeconomic development and improved standard of living for the beneficiaries.

The assessment of non-power benefits of the considered interventions in Se San river basin includes the following elements:

- + Benefits of year 2020 irrigated agriculture development in upstream areas vs. impact on hydropower production benefits due to reduced in-flow.
- + Irrigation benefits downstream of the dams due to increased water availability in critical periods
- + Flood damage reduction benefits in downstream flood prone areas
- + Combined project benefits

Socioeconomic impact issues of various projects include:

- + Partially and indirectly-affected people; + Migration; + Water access and rights;
- + Land use; + Food security; + Health; + Fishery; + Transportation;

Environmental impact issues of various projects include:

- + Water and river use; + Water quality; + Soil and erosion; + Sediment transport; + Land use; + Biodiversity, including fish and fishery; + Impact on protected areas

- Integrated Water Use and Water Resource Protection Plan of River Basin

The objectives of the Plan cover both socioeconomic and environmental concerns.

The socioeconomic concern is irrigation development. The socioeconomic and environmental concerns are attempted through the flood and natural hazard reduction in the basin. The irrigation projects will have different impacts on socioeconomic and natural environment:

- + The great budget foot the plan implementation will have positive impact on living conditions of local people.
- + The plan implementation will cause the big resettlement
- + The biodiversity in the basin will be reduced
- + The flood control will be improved

A3 are these goals/objectives linked to specific strategies to achieve the goals?

- National Hydropower Plan Study

There are 5 planning hydropower projects in the Sesan basin. For each of the projects some environmental mitigation and enhancement measures are proposed based on the key aspects of detrimental environmental impacts. These measures focus on:

- + Biodiversity and Protected areas; + Land use and fragmentation; ; + Revegetation; + Eutrophication control; + Erosion and sedimentation; + Fish and education in new fishing methods; + Developing fish farming; + Water supply

- Integrated Water Use and Water Resource Protection Plan of River Basin

There are some detail water use plans for different fields:

- + For industry and urban areas (list of industry and urban areas which need the water supply works, water demand of each area, some proposed water supply plans)
- + For agriculture and fishery production (water demand for each area in the basin, list of proposed irrigation works)

A4 are the goals integrated or are they in opposition?

- National Hydropower Plan Study

The goals are partly in opposition because the main goals lead to negative environmental impacts (resettlement, water quality, erosion, biodiversity, etc)

- Integrated Water Use and Water Resource Protection Plan of River Basin

The goals are partly in opposition because the main goals lead to negative environmental impacts

A5 are goals / strategies in line with, integrated with other national goals? (such as PRSPs)?

- National Hydropower Plan Study

The study is in line with national goals, as National strategy for electricity development to year 2020.

The most up to date forecast suggests that the annual energy demand will grow from 26 TWh in the year 2000 to 70-80 TWh in the year 2010, and 167-200 TWh in the year 2020

National goals include the reduction of environmental impacts, but not to stop hydropower development.

- Integrated Water Use and Water Resource Protection Plan of River Basin

The plan is in line with national goals, as National strategy for water resource to year 2020. Its objectives such as water resource protection, reasonable water use, etc.

B Basin description and impact reports

Due the Integrated Water Use and Water Resource Protection Plan of River Basin is very spare, the following analysis will focus on National Hydropower Planning Study.

B1 Does the basin description include a description of- and impact reports of environmental factors (including all biotic, a-biotic and polluting sources)

B1.1 Have the main different vegetation zones (alluvial and terrestrial) in the river basin been mapped and described?

Vegetation types and flora, plankton species in the basin and on areas that were impacted by the regulation have been mapped and listed.

The forest in the basin covers about 54% of the area, of which about 53% is natural forest and 1% planted forest. The main types of forest are dense evergreen broad-leaved forests, deciduous broad-leaved forests, semi-deciduous broad-leaved forests, pine forests and bamboo forests.

There are about 3,400-3,700 species belonging to 6 families as follows:

- Magnoliophyta, Polypodiophyta, Pinophyta, Lycopodiophyta, Psilotophyta, Equisetophyta

The short descriptions of the impact of regulation on vegetation, on flora and plankton species were presented for each planning hydropower projects in the basin

Nguyen Van Chiem, Bui Quan Te (1998) has presented a list of 47 Phytoplankton species identified in the survey downstream of the Yali dam site (1998). The density of Phytoplankton is from 348,900 to 606,000 cells/l.

Based on quantitative analysis in December 1999 and research documentation of Bien Ho and of streams and rivers in Gia Lai and Kon Tum provinces, a list of 121 Phytoplankton species has been established.

B.1.1a Do the report/planning document in particular pick up the issue of vulnerable or threaten botanical species ?

Yes, the threatened flora species have been identified in the report.
Surveys have revealed 69 rare species of 40 families as follows:

- 4 species: Endangered (E)
- 17 species: Vulnerable (V)
- 30 species: Rare (R)
- 5 species: Threatened (T)
- 13 species: Insufficiently known (K)

1.2 Do the reports /planning documents describe the fauna, and the *impact* of the regulation on the fauna?

B1.2a for birds?

Birds have been registered in the basin and in the area will be impacted by the regulation (reservoir areas).

The exact status of the area in the reservoirs and basin can only be determined after intensive surveys.

B1.2b for the benthic fauna? (bottom dwelling) and plankton

The benthic fauna has been registered in the basin and in the area will be impacted by the regulation (reservoir areas).

Nguyen Van Chiem and Bui Quan Te (1998) have provided a list of 12 species and groups of Zooplankton identified downstream of the Yali dam site.

Samples from 1999 together with available research documentation of Bien Ho and of streams and rivers in Gia Lai and Kon Tum provinces indicate 59 zooplankton species in the river.

The survey on Benthos in December 1999 identified 25 taxa of Benthos groups and a list of 37 species.

The exact status of the area in the reservoirs and basin can only be determined after intensive surveys.

The short descriptions of the impact of regulation on benthic fauna were presented for each planning hydropower projects in the basin

Example for Upper Kon Tum Hydropower Project: The periodically dry up of the draw down zone (4 m) will to a large extend destroy normal littoral life in the reservoir. It is in this zone that the most important fish food animals are produced. In the deeper bottom areas the sediments will also be of inorganic character after some years of sedimentation and only have little nutrient value to bottom dwelling animals. The planktonic nutrient chain will be the only of any importance to the aquatic life. In the years after impounding, this can however be rich, due to washout of nutrients and organic material from the inundated terrestrial areas. With the present human activity in the catchment area, it does not seem like pollution will be a large threat to the ecosystem in the reservoir.

The dam will act as a barrier to migratory species and they will be severely reduced in number. Several of these will disappear, and this may also include some of the 8 rare and endangered species that are recorded in the river.

Downstream of the dam, aquatic life will be totally destroyed down to the first tributary of any size. Even further downstream the aquatic life will suffer considerably due the flow reduction that follows the diversion.

B1.2c for mammals?

The mammals have been registered in the basin and in the area will be impacted by the regulation (reservoir areas).

In the Se San River catchment area, there are 94 species of mammals

The animals mainly thrive along Krong Poko River and Sa Thay River and in Dac Ne – Tra Khuc areas.

The exact status of the area in the reservoirs and basin can only be determined after intensive surveys.

B1.2d for reptiles?

The reptiles have been registered in the basin (50 species) and in the area will be impacted by the regulation (reservoir areas). The exact status of the area in the reservoirs and basin can only be determined after intensive surveys.

B1.2 e for fish?

The fish species have been registered in the basin and in the area will be impacted by the regulation (reservoir areas).

Based on investigations and interviews in December 1999, and review of existing documents, a total of 98 fish species have been identified in Se San River, of which 8 fish species are listed in the Vietnam Red Book.

There is no permanent fishing in the area. Every January, local fishermen concentrate catching a particular fish (scientific name not known). About 20 - 30 fishermen catch from 5 to 7 kilo fish each day. This particular fishing lasts for a period of 15-20 days.

Local people also use nets for fishing, but the catch is small.

Cultivated fish species include *Cyprinus carpio L*, *Sauvager*, *Cirrhina molitorella*, *Ctenopharyngodon idellus*, *Labeo rohita*, *Labeo mrigala*, *fluta alba*. The area for cultivation of fish is small and the productivity is low. Mainly small dams in terrain depressions are used for fish farming.

The exact status of the area in the reservoirs and basin can only be determined after intensive surveys.

The short descriptions of the impact of regulation on fish and fishing were presented for each planning hydropower projects in the basin

Example for Upper Kon Tum Hydropower Project: It will not be possible to maintain good fish productivity in the reservoir, even though there will be a shift in the species composition towards planktivorous fish species. In the first years after impounding there may be an increase in fish production due to the fish having access to food from the inundated terrestrial areas. This increase will not last longer than 10 years after the impounding. After that the productivity will be lower than before.

In the downstream area the fish fauna will be considerably reduced due to the reduction in flow, as the water is diverted to another basin.

The dam will act as a barrier to the migratory species, and these will disappear from the river in the Project Area. The species diversity of the fish community will be reduced. Some of the 8 recorded red list species may also disappear. It is not known to what extent these endangered species can survive in the tributaries after impounding and detailed surveys have to be conducted.

Downstream of the tailrace outlet in Dak Lo River, there may be considerable water flow variations that may cause erosion in the river banks with deterioration in the water quality. This will impact the fish population in this river negatively all the way down to the low land areas of the receiving river system.

Have the sensitivity of the different ecosystems in the river basin been evaluated?

No, the sensitivity of different ecosystems in the basin has not been evaluated.

B1.1b Have vulnerable or threatened vertebrate or invertebrate species (fauna; fish, birds, reptiles, amphibians, mammals, macrophytes) in the area impacted by the regulation been registered?

The rare and vulnerable plants, animals, birds in the areas impacted by the regulation have been registered in the report.

B1.3 Are the geology and the landscape in the area described and impacts identified?

B1.3a geology (soils?)

Topography

Se San River basin is located on the south and south-western sides of Ngoc Linh mountain range. The geomorphological structure of the basin is common for the region.

Ngoc Linh mountain range is the largest in the north-western highland, stretching out in a north – north-west to south – south-eastern direction. It is the water divider between Se San River and other small rivers flowing into the South China Sea (Thu Bon River, etc.). The Ngoc Bin San mountain range is the water divider between Se San River and other Mekong tributaries.

There are also several highland plateaux in the basin as follows:

- The Kon Plong highland with an elevation of +1,100 to +1,300 m.
- The highland of Kon Ha Nung which is ranging between +500 and +900 m.
- The Pleiku highland to the south of the basin with an elevation of +700 to +800 m.

Geology

The geological structure of Se San River basin belongs to the Kon Tum land block. It includes the oldest rocks in Vietnam under Archeozoic (Khanh Hoa complex) as follows:

- Metamorphic rocks of Grannulit
- Metamorphic rocks of Proterozoic under the Poko system
- Sediments of Mesozoic under the Dung Mang Fang system aged Triassic
- Sediments of Cenozoic
- Effusive basalt and intrusive magma formation.

The impacts have not been identified

B1.3 b Landscape - Describe the briefly the landscape and the impact of the regulation.

The landscape has not been described

The catchment area has a very large area that is forested. Most of this forested area falls in the protected area and contiguous areas. There is one protected area in the catchment area designated for flora and fauna protection. Construction and operation of the Project will disrupt the protected area. The construction of the Project will encompass new roads, some of which may tread into land not usually accessible. This can enhance fragmentation-related impacts; deforestation, blocks to migratory animals, uncontrolled encroachment for agriculture, hunting and trapping of animals, etc.

B1.3 g Are flood data recorded in the basin description?

Yes, the flood data was recorded in the basin description

The majority of flood events in Se San River basin are due to the activity of the summer monsoon. These floods mostly occur during the period from July to October. The extreme floods in the basin are however caused by typhoons arriving from the N and NE directions. Damages caused by floods occur relatively frequently in the basin, however most damages are caused by flash floods generated by heavy rainfall.

There is one major reservoir in the basin as well as several smaller reservoirs. Yali Hydropower Plant is the only large reservoir with 779 Mm³ of active storage, however the reservoir is of minor importance with regard to flood control as there is little potential for damage reduction downstream of the Yali Reservoir. The smaller reservoirs in the basin all have purely local effects on floods and these have not been investigated in detail in this Study. In general there is only a marginal potential for flood mitigation in Se San River basin. The greatest benefits are thought to come from non-structural measures, primarily re-forestation and other land-use constraints, such as soil erosion.

B1.4 Description of the hydrology / hydro-morphology of the basin for the following elements:

B1.4a– Do the plan include a description of change in river water flow, (portion of the river with changed water flow after a regulation or urbanisation, change in water flow in relation to flood, normal water flow and low water flow?

- No, targets for environmental flow have not been determined. .

B1.4b Do the plan include a description of human made physical barriers or other physical change of the river bank or river basin (ex lowering of lakes, drainage, vegetation removal) in the basin and the impact? [Describe the change and the impact.](#)

The impacts for birds, animals and flora has been described but in general only.

B1.4c Do the plan describe sedimentation and erosion patterns in the basin, and the impact of the regulation on these two aspects? [Describe change and impact.](#)

The erosion and sedimentation have been described in the study

Potential Erosion

The erosion level of 800 – 1,100 tons/ha/year is predominant, see the table below, and confined to large areas in the northern and eastern part of Kon Tum Province and to the west and east of Pleiku.

The erosion level of less than 200 tons/ha/year is the second most common, occurring on large areas, stretching from the north-northwest of Kon Tum to the south-south-west of Pleiku.

The erosion level of 1,400 – 1,700 tons/ha/year occupies the smallest proportion, and is only sporadically distributed in the Ngoc Linh region.

Potential Erosion of Se San River Basin

Level	Area (km²)	Percentage (%)
<200 ton/ha/year	2,213.5	19.7
200-500 ton/ha/year	1,762.0	15.7
500-800 ton/ha/year	1,122.5	10.0
800-1,100 ton/ha/year	5,255.0	46.8
1,100-1,400 ton/ha/year	839.5	7.5
1,400-1,700 ton/ha/year	37.5	0.3
Total	11,230.0	100.0

Source: Potential Erosion Map – Institute of Geography - 1999

The surface erosion in the Se San River basin reaches 79.5 tons/km²/year, while that of Krong Poko River basin is 144 tons/km²/year and Dak Bla River basin 190 tons/km²/year.

Sediment Transport

The potential erosion of the basin is estimated at 412 tons/ha/year on average. Due to the thick absorbed basaltic adaphophic humid soils with abundant vegetation cover and rather moderate rain intensity, the surface eroded sediment to the river is moderate.

Based on observations from 1991 – 1997 by PECC1, the turbidity fluctuates from 50 – 150 g/m³. These figures comply with the turbidity presented in Vietnam's Average Turbidity Map, based on data up to 1990 and presented by Surface Water Resources Department (Institute of Geography).

The turbidity is dependent on different topographical factors. The turbidity of Krong Poko River, which flows on steeper relief, is lower compared to Dak Bla River that flows on smoother relief.

The sediment transport shows clear seasonal variations, and almost 88 % of the annual sediment transport takes place during the flood season. September, which is the month with the highest flow, accounts for 36 % of the annual transport. The sediment transport in the dry months is very low. Between January and April, the sediment transport is only about 1 % of the total annual transport. The measured maximum turbidity is 1,220 g/m³ and the minimum is close to zero.

The impacts of the regulation on these aspects have been described for each hydropower project in the basin.

Example for Upper Kon Tum project:

Erosion/Sedimentation

The inundated area consists of almost 40% agricultural land, which indicates that the shorelines of the reservoir to a large part will consist of soils, and the shoreline will be exposed to wave erosion. In the draw down zone (4 m) the organic material and fine silt will be washed out and settled further out in the reservoir. After some years the draw down zone will consist of coarse sand with little nutrient value for both fish and bottom animals. The deeper sediments will also be largely inorganic due to the sedimentation of the erosion material, and therefore have low bottom animal productivity.

The retention time in the reservoir will result in sedimentation of part of the incoming suspended sediments. For some human use categories like drinking water supply, the sedimentation will be an advantage to the water quality. However, the incoming water will have low content in suspended sediments, so this advantage will not be significant.

Downstream of the tailrace outlet in Dak Lo River, there will be considerable water flow variations that may cause erosion with deterioration in water quality.

B 1.4c Do the plan include a description of temperature changed due to ice-regime or others? [Describe the change and the impact.](#)

No

B1.5 Ground water

B1.5a Have wells and springs in the basin been registered and described

No, there is no record on this in the reports

B1.5b Have the impact on the ground water been evaluated? [Describe the impact.](#)

No, the impact on the ground water have not been evaluated

B 1.6 Are the climate in the basin described?

B1.6a Temperature patterns?

B1.6b Precipitation patterns?

The climate was described in Integrated Water Use and Water Resource Protection Plan of River Basin, but not in National Hydropower Planning Study

B1.7a Do the plan include a description of the water quality in the basin and the impact of the regulation?

According to measured water quality at Trung Nghia station and at some other locations within Se San River basin, the mineralization degree of the water is low, less than 100 mg/l on average. According to Alekin's classification, the water belongs to the soft water group. With regard to chemical composition, water in the rivers and streams of Se San River basin is of the Bircarbonate - Sodium group (Na^+).

The content of P is low and within the limits of natural water. Iron is present in high amounts, most often at 0.5 – 1 mg/l, with the highest at 4.8 mg/l. These values are all above the acceptable standard for household consumption.

In most of Se San River basin, water is almost free from organic substances. However, in Dak Bla River after passing Kon Tum town, the contents of organic substances are quite high caused by wastewater outlets.

The water of the Se San River is characterised by a neutral to weak alkaline reaction. Average pH is 7.4, varying between 6.8 and 8.0.

The retention time of the water in the reservoir will have the effect that the water will clear up due to sedimentation of the suspended solids. The coliform bacteria that are transported into the reservoir will also to a large part be removed from the water by the fact that many planktonic organisms are consuming them, and they are also removed by sedimentation.

For the purpose of drinking water supply the water quality in the reservoir will be better than in the in coming river. However, since the water in this area is little polluted and contain only small amounts of suspended sediments, this advantage will not be significant. Other positive effects are not expected.

B1.7a Are pollution point sources described in the planning document?

No, the pollution point sources were not described.

B1.7 Do the basin description include description of non point sources – industry, agriculture, forestry, mining activities, polluted sediments, transport

Non point-polluting sources has been approached in general, including industry, agriculture, forestry, transport

B2 The socio-economic situation

B2.1a Has a population survey been performed in the area of impact?

The lists of land owners impacted by the projects and of people who will reset from impacted areas have been made for each hydropower project. The lists are made based on data and information collected, and field works performed, by the National Institute of Agriculture Planning and Projections (NIAPP) and the National Institute of Ethnology (NIE)

B2.1 b Does the plan provide information concerning the income distribution of people impacted?

The information concerning the income of people s is provided in the report for the basin and for each project.

An overview of employment distribution in the two provinces is provided in the following tables. It may be noted that agriculture is the predominant source of employment (and income), with 88% in Kon Tum Province, and 85% in Gia Lai Province. Total food in rice equivalents per capita (1998) was 289.7 kg in Kon Tum Province and 232.2 kg in Gia Lai Province, while the corresponding figure for the whole country was 408 kg. GDP per capita of Kon Tum and Gia Lai provinces was 2.4 MVND and 2.5 MVND in 1999, respectively, much lower than that for the whole country, 4.7MVND.

Employment Distribution by Sector, 1998

Sector	Total	Kon Tum	Gia Lai
Agriculture	482,799	122,907	359,892
Industry, construction	64,109	12,292	51,817
Tourism, services	18,377	4,726	13,651
Total	565,285	139,925	425,360

GDP Value by Sector 1998, MVND

Sector	Kon Tum	Gia Lai
Total GDP	702,530	2,281,943
Agro-forestry-aquaculture	363,888	1,231,227
Industry, construction	89,453	549,939
Services, tourism	249,189	500,777

Example for Upper Kon tum Hydropower Project:

Household economy in the Project Area is subsistence oriented and based on agricultural production: slash-and-burn and cash crop cultivation add to some wet rice cultivation. Crop yields generally remain at a low level. Farming accounts for 94% of the household income. The GDP per capita and year of the directly-affected people is very low, 51 USD, compared to 169 USD for the whole region and 355 USD for the whole country.

B2.1c Do the plan include an evaluation of the impact of the regulation on the economy in the area?

There are some comments and forecasts about the change of economic structure for each project

Example for Upper Kon tum Project: The area of agricultural land is limited at the resettlement sites. It is therefore important to work out a plan for alternative economic activities for these areas. Focus should be on agricultural processing, fishery, small-scale industries, market development and small-scale business. Exempt from agricultural taxation should be guaranteed during the first years of the resettlement.

Industrial development has a good potential in the Project Area. In the first place, investments need to be concentrated on upgrading staple industries like processing agro forestry products. Construction of new enterprises for processing of agro forestry products should be supported, as well as of e.g. coffee, cassava powder, latex and meat. Development of the rural industry should be concentrated along the

district and national roads provided that the road system will be upgraded. This is also where preferably access to rural electrification will be established.

B2.1 c Does the plan describe the impact on employment /occupation in the basin?

The impact on employment is described but not detail.

Example for Upper Kon tum Project: The construction of the Project will, directly and indirectly, create employment opportunities and expand the local economy. There is no reason to assume that out-migration would increase, but rather that working opportunities in the region due to the hydropower project construction would attract more people into the area. Increasing population concentrations might cause more social tension due to changes in the socio-economic and cultural settings.

B2.2 Does the plan describe the impact on the different land use sectors in area?

B2.2a on agriculture in the area of impact?

The impact on agriculture area is described in the study

Example for Upper Kon tum project:

Loss of Agricultural Land

1. Loss of agricultural land in the reservoir area: 1.6 km²
2. Total agricultural land in the catchment area: 17 km²

The amount of agricultural land lost in the catchment is considerable. In the reservoir the area is relatively large (39%) and includes growing of cassava, some rice, maize and vegetables. Local ethnic communities commonly practise shifting agriculture.

B2.2 b Does the plan describe the impact on the industry in the area of impact?

There is little industry in this area, thus the industrial setting has not been described

B2.2c Does the plan describe the impact on the tourism in the area of impact??

There is little tourism in the area, thus the tourism setting has not been described

B2.2d Does the plan describe the impact on the recreation the area of impact?

In general there is no recreation in the basin.

B2.2e Does the plan describe the impact on the cultural heritage / cultural monuments in the area of impact?

There is no cultural heritage in the area.

But there are some small cultural monuments and local habit. However the impacts of the project have not been described.

B2.2f Other

Nothing.

B2.3 Does the plan include a general description of the socio-economic history of the area?

Summary of Regional Conditions

In the upper regions of the basin, particularly where previous logging has been carried out, significant areas of mono-culture reforestation using coniferous species has been undertaken. Much of the upper-mid watershed area has been used for the production of industrial crops, such as coffee, rubber and, in areas of high soil fertility, sugarcane.

Population density is relatively low, reflecting a relatively small share of agriculture land in the region. Agriculture still represents more than half of total GDP, with services and industry on the increase. Poverty and famine is still part of the realities of life for up to 20% of the population, and even higher in smaller villages and in the mountain areas. Poverty is also the result of more difficult access to health and education facilities for the more isolated villages.

The economy of the basin is mainly based on agriculture; industry's share of the economy is still small. Average income per capita is very low, having increased from 74.5 USD in 1995 to 97 USD in 1999. The potential for socio-economic development in the basin is high if unused land is exploited, and measures changing crop pattern are implemented. Nevertheless, to develop the socio-economy in the region, first priority should be paid to infrastructure construction, and to increase education levels and improve health care. Efforts must be undertaken to alleviate poverty, and to ensure community services and income improvements that will enable villagers to participate in the modern economy.

B2.4 a Does the plan include a description of the different sectors use of water (including marginalised groups poor and women)? The spatial and temporal variations in water cycle elements, such as water resources availability (m3/person/year), water use (litres/person/day).

Most residents use springs and dug wells for drinking water and stream water for washing and bathing. In some places without streams, people dig their own wells. Although there are no exact figures of water quality, well-water quality is in general rather good. In the dry season spring-water discharge decreases, its quality being better in the rainy season. Stream-water quality is entirely unsanitary, and cannot be used for domestic uses or drinking unless it is treated. Rivers, streams and other places with stagnant water, such as small ponds and lakes, are polluted causing diarrhoea, dysentery, and malaria. Gynaecological diseases occur more often with insufficient water. Households dig wells not only for drinking but also for irrigation of gardens. The majority of households using water-wells lives in the lower region and has average or above-average living standards. These people account for 45-50% of the total population. Their wells are some 10 to 15m deep. Stream and spring water is often situated far from the residences and therefore often conveyed by pipes, made of bamboo or PVC.

So far, the fresh-water programme funded by UNICEF since 1986 has provided fresh water to about 40% of the national population. However, in the Se San River basin only a few small fresh water supply programmes funded by the Government have been implemented, mainly in some towns.

Generally speaking, water for domestic uses is in many places not safe, especially in the rainy season. Water sources, mainly rivers and streams, are contaminated. According to the general evaluation of Kon Tum Province's Construction Office, all water sources in the project areas are deemed to be sufficient for domestic use in the short to medium term.

B2.4b If good drinking water is scarce, does the plan describe allocation efforts?

Yes, good drinking water is scarce. Reliable and hygienically safe water to the rural and urban communities is a major factor in mitigation of poverty and improving people's health and wellbeing. Therefore, the Vietnamese authorities have given highest priority to secure drinking water supply. It is

also important to allocate sufficient water for industrial purposes. Quantity-wise, the municipal and industrial water demands are low compared to the irrigation water requirements, whereas the water quality plays a crucial role. The BWRP takes into account the water demands for the year 2020.

The region is characterised by low population density (27 people/km² on average, 1996). Except for Kon Tum town, most communities are small, i.e. communes and mountainous villages. Water is supplied in various ways according to geographical conditions. Water from the Se San River is, however, the main water source for households in the region.

People in mountainous areas take advantage of the steep slopes to canal and use river water for domestic purpose. River water is used directly without any treatment.

B2.4 c Does the plan describe the quantity of water for irrigation by different user groups?

A thematic map showing the extent of irrigation in the river basin is presented in the report. In general, this river basin holds a substantial potential for increased agricultural production. Today, most of the agriculture in Se San River basin is by upland slash-and-burn cultivation. In the lower parts, one crop of rain-fed rice is also harvested. Most of the agriculture is done by small-holders. Some state-owned rubber plantations are in operation although in a stagnant or declining state.

For irrigation purposes, overflow dams are common in Kon Tum where water resource is available. The capacity of the dams is sufficient for the present agriculture in the region with the arable land scattered along the river. The reservoirs are mainly small. The water source is near the places where the water is used and the loss of water in the canals is therefore limited.

The use of water for irrigation of paddy fields accounts for a pre-dominant part of the total water use in the basin. The water need for irrigation is expected to increase considerably during the planning period, especially as a result of the envisaged increase of irrigation of paddy fields. Another factor is the development of other crops connected with the Government's plans to develop up to 100,000 ha of new rubber plantations and another 5,000 ha of coffee plantations.

B2.5 a Does the plan describe equity aspects among water using sectors? [Describe these equity aspects.](#)

No this has not been described.

B2.6 Does the planning document include a review of the impact of the regulation on human activities, use of natural resources described (including consequences of the regulation for fishing, game hunting, recreation ?

No

B2.4 Are possible conflicts approached and described?

No the conflicts have not been approached in the impact assessment

C Have stakeholders been involved in the planning process or preparation of the documents or agreements?

Have stakeholders been involved in identifying the problem?

C.1a have stakeholders (private, public and civil society) been involved in the planning process?

[Describe how they have been involved.](#)

Hydropower exploitation involves and affects a number of people; from directly affected people, who will have to be relocated because of submerged areas caused by dams and reservoirs, to electricity

consumers as well as irrigation users (and others such as people getting advantages from flood control and fisheries) and decision makers in parliament and government institutions in Hanoi. Given that all these groups of stakeholders have 'stakes' (negative or positive) in hydropower exploitation, there is a need to search for an approach where representatives of these stakeholders get means to be informed, consulted and take part in, and have an influence on decisions made during the process.

Four so-called Central Stakeholder Meetings have been held during 1999-2001 in Hanoi, mainly for representatives from ministries, state agencies and mass organisations. The experiences from the stakeholder participation process during the early stages of the Study indicated that the stakeholder participation dialogue should be extended to also directly involve local stakeholders in the affected river basins. Therefore, the stakeholder component was extended to also include stakeholder workshops in three of the five river basins (Da, Se San and Dong Nai River basins) covered by the NHP Study and one summary workshop in Hanoi. The river basin workshops took place during October 2000, and the fourth workshop in Hanoi in May 2001.

C1b. Have marginalised groups: poor, ethnic groups and women (gender) been involved? [Describe how they have been involved if they have been involved.](#)

Ethnic groups and women have been involved. The informants have been cadres, women union members, youth union members and heads of households from the hamlets. One third of informants have been women.

C2 Did the stakeholders have possibilities for financial support to attend meetings? [Describe in what way?](#)

Local meetings were arranged, i.e. there is no need for financial support.

C 3 Was there decentralised localisation of meetings to facilitate participation? [Describe how.](#)

No

C 4 Have the project management/ project expertise included interdisciplinary representation (natural and social sciences)?

Yes interdisciplinary project expertise has been included.

The Study is carried out by a Study Team consisting of key personnel from the joint venture companies SWECO International, Statkraft engineering and Norplan in close cooperation with the following local sub-consultants:

- Institute of Water Resources Planning (IWRP)
- Power Engineering Consulting Company No.1 (PECC1)
- Power Engineering Consulting Company No.2 (PECC2)
- Institute of Geology (IG)
- National Institute of Agriculture Planning and Projection (NIAPP)
- Institute of Ethnology (IE)
- Institute of Energy

C5 Were information to stakeholders provided in the relevant channels? [List the channels used, and describe how they will reach stakeholders, and which stakeholders](#)

Four Central Stakeholder Meetings have been performed, mainly for representatives from ministries, state agencies and mass organisations. The province authorities have normally not been participating in the meetings but informed by mailed information, and questions and answers sent to the Client. Very few responses have been received, most of them of little value for the Study.

The Stakeholder Workshops with direct involvement of representatives (province, district and commune levels) of affected peoples were held in October 2000 in Son La (Da River basin), Pleiku (Se San River basin) and Da Lat (Dong Nai River basin). Issues raised at these workshops were further discussed at a workshop in Hanoi in May 2001 with participants from 7 ministries, 4 provinces, 7 research institutes, mass organisations, Vietnamese NGOs and the World Bank.

C6 Were information of project given in advance to stakeholders? [Describe the information process.](#)

No, the information of project was not given in advance to stakeholders.

C7 Were information of the project given in local languages, and in an understandable manner? [Describe the situation.](#)

Information of the project was given in a popular manner, in a language that everyone can understand.

C8 Does the problem identification reflect the water user interests in the basin? [Describe how it reflects or do not reflect the water use interest.](#)

The problem identification related to the hydropower development of the basin reflects the water user interests in the basin through the hearing consultations of all parties of concern.

C9 Does decision making follow principles of democracy (i.e. ...)? [Describe how it does follow such principles or why it does not follow principles of democracy.](#)

Yes, it follows principles of democracy.

C10 Which sectors dominate/influence the documents most and what sectors are poorly represented and what sectors not included at all? [Describe the situation.](#)

C 11 were water allocation agreed among stakeholders? [Describe the situation](#)

Not clear.

D What are Governance concerns of the plan/planning process?

D.1 which institutions have been involved in the planning process? [List the institutions involved and describe how they have been involved.](#)

The Study is carried out under the overall supervision of the Client, Electricity of Vietnam (EVN) represented by the Management Board of National Hydropower Planning Study. A Steering Committee, chaired by the Ministry of Planning and Investment, has been appointed with members from relevant Vietnamese agencies.

The Study is carried out by a Study Team consisting of key personnel from the joint venture companies SWEKO International, Statkraft engineering and Norplan in close cooperation with the following local consultants:

- Institute of Water Resources Planning (IWRP); Power Engineering Consulting Company No.1 (PECC1); Power Engineering Consulting Company No.2 (PECC2); Institute of Geology (IG);

National Institute of Agriculture Planning and Projection (NIAPP); Institute of Ethnology (IE);
Institute of Energy

D2a What governance levels are included in the planning process? (supra-national, national, state, province, districts, lower levels)

National level, Provincial level, District level, Commune level

D2b Has there been a decentralised planning process?

The planning was initiated by Electricity of Vietnam. It's governance company.

D 3. Are the objectives of the plan linked to an institutional framework/legal framework? According to the Terms of Reference the objective of the National Hydropower Plan (NHP) Study of Vietnam is to provide the Government with alternative power system (generation and transmission) development strategies to decide on national long-term power demand. Objectives other than economic power development will be emphasised and evaluation of these strategies from viewpoints of laws and institutional responsibilities, economic efficiency, investment requirements, macro-economic issues, environmental and social impacts, will be continuously undertaken by the Government.

Another important objective is the development of domestic institutions, analytical tools and staff skills to the stage that an integrated multi-sectoral approach to water resource planning will become norm in Vietnam.

The overall objective of the NHP Study is to assess and rank potential hydropower projects in Vietnam from the following two perspectives:

- **A Cross-Sectoral Approach** that takes the form of an integrated assessment of the hydropower projects based on the following two significant and basically non-comparable indicators of the projects:
 - Technical/Economic Preference Index reflecting the technical and economic viability, including costs for environmental and social mitigation measures, and restrictions to and benefits of other water uses (flood control and irrigation)
 - Environmental/Social Preference Index reflecting the environmental and social impacts with due considerations to enhancements and mitigation measures, as well as beneficial impacts. The impacts are valued both in respect of quantity and quality (to what extent the impact matters)
- **A National Hydropower Development Plan** based on generation system simulations to identify a sequential development of the studied hydropower projects to meet the growing power demand up to the year 2020, meaning that the appropriate timing and order of priority will be the governing factor. Various power development scenarios will be examined and include different scales of Son La Hydropower Project in combination with the most attractive projects in other river basins. Also a power development scenario without Son La Hydropower Project will be studied as well as a scenario with only thermal expansion.

During the NHP Study, large efforts have been made to involve the various stakeholders as much as possible. This has been a difficult task for several reasons, one reason being that the NHP Study is a planning exercise only, and the final decision, if any, and to actually implement a particular hydropower project may be taken far into the future. The approach to obtain a dialogue with the stakeholders has been to organise workshops both in Hanoi for the centrally located organisations, and in the provinces in three of the river basins covered by the Study.

D 3b. Are objectives linked to regulations or law?

Water law: The Water regulations for different purposes have to be based on river basin planning, on water resource potential; to ensure the justice, rationale and to give priority to drinking water.

National Strategy on Water Resource to 2020:

- Effectuate a policy of economical and useful Water use.
- The water regulations have to be reasonable between different users and regions, provinces. Give priority to drinking water and to economic fields. To ensure the environmental flow. The water allocation to year 2010 is: for 10.5 millions ha of annual and long-term crops, for 13,000 – 15,000 MW of hydropower plants, for 0.64 millions ha of fish production.

Law on Environmental Protection

- Objects subject to elaboration of strategic environmental assessment reports include strategies, planning and plans for development of branches or domains on national scale.

D 4 Are the documents listed in table 1 the basis/background for decision making or the results of decision making (to what extent, – a table can be presented showing the type of documents or laws or policy etc, their legal binding nature, when was the document prepared, by whom, was it a participatory process, how are the documents used)

D5 What IWRM principles have been included

The overall objective of the NHP Study is to assess and rank potential hydropower projects in Vietnam from the following two perspectives:

- A Cross-Sectoral Approach that takes the form of an integrated assessment of the hydropower projects based on the technical and economic viability, and the environmental and social impacts
- A National Hydropower Development Plan based on generation system simulations to identify a sequential development of the studied hydropower projects to meet the growing power demand up to the year 2020, meaning that the appropriate timing and order of priority will be the governing factor.

D 6a. Is there an adequate understanding of the constraints in the planning documents – political, financial and managerial to effective implementation? [Argue for your point of view.](#)

D6b Where such constraints have been identified, are appropriate measures for overcoming them proposed? [List constraints and describe measures](#)

D 6c. Is there adequate monitoring to assess whether implementation is in line with plans? [What monitoring has been prescribed?](#)

A monitoring programme will in many respects be a tool for final decisions on mitigation requirements and provide follow-up monitoring and controls – thus this would be essential.

D 6.d Are finances established to ensure monitoring?

Based on the mitigation measures proposed, including monitoring, and the principles for calculating the costs for measures, the Mitigation Cost for each Hydropower Project is estimated.

References

- Electricity of Vietnam, SWECO International. National Hydropower Plan Study (NHP), Vietnam. 2001
- Irrigation Planning Institute – MARD. Integrated Water Use and Water Resource Protection Plan of Ca River Basin. 2006

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Planning documents in the Tejo River basin, Portuguese part; The Tejo River basin Water plan and the National Water Plan

Maria Manuela Portela, Marta Machado, IST- Cehidro, Portugal

“(…) whenever the Tejo flows, something always happens, because a river has its own glories and its own dramas. Like the men. A river lives, breaths, works, builds and destroys. So do the men. But men love and fall in love (..).

(…) A river has its own glories and its own dramas, but it does not fall in love.

The Tejo River does not think – it acts. It acts according to the circumstances. It acts and it builds, it acts and it destroys. Like a man. But a man thinks and knows the doubt.”

(Alves Redol, 1911-1969)

“(…) Quando o Tejo passa, algo acontece sempre, porque um rio tem as suas glórias e os seus dramas. Como os homens. Um rio vive, respira, trabalha, constrói e destrói. Também os homens. Mas os homens amam e apaixonam-se (..).

(…) Um rio tem as suas glórias e os seus dramas, mas não se apaixona.

O Tejo não pensa – age. Age ao sabor das circunstâncias. Age e constrói, age e destrói. Como o homem. Mas o homem pensa e conhece a dúvida.”

(Alves Redol, 1911-1969)

A1 - What are the main objectives of the plan?

The overview presented herein was based on the Portuguese Tagus/Tejo River Basin Water Plan as well as on the National Water Plan, the latter resuming and ensuring the compatibility among all the Portuguese river basin plans. All the Portuguese river plans aimed at providing a complete characterization national context related with the water resources. They were the first generation of the water plans as nothing existed before.

Therefore their main objectives were to provide a complete characterization of each watershed based on detail studies developed by a multidisciplinary team.

The National Water Plan was approved by the Decree-Law n.º 112/2002, from 17th April and the Tagus/Tejo River Basin Plan by the Regulatory Decree n.º 18/2001, from 7th December.

According to the previous legal document, the Tagus/Tejo Basin Plan should be understood as a sector plan aiming at establishing, in a structured and programmatic way, a national strategy for the management and utilization of Tejo River Basin, in articulation with the land planning activities and with the conservation and protection of the environment. For those purposes the plan should utilized an integrated approach that combined technical, economic, environmental and institutional aspects and that involved the economic actors and the populations directly interested in water resources related issues.

Both documents – the Tagus/Tejo River Basin Water Plan and the National Water Plan – aimed at providing the general framing, the strategies and the programmatic targets for the future water resources planning activities, the former, in the Tagus/Tejo River Basin, and the latter at a national level, as previously stated.

According to the legislation that led to the National Water Plan (Decree-Law n.º 45/94, from 22nd February), the studies started with an extensive characterization of the pristine situation in order to identify the objectives relevant in terms of water resources management and consequently the measures and the actions that should be carried out to achieved those objectives. The analysis period for all the river basin plans was of 50 years, from 1941/42 to 1990/91 (hydrologic years which, in Portugal start on the 1st October).

Based on the characterization thus resulting for all the issues concerning the fresh water – either related with the water availability, in time and in space, but also in quantity and quality, or with the water use, consumptive or not consumptive, and also in space and in time – the Tagus/Tejo River Plan together with the National Water Plan also aimed at contributing to re-structure the legal and the normative framing of the water sector towards coherent and efficient water resources policies.

A2. Do the objectives cover both socioeconomic and environmental concerns?

To achieve the objectives previously briefly mentioned an integrated methodology was applied in Tagus/Tejo River Basin Plan by combining all the relevant components in terms of water resources – from the socioeconomic and environmental aspects to the involvement of all the actors some how interfering or related with the water resources planning and management – also including an extensive public discussion in several different *fora*.

The general structure of any of the Portuguese River Plans comprehended the following main steps:

- analysis and diagnosis (inventories – water resources availability and demands, environment aspects, social structure, economic activity, natural hazards, built heritage, and so on);
- definition of environmental objectives (short, medium and long term objectives);
- identification of measures and actions (based on different scenarios);
- general conception of programs to implement the foreseen measures and actions (at the physical, financial and institutional levels).

A3. Are these goals linked to specific strategies to achieve the goals?

Any of the Portuguese River Plans were developed according to very well established principles. Besides fundamentals principles of political and administrative nature the following ones were also considered, as established in the article nº 1 of the Decree-Law n.º 45/94, from 22nd February, that regulated the Portuguese river plans: planning and management principles (“**globalise**”, as an integrated approach based on technical, economic, environmental and institutional aspects; **rationality** understood as the optimization of the different sources of water as well as of the different needs, with the guarantee of the water resources preservation, in quantity and quality; **integration** with the user’s sector planning, the regional planning, the land-use planning and the conservation and protection of the environment; **participation**, involving the stakeholders and the population having in view a large consensus; and **strategy**, a fast response, by consensus, based on the available information.);

The characterization accomplished in the river basin plans should help identifying the strategies that should be “merged” into the legal documents that were being prepared within the water resources policies. Those strategies were related with the following principles:

- **Principle of the social value of the water** (the water should be understood as a universal asset therefore its cost should be socially acceptable).
- **Principle of the environmental dimension of the water** (the water must be protected in order to ensure a sustainable utilization).
- **Principle of the economic value of the water** (as the water is becoming a more and more scarce asset its utilization must be economic efficient, and the cost related with the water services must be recovered based on the polluter-payer principle and on the user-payer principle).

- **Principle of the integrated management** (the water, the land and aquatic ecosystems and the wet areas depending on those ecosystems should be considered in an integrated way from both quantitative and qualitative points of view).
- **Precaution principle** (the measures aiming at preventing the environmental impacts of given actions should be carried out even if there is not unquestionable scientific evidences of the cause-effect relationships among actions and impacts).
- **Prevention principle** (the actions with negative consequences on the environment should be considered in the very early stages in order to eliminate or to reduce their effects).
- **Correction principle** (the environmental damages caused by pollutant entities should be corrected in their origins based on the imposition of correction measures and on the recovery of the costs of those damages).
- **Cooperation principle** (which recognizes that the water protection is a duty of the State and an obligation of the citizens).
- **Principle of the reasonable and equitable utilization of the shared basins** (which imposes that the water should be utilized in a reasonable and equitable way in order to ensure its sustainable utilization and its protection among shared watersheds).

The river plans were understood, not as static issues, but instead as dynamic issues. Therefore their revision was foreseen since the beginning. However, meanwhile the new Water Law (Law n.º 58/2005, 29th December) was approved, replacing the previous legislation and transposing to the national context the 2000/60/CD Directive (Water Framework Directive). In that law more emphasis is given in out concerns the sustainability of the water resources management based on an integrated planning system.

According to the Water Law the different river basin plans should be updated and replaced by the River Basin Management Plans (*Planos de Gestão de Bacia Hidrográfica*) which should be approved until 2009. The National Water Plan should be reviewed until 2010.

A4. Are these goals integrated or are they in opposition?

The different goals are integrated.

In fact, together, the Portuguese river plans should provide an integrated tool towards the sustainability of all the fresh water uses. For that purpose the studies carried out within the framing of the water plans should first of all clearly identify main and general the problems related with the water in each watershed and provide tools or ways to solve those problems. At often stated during the execution of the different water plans, they were the “first generation” of the Portuguese water plans and therefore they result some how not as completed as desirable.

Nevertheless they prepared the way to the new water legislation which clearly depicted the main goals of the water resources strategies, as pointed out in the previous item.

A5. Are goals/strategies in line with integrated with other national goals?

The goals of the different Portuguese river basin plans consubstantiate the national goals related with the water resources which justifies that those plans were further translated into Regulatory Decrees (the river basin plans) and into a Decree-Law (the National Water Plan that aggregated all the river plans).

B. Basin description and impacts reports

B1 Does the basin description include a description of – and impact reports of environmental factors (including all the biotic, a-biotic and polluting sources

Part 1 (B1) – General information related with the natural systems in the Tejo River Basin Plan

Part B1 was organized into **two parts**: the **Part 1 (B1)** provides a general characterization of the more relevant topics some how related with the questions presented in the template thus resuming the available information about the natural systems. Besides a brief general characterization of the basin it includes information related with the following topics: geology and geomorphology, soils, hydrology, hydrogeology, flora and vegetation, fauna and terrestrial vertebrate, river ecosystems, fish species, macrophyte, areas with special protection status, land use, industrial pollution, floods and the governance situation. **Part 1 (B1)** can be presented as an annex. The **Part 2 (B1)** provides the answers to the questions listed in the template, those answers being based on the information presented in **Part 1 (B1)**.

Watershed general characterization

The Tejo watershed is the largest Portuguese watershed (Figure 1), with a total area of 80629 km², 29.8% (24800 km²) of which is located in Portugal. The Tejo watershed is like a large central-west corridor, oriented from ENE to WSW (upstream to downstream), with a length of 700 km and an average width of 120 km. This orientation and configuration are a consequence of the general Meseta inclination, down slightly to west, and by the limits of the vigorous relief alignments, north of the Central Cordillera (Samosierra, Guadarrama, Gredos, Gata, Estrela, which extend from the Lousã, Sicó, Lamps, Montejunto, north, and to the south elevations of the Montes de Toledo, Altamira, Guadeloupe, St. Peter, S. Mamede, and Ossa, Finally, Arrábida).

The main channel of Tagus/Tejo River is 1100 km long, 230 km located in Portugal and 43 km along the border between Portugal and Spain (Figure 2). In the Spanish watershed the Tagus main channel is located more close to the southern boundary of the basin, while in the Portuguese watershed is the opposite: the basin spreads largely southwards, with the Sorraia sub basin, and is tightened at north side, namely along the final reach, by the Estremenho Limestone massif.

The tributaries with the largest watershed areas are, in the left bank, the Sorraia River, with 7555 km², and, in the right bank, the Zêzere River, with 5080 km² – Figures 3 and 4. Despite the watershed area relationship the mean annual flow in Zêzere sub basin is larger then the one in Sorraia sub basin: 3292 hm³/year and 1185 hm³/year, respectively.



Figure 1 – Portuguese part of Tagus/Tejo River basin

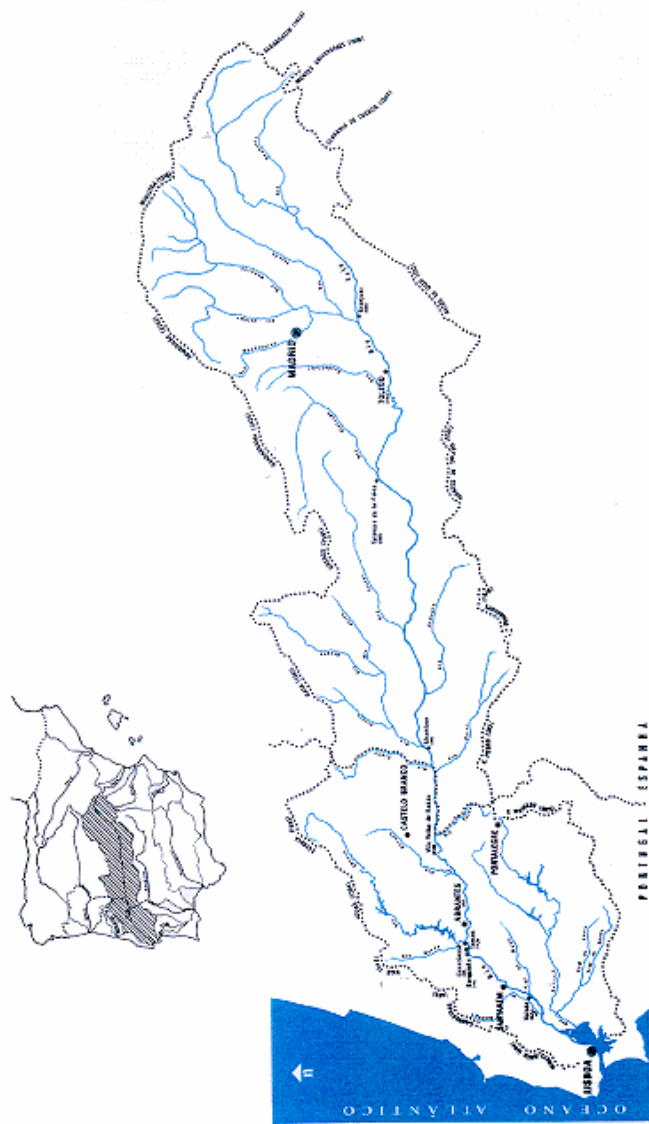


Figure 2 –Tagus/Tejo River basin, in Portugal and Spain.

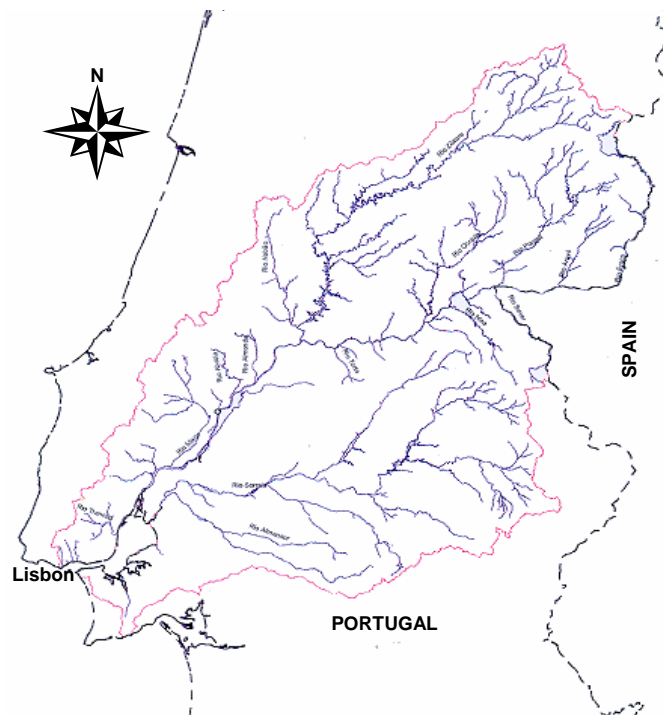


Figure 3 – Tagus/Tejo River basin watercourses (without scale).



Figure 4 – Tagus/Tejo River main Portuguese sub basins.

In administrative terms, the Tejo River basin comprehends 94 municipalities (Figure 5), though around a dozen of those municipalities are in the basin border and therefore only partially located in the basin. In Alentejo region (South) there are 20 municipalities total or partially included in the basin, 30 municipalities in the centre region and 44 municipalities in Lisbon and Tejo valley region.



Figure 5 – Administrative division in Tagus/Tejo River basin. Municipalities (without scale).

Geology and geomorphology

From both geologic and geomorphologic aspects the Tagus/Tejo Basin has three different units, well differentiated – Figure 6:

- the Old Massif, consisting of the oldest rocks, of the metamorphic and eruptive types, from the Paleozoic period;
- the western border, consisting of the Cenozoic and Mesozoic sedimentary formations of the Old Massif western and by the contemporary eruptive rock;
- the Tejo Lower Tertiary basin, built upon tertiary and quaternary sediments that fill the breaking downstream area which is identified by the low Tejo.

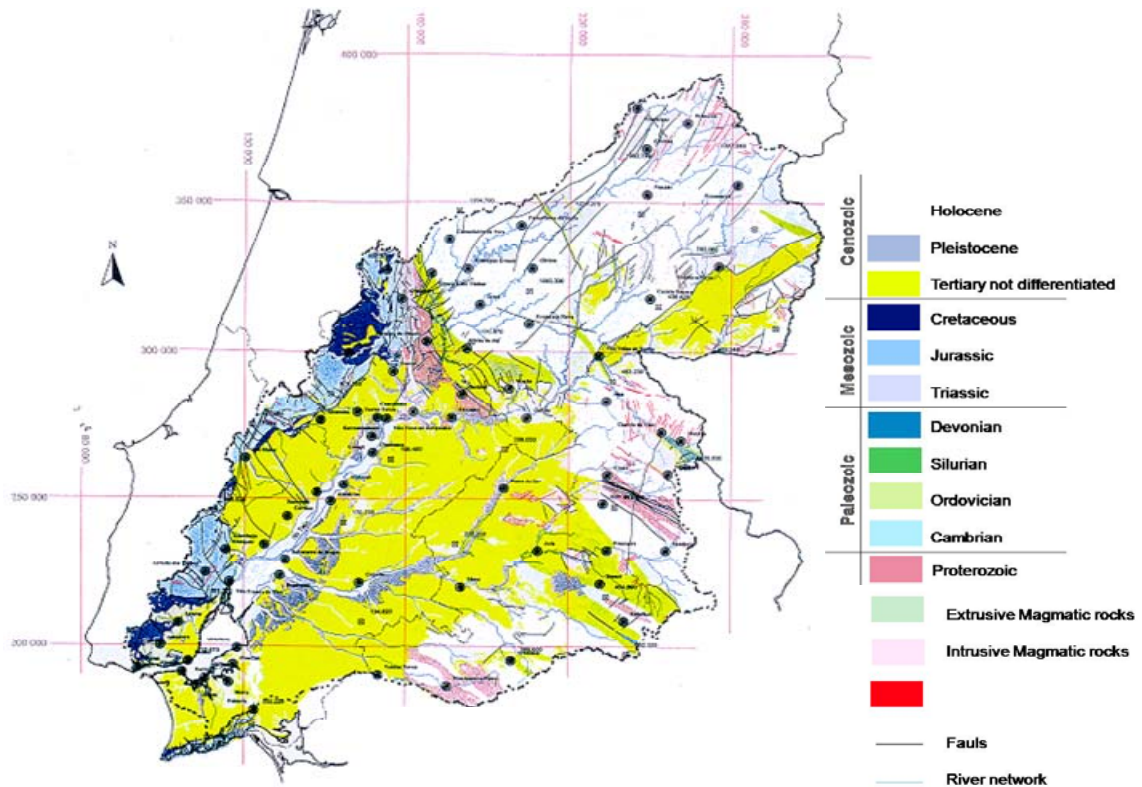


Figure 6 – Geologic and geomorphologic map

Soils

Despite the huge area of Tagus/Tejo River Basin and the variability of the natural conditions, 94% of the watershed area is occupied by four main types of soils, as represented in Figure 7: Cambisol, Lithosol, Podzsol and Luvisol.

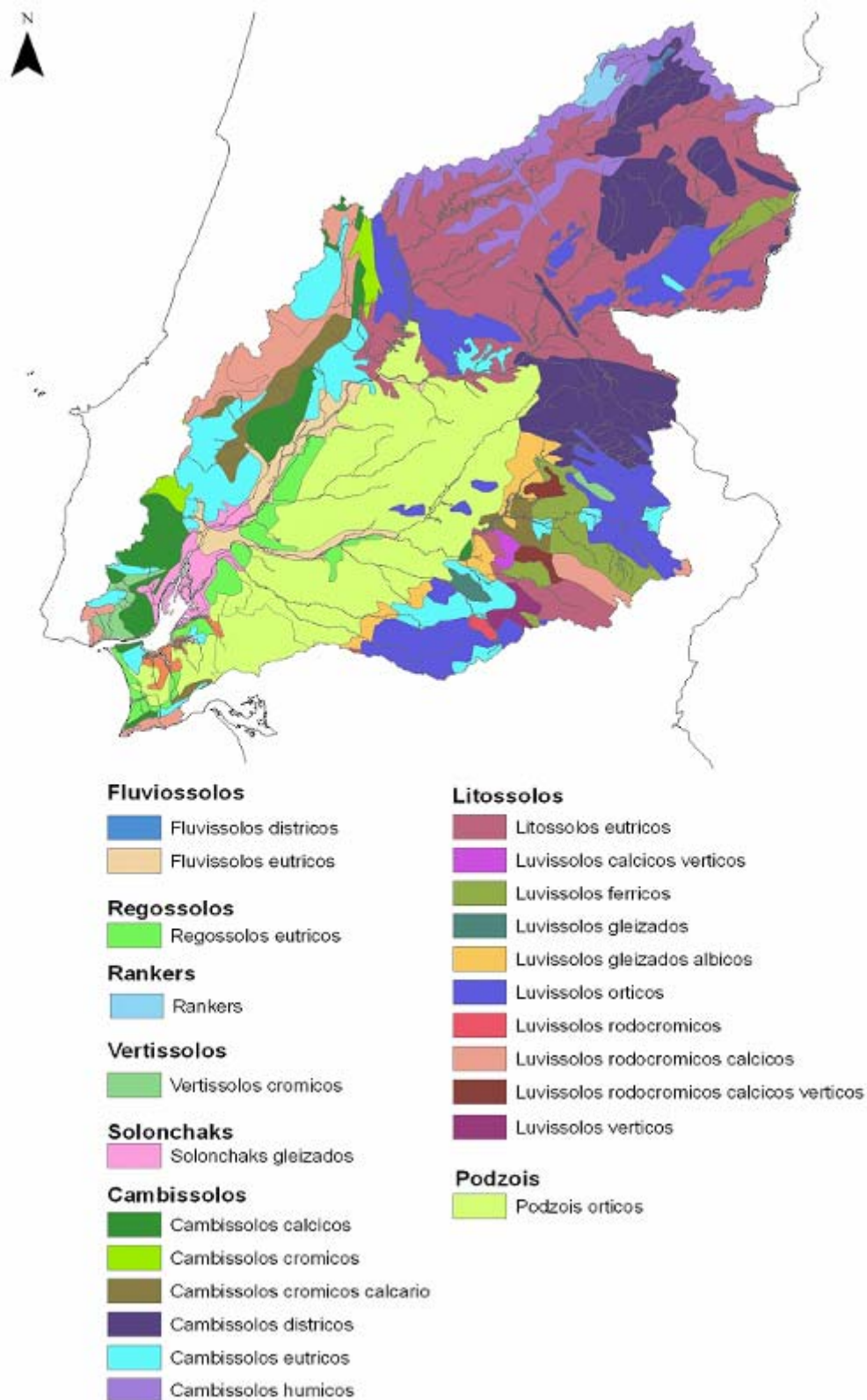


Figure 7 – Tagus/Tejo River basin. Soils map.

Hydrology

The hydrologic characterization of the Portuguese part of Tagus/Tejo River basin was based in the available records and resulted in several maps some of them being presented in the following figures, included in the next pages (the average spatial values for the whole watershed area are indicated between brackets):

- Figure 8: mean annual precipitation (870 mm).
- Figure 9: mean annual air temperature (14.9°C).
- Figure 10: mean annual humidity (75.6%).
- Figure 11: mean annual insolation (2 615 hours).
- Figure 12: mean annual potential evapotranspiration (1080 mm).
- Figure 13: mean annual wind velocity (9.8 km/h).
- Figure 14: mean annual flow (259 mm).

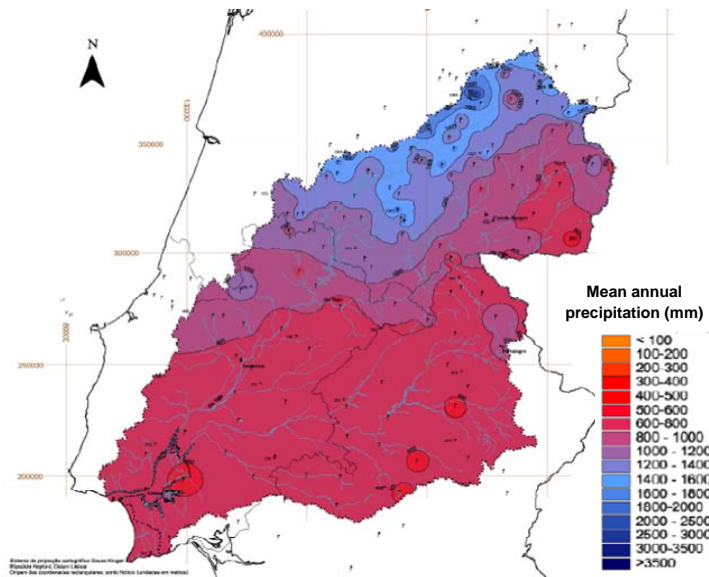


Figure 8 – Mean annual precipitation.

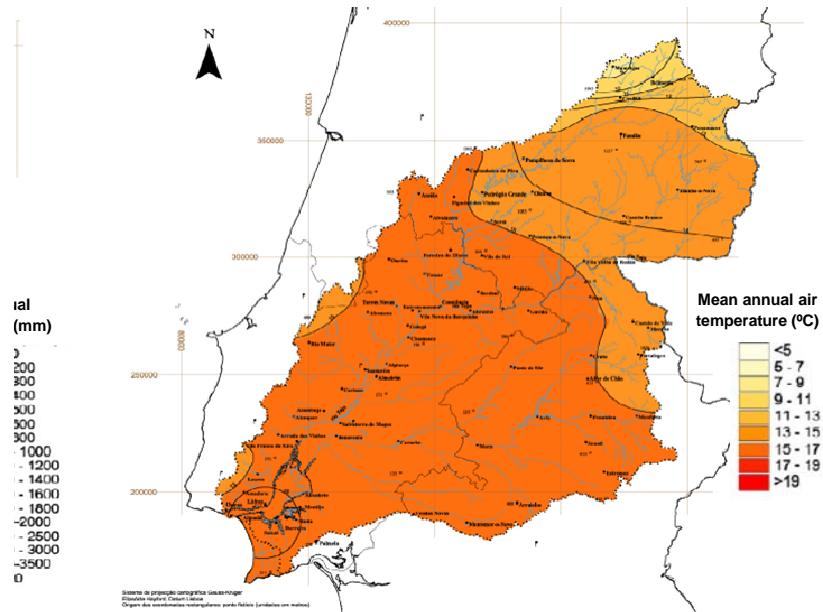


Figure 9 – Mean annual air temperature.

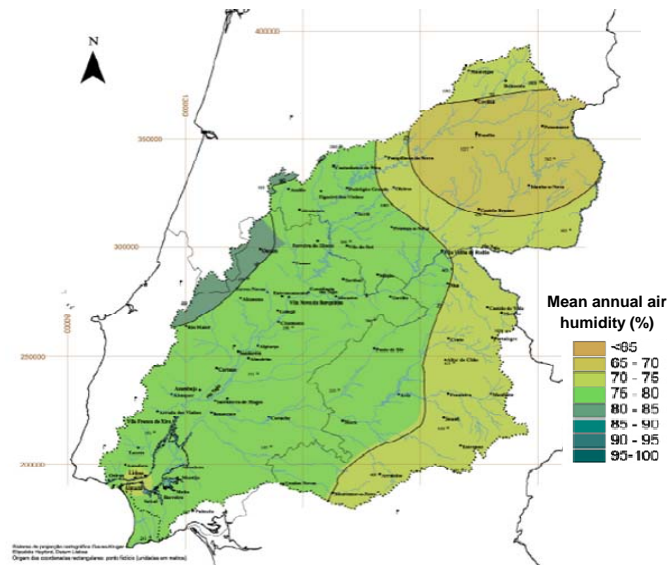


Figure 10 – Mean annual air humidity.

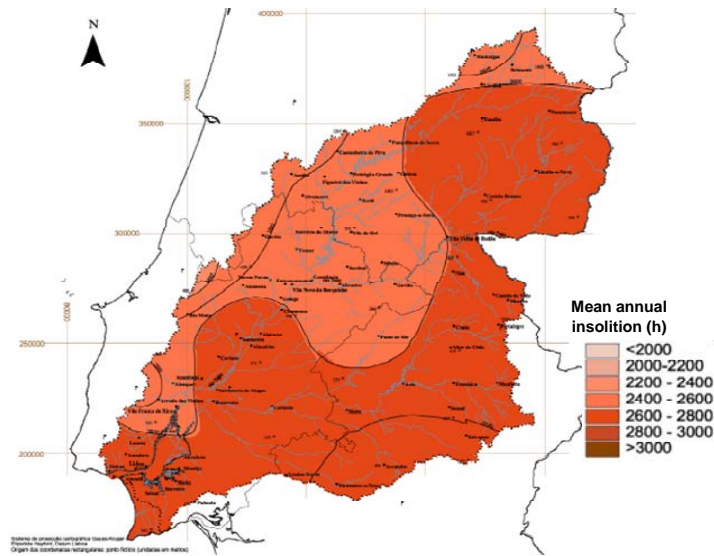


Figure 11 – Mean annual Insolation

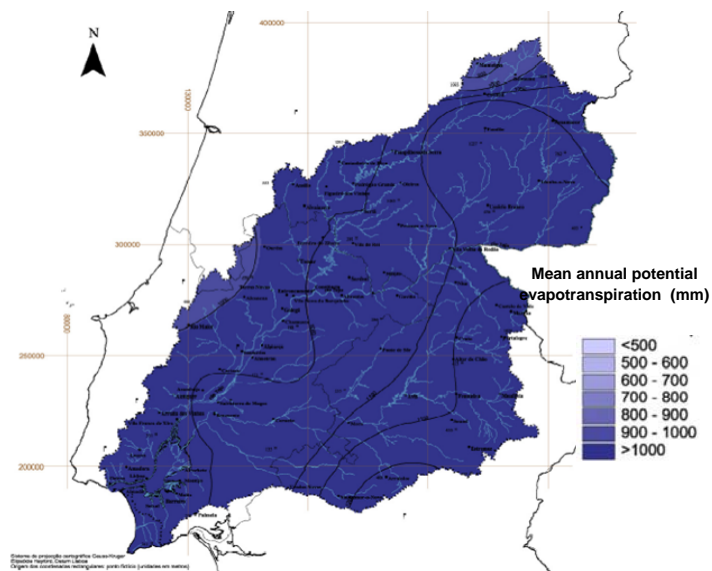


Figure 12 – Mean annual potential evapotranspiration.

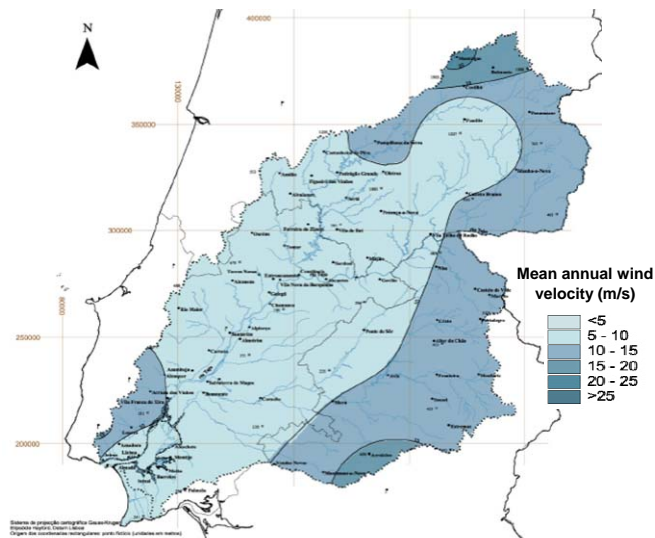


Figure 13 – Mean annual wind velocity.

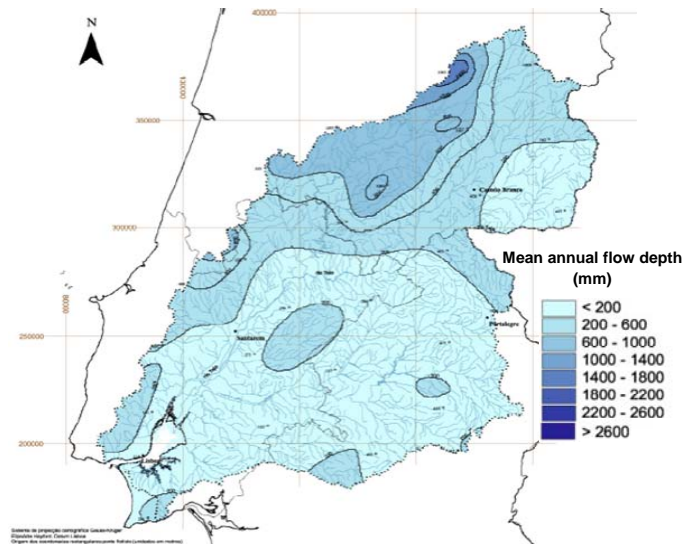


Figure 14 – Mean annual flow depth.

Hydrogeology

In the Tagus/Tejo River basin were identified sixteen groundwater systems and fourteen hydrogeologic areas as presented in Table 1 and in Figure 15, included in the next pages. Figures 16 show the distribution of groundwater availability.

Flora and vegetation

The Tagus/Tejo River basin has a great diversity of spontaneous vegetation. The vegetation of the initial stretch in Portugal is dominated by the *Quercus rotundifolia* and by the *Pyrus bourgaeana*. In the middle and final river stretches, it abounds the *Quercus suber*, the *Arbutus unedo*, the *Erica arborea* and the *Erica australis*. In the downstream stretch prevails the vegetation that occupies recent sands and alluvium, the *Halimium* spp., the *Stauracanthus* spp. and the *Ulex australis* ssp. *Welwitschianus* being dominants.

In the Tagus/Tejo River basin there are about 172 species classified as rare, as endangered, as threatened or in danger of extinction, having special importance the "priority species" mentioned in the attachment II of the Directive 92/43/CEE.

Due to its territorial area, the Tagus/Tejo River basin gathers a large variety of *habitat* types, including many locations with elevated wildlife population diversity and many terrestrial vertebrates' species with considerable conservation value.

Table 1 – Hydrogeologic systems identification in Tejo Basin

Hydrogeologic system	Area (km ²)	Main watershed
Aluviões de Abrantes	119	Tejo
Aluviões de Constância	163	Tejo
Aluviões do Tejo	1090	Tejo
Bacia do Tejo-Sado / Margem Direita	1620	Tejo
Bacia do Tejo-Sado / Margem Esquerda	6920	Tejo; Sado
Elvas – Vila Boim	1071	Guadiana; Tejo
Escusa	78	Tejo
Estremoz – Cano	1868	Tejo; Guadiana
Liásico Penela – Tomar	1746	Tejo; Mondego
Maciço Calcário Estremenho	7905	Tejo; Ribeiras do Oeste; Lis
Monforte	162	Tejo
Ota – Alenquer	103	Tejo
Ourém	320	Tejo; Mondego; Lis
Pisões – Atrozela	322	Tejo; Ribeiras do Oeste
Sicó-Alvaiázere	3267	Tejo; Mondego
Vale de Lobos	66	Tejo; Ribeiras do Oeste
Arrábida	159	Tejo; Sado
Calcários e Quartzitos de Cabrela e Montemor-o-Novo	31	Tejo; Sado
Cristas Quartzíticas da S. de S. Mamede-Marvão-Portalegre	9.2 (*)	Tejo; Guadiana
Cristas Quartzíticas de Penha Garcia	47	Tejo
Depósitos de Rañas da Beira Baixa	7854	Tejo
Formações Xistosas da Serra de Ossa	221	Tejo
Gabros de Alter do Chão-Cabeço de Vide	213	Tejo
Granitóides de Montemor-o-Novo e Almansor	247.2 (*)	Tejo; Sado
Granitos da Região de Nisa-Castelo de Vide	682	Tejo
Jurássico Superior da Região de Arruda dos Vinhos	353.1 (*)	Tejo; Ribeiras do Oeste
Miocénico e Cenomaniano de Lisboa	148	Tejo
Montejunto	44.6 (*)	Tejo; Ribeiras do Oeste
Extensão da Margem esquerda da Bacia do Tejo	14896	Tejo; Sado
Região da S. da Estrela-S. de Sto. António (zona da Covilhã)	741	Tejo; Douro

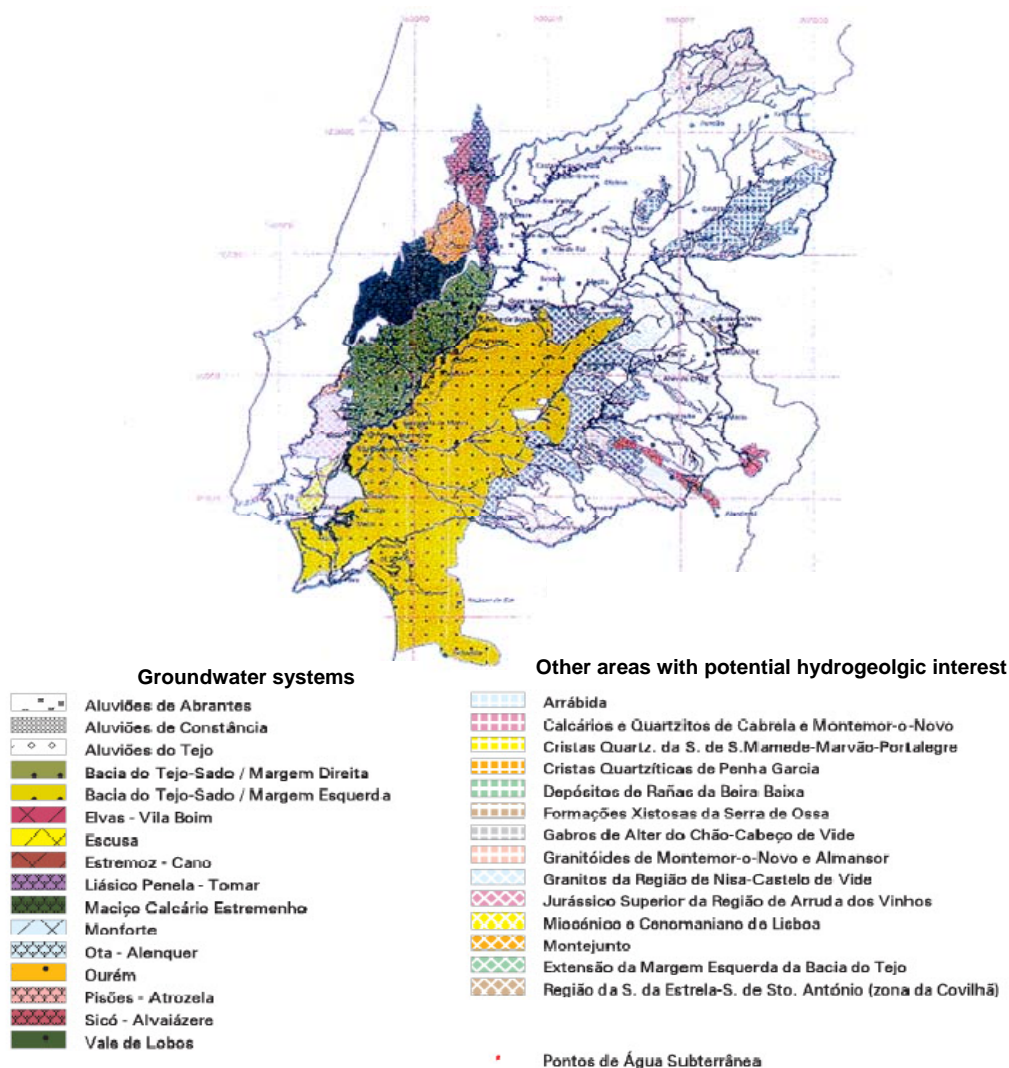


Figure 15 – Hydrogeologic systems in the Tejo River basin.

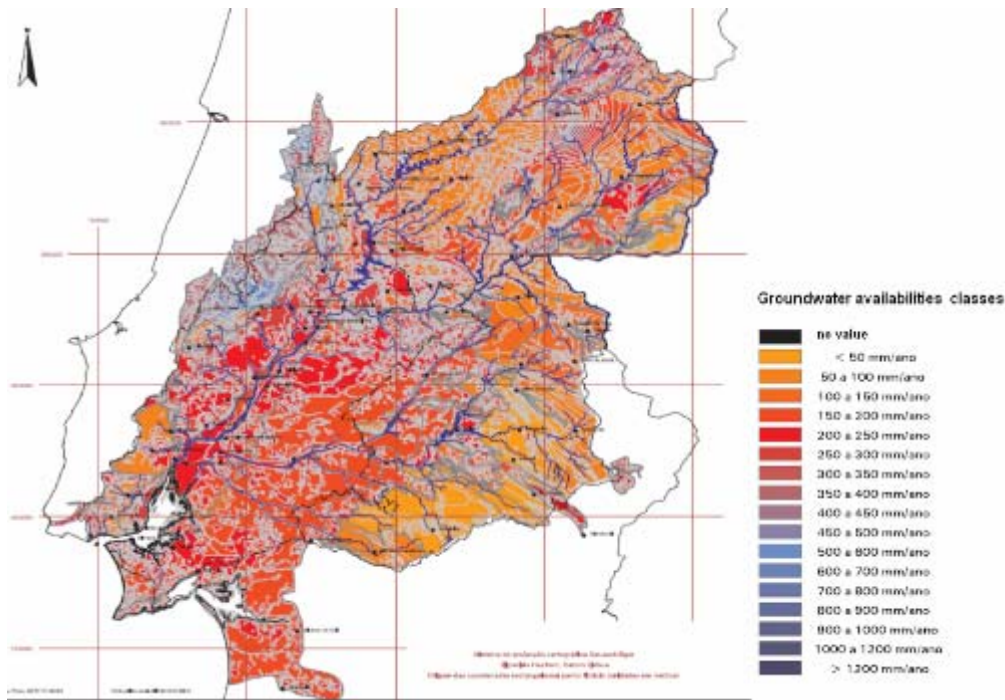


Figure 16 – Groundwater availability.

Fauna and terrestrial vertebrate

The information presented in the Tagus/Tejo River Plan refers 17 amphibian's species, 22 reptile's species, 228 bird's species and 54 mammal's species, representing 75% of the Portuguese terrestrial vertebrate's species which gives a clear picture about the high biological diversity in the basin.

According to the category preservation defined in the Red Book for the terrestrial vertebrates, from the species registered in the Tejo River Basin Plan, about 12% of the amphibian's species, 18% of the reptile's species, 31% of the bird's species, and 45% of the mammal's species are in danger of extinction.

River ecosystems

Tejo River basin presents diversified natural river ecosystems, as a consequence of the fluvial, geoclimatic and geomorphologic natural diversity of the basin.

Any water resources management policy in the basin will have to ensure the maintenance of the structural ecologic equilibrium and the auto-sustainability of those communities. Nowadays there is already a considerable knowledge about the ecosystems as a consequence of the huge effort that has been carried out in order to systematize and to identify the freshwater species in the basin. However, for some of the existing biological communities, the available knowledge is still scarce and fragmented, and often focused on given species (or even aspects of those species, for example, genetics or physiology issues), certain communities (macrophytes and freshwater fishes), some ecosystems (intermittent rivers, small irrigation reservoirs) or certain sub basins (Sorraia basin, Nabão basin).

From a scientific point of view, all species, communities and ecosystems should be equally interesting and important. However, it is possible to place in hierarchy the relative importance of the communities that are more susceptible to management actions, and therefore that need to be better study. In the Tejo River basin plan the following communities were identified as being in the previous circumstances: a) the reservoir plankton; b) the river macroinvertebrates; c) the macrophytes; and d) the freshwater and reservoirs fishes.

Fish species

The basin supports several fish communities, including 25 river fish species and a dozen of species that although belong to salt water environments, are also found in the river ecosystems. Eight of these species are endemic (four of them threatened in Portugal), and another two – *Lampetra fluviatilis* and *Lampetra planeri* – are only found in Tejo River.

The river has some of the most threatened fish species in Europe, like shown by the classification of eleven *taxa* presented in the attachment II of the Directive 97/62/CE - Directive Adaptation 92/43/CE "Fauna-flora-Habitat". That attachment lists the animals and vegetables species whit interest within the EC and which preservation justifies the implementation of special conservation areas.

As shown in Figure 17, about 50% from the total of native species were classified as vulnerable and very vulnerable, the survival of those *taxa* being threatened if the present perturbation factors are not overcome.

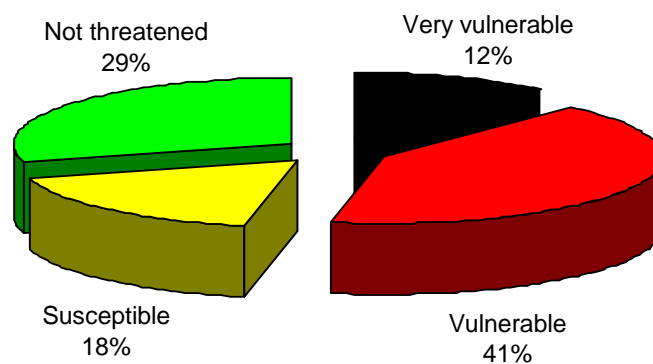


Figure 17 – Percentage of fish species in each conservation category.

Macrophyte

There are five macrophyte groups that were grouped by the sampling sections localized in Figure 18. This grouping technique was accomplished by applying the distance measure of Bray-Curtis.

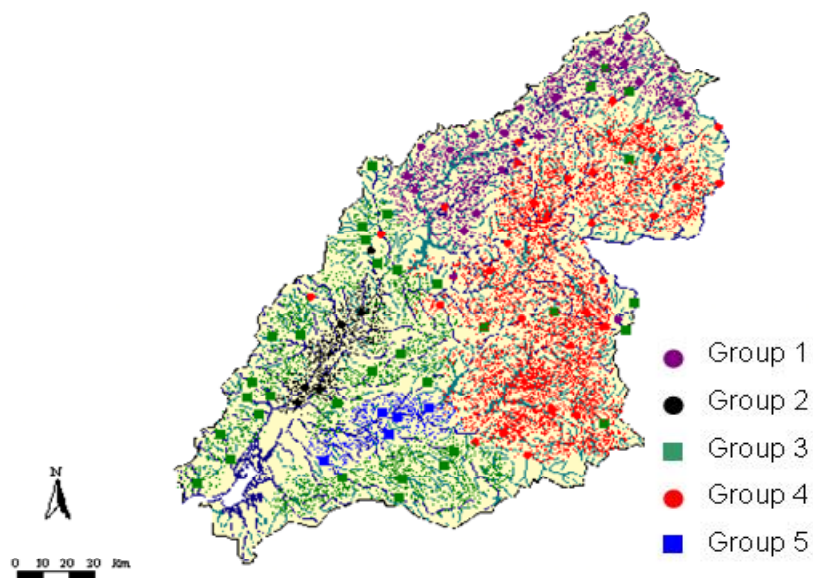


Figure 18 – Zoning of the fluvial macrophyte based on multivariate analysis of the floristic composition of each river reach.

Areas with special protection status

Figure 19 shows the location of the eleven areas with legal protection status, including Natura 2000 areas. These areas belong to the network of Portuguese protected areas and occupy 307529 ha of Tejo River basin. The human activities in the protected areas are conditioned by land management plans and by specific regulation.

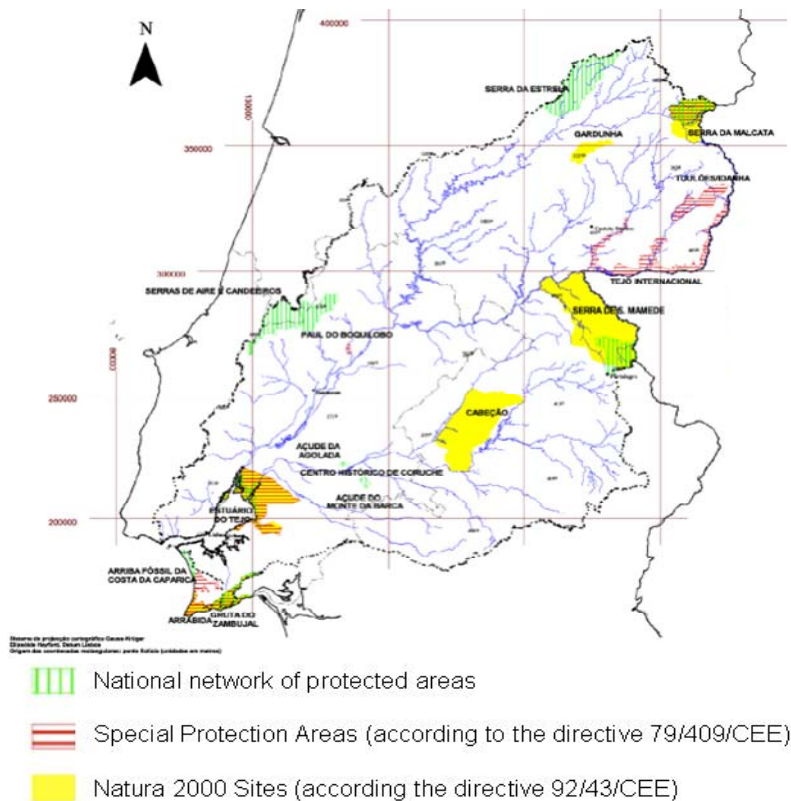


Figure 19 – Areas with special conservation status.

Land use

The Tejo River basin has the highest urban area concentration of Portugal. Besides the capital, it includes some other relevant urban centers, some important industries, and also a vast agro-forestry activity – Figure 18.

The agriculture occupies 50% of the basin soils, and the forests and semi-natural environments prevail in 46% of the area. The artificial territories occupy 1.6% and the areas covered by water, about 2% (font: CORINE)

The irrigated crops predominate in the Lezíria zone (downstream stretch of the Tejo basin) and surrounding areas and in Cova da Beira, due to the water availability ensured either by the natural hydrologic conditions (water intakes direct from the rivers) or by special infra-structures (dams and water distribution networks).

The main cultures are cereals and forages ($\approx 280\,000$ ha), olive ($\approx 140\,000$ ha), vineyards ($\approx 70\,000$ ha), meadows and pastures ($\approx 87\,000$ ha).

In general terms the forest is dominated by “montado” (cork oak and holm oak) with 25% of area, pine forest ($\approx 18\%$) and eucalyptus grove ($\approx 11\%$); the mixed forests occupy 14% of the area. 12% of the forest area is degraded and burned.

The artificial areas include urban, industrial and road areas mainly related with the capital and surroundings. It should be pointed out that besides the capital there are some urban nuclei also with some importance.

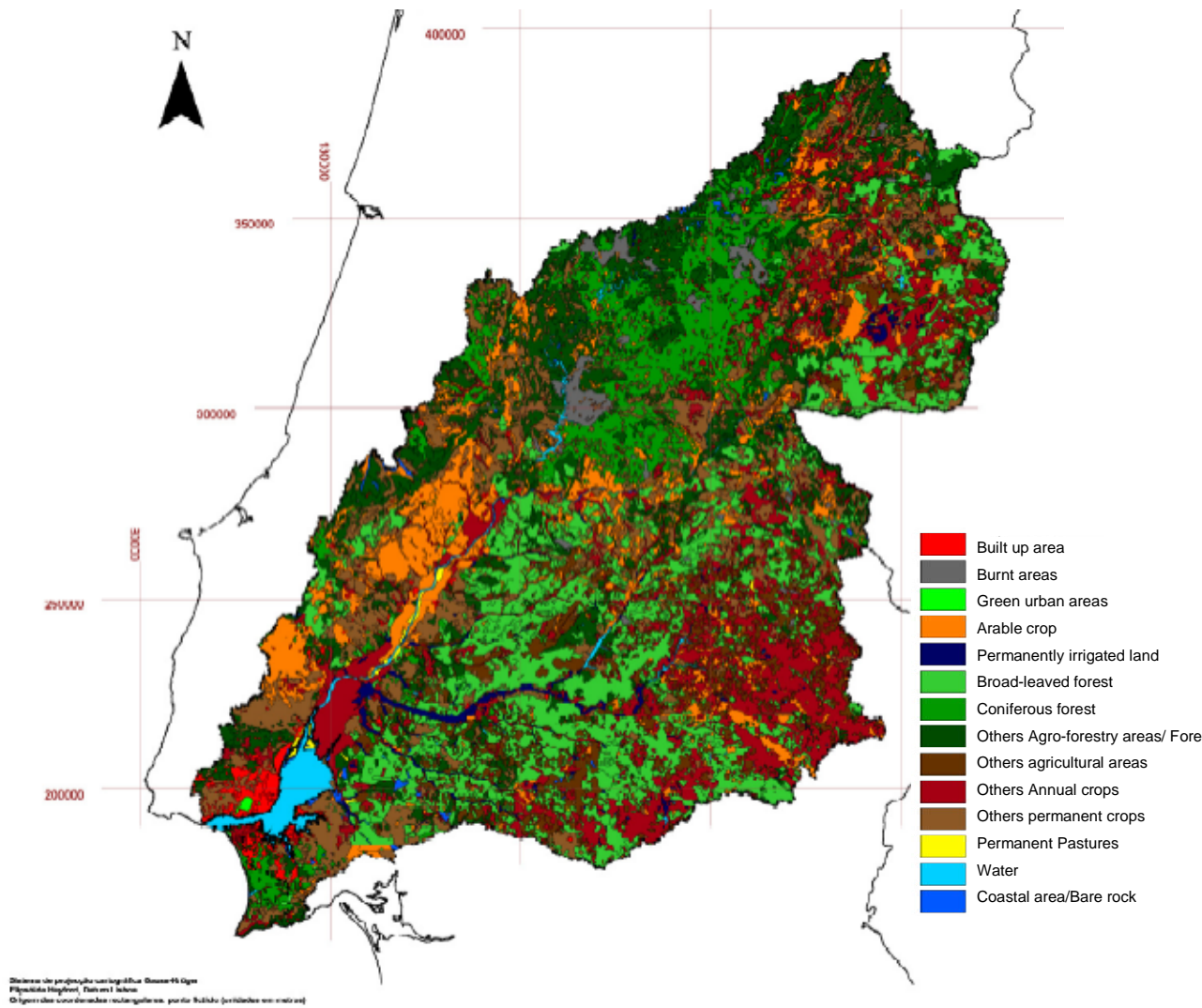


Figure 6.1 – Land use.
Figure 20 – Land use.

Industrial pollution

Figure 21, included in the next page, shows the location of the main industrial pollution sources according to the annual pollution charges, expressed in terms of CBO₅, CQO and SST. The data was obtained via inquiries. The figure resumes the information provided by those industrial units that, having answered to the inquiry, also had data concerning the composition of their sewage discharges.

The estimates of the annual pollutant charge of topic nature generated in the Tejo River basin are of about 100216 ton of CBO₅, 222478 ton of CQO, 102450 ton of in SST, 3836 ton of total P and 12581 ton of total N. Table 2 shows the pollutant charge density generated by the industry.

Table 2. Pollutant charge density of topic nature generated by the industry.

	Pollutant charge density (kg/ha/year)				
	CBO ₅	CQO	SST	P	N
Total	103751	203294	69672	326	964

The areas with larger contributions regarding the pollutant charge density of CBO₅, CQO e SST comprehended Lisbon and surrounding area, the Trancão River sub basin and the Tejo estuary. Figure 22 shows the industrial charge of topic origin – CQO.

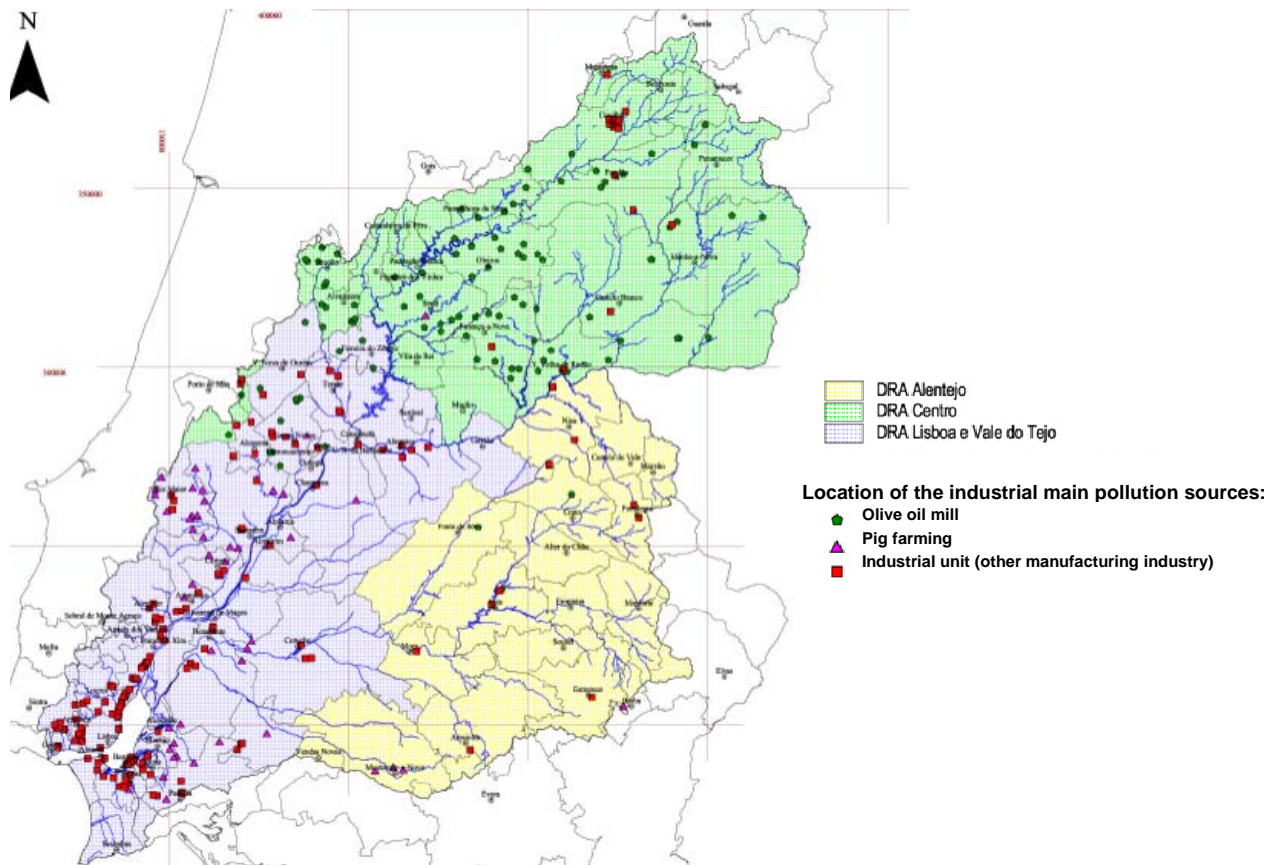


Figure 21 – Location of the industrial main pollution sources.

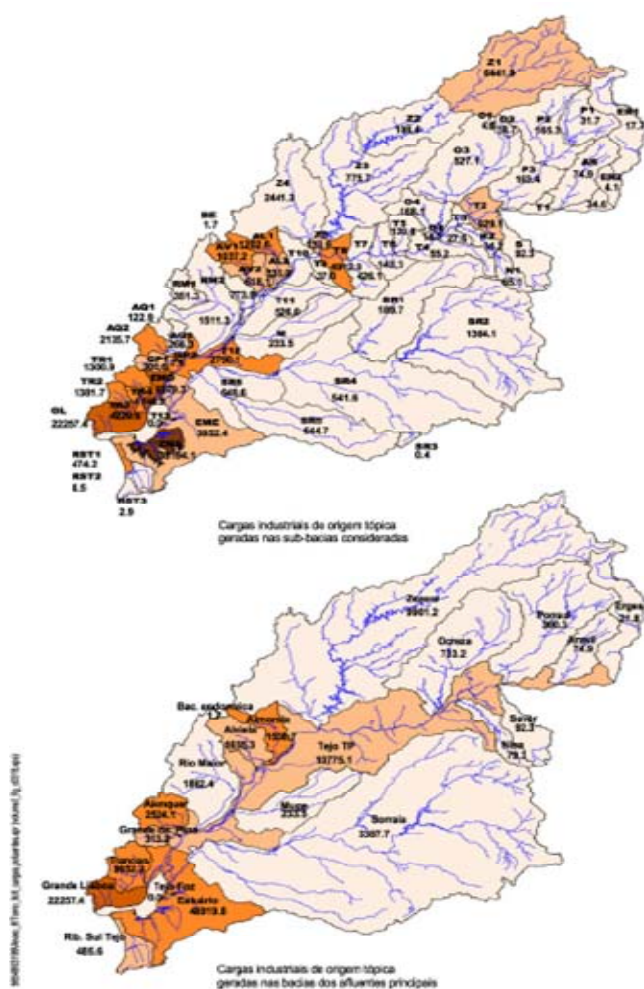




Table 3 – Peak flood discharges and specific peak flood discharges in the 28 gauging stations of Figure 24. Return periods of 100 and 1000 years.

Gauging station		Return Period, T			
		T = 100 years		T = 1 000 years	
		Peak flood discharge	Specific peak flood discharge	Peak flood discharge	Specific peak flood discharge
Name	Watershed area (km ²)	(m ³ /s)	(m ³ /s.km ²)	(m ³ /s)	(m ³ /s.km ²)
Manteigas (EH)	27	51	1.9	79	2.9
Rib ^a da Laje	37	97	2.6	140	3.8
Rib ^a de Cabanas	53	168	3.2	256	4.8
Rib ^a da Devesa	54	67	1.2	106	2
Pte Panasco (EH)	109	40	0.4	79	0.7
Rib ^a das Eiras	141	193	1.4	281	2
Rib ^a de Ana Loura	143	169	1.2	255	1.8
Monforte (EH)	143	181	1.3	275	1.9
Rio Torto	159	84	0.5	149	0.9
Rib ^a de V ^{le} da Cobra	179	207	1.2	365	2
Rib ^a da Sertã	216	213	1	314	1.5
Rio Almonda	228	474	2.1	738	3.2
Rio Taveiro	233	333	1.4	484	2.1
Rib ^a de Lavre	260.5	264	1	416	1.6
Rib ^a de Muge	280	149	0.5	256	0.9
Rio Alenquer	282	620	2.2	1003	3.6
Rio Trancão	293	729	2.5	1131	3.9
Rio Alviela	331	768	2.3	1182	3.6
Rib ^a do Tripeiro	346	422	1.2	620	1.8
Vala da Amieira	449	555	1.2	952	2.1
Rio Zêzere	599	776	1.3	1126	1.9
Agroal (EH)	606	444	0.7	698	1.2
Pavia (EH)	610	592	1	864	1.4
Moinho Novo (EH)	647	350	0.5	569	0.9
Rib ^a Muge	695	716	1	1233	1.8
Rio Maior	709	1298	1.8	2064	2.9
Rio Maior	921	1262	1.4	1980	2.1
Alvito (AH)	964	891	0.9	1329	1.4

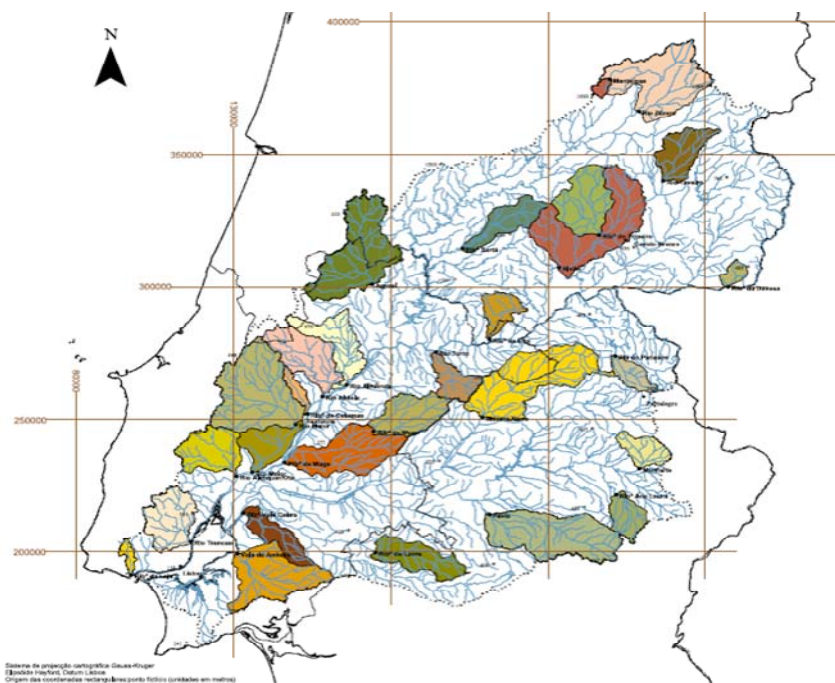


Figure 24 – Schematic representation of the watersheds of the 28 gauging stations that supported the peak flood discharge computations.

The governance situation

The Tagus/Tejo River Basin Plan comprehended an extensive analysis of the normative and institutional framework of the water resources management in the basin.

In terms of legislation, more than five hundred documents related with the following aspects or domains were collected and analyzed by the team responsible for the governance studies: legislation related with detergents, environmental impacts, emission rules, water quality, nature, trading of phytopharmaceutics products, pollution by nitrates due to agriculture, licensing and utilization of the hydric domain, land management plans, irrigation systems, industry, energy production, protected zones, civil protection, competencies and obligations of the different ministries (environment, agriculture, land administration, economy, fisheries), harbor authorities, competencies and responsibilities of the municipalities and of the parishes, etc.

Besides the municipalities that should ensure the law application at a local level, the main organisms responsible for the water resources management were also identified relating to the Ministry for Environment Spatial Planning and Regional Development, the Water Institute, the Environment Institute, the Institute for the Nature Conservation, the Coordination and Regional Development Commissions of Lisbon and Tejo Valley, the Coordination and Regional Development Commission of the Centre and the Coordination and Regional Development Commission of Alentejo.

The study reveal that at an institutional level there was a considerable overlapping among responsibilities and obligations of the different central and regional organisms in charged for the water resources management and planning. The huge number of normative and legal documents makes the practical application of those documents very difficult and it favors the disrespect of the legal dispositions.

Part 2 (B1) – Specific answers to the questions listed in the template

The study reveal that at an institutional level there was a considerable overlapping among responsibilities and obligations of the different central and regional organisms in charged for the water resources management and planning. The huge number of normative and legal documents makes the practical application of those documents very difficult and it favors the disrespect of the legal dispositions.

(B1.1a) Vegetation zones were not differenced in the Portuguese part of Tejo/Tagus river basin though they were identified as previously presented (The vegetation of the initial stretch in Portugal is dominated by the *Quercus rotundifolia* and by the *Pyrus bourgaeana*. In the middle and final river stretches, it abounds the *Quercus suber*, the *Arbutus unedo*, the *Erica arborea* and the *Erica australis*. In the downstream stretch prevails the vegetation that occupies recent sands and alluvium, the *Halimium spp.*, the *Stauracanthus spp.* and the *Ulex australis ssp. Welwitschianus* being dominants.). Some related information was however produced namely the zoning of the fluvial macrophyte (Figure 18), the corine land cover characterization (Figure 20) and the forest species distribution, according to 5th national forest inventory, from 2005, shown in the next figure. The topographic information inherent to most of the spatial representations was acquired from 1/25 000 maps (spatial resolution based on a rectangular mesh with 250 x 250 m).

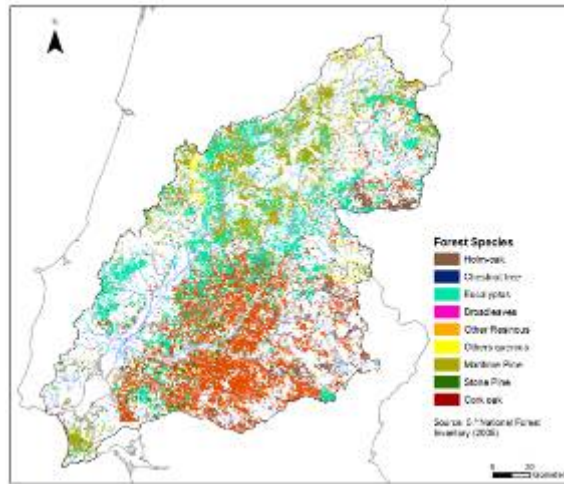


Figure – Forest species distribution in the Tejo River Basin, according to 5th NFI (2005).

(B1.1b) The Tejo River basin studies lists the more vulnerable species as previously presented (...The information presented in the Tagus/Tejo River Plan refers 17 amphibian's species, 22 reptile's species, 228 bird's species and 54 mammal's species, representing 75% of the Portuguese terrestrial vertebrate's species which gives a clear picture about the high biological diversity in the basin. According to the category preservation defined in the Red Book for the terrestrial vertebrates, from the species registered in the Tejo River Basin Plan, about 12% of the amphibian's species, 18% of the reptile's species, 31% of the bird's species, and 45% of the mammal's species are in danger of extinction). It also includes a map with the areas with special conservation status (Figure 19).

(B1.2a to B1.2f) The Tejo River basin plan did not foresee concrete actions. Accordingly it was not focused on impact assessment related issues.

(B1.3a and B1.3b) The characterization of both the geology and the topography was included in the studies, the geology being previously presented in Figure 6. Once more, no impact assessment was carried out as this matter was out of the scope of the studies.

(B1.4a and B1.4e) The characterization of more relevant hydrologic variables was included in the studies as well as the characterization of the floods – Figures 8 to 14 and Figure 23. The changes in those variables, due to urbanization, climatic changes or any other issue, were not analyzed. The inventory phase of the Tejo River basin plan included the inventory of the main hydraulic structures such as dams and dykes and main water supply systems. No impact assessment studies were carried out. The plan did not include the analysis related with temperature changes,.

(B1.5a and B1.5b) Most of the water origins (based either on surface waters or ground waters) for urban supply and for irrigation and industry purposes were identified according to the information provided by the Portuguese national census or acquired through specific inquiries, as previously described (Figure 26) and included in the Tejo data basis (WP2). No impact assessment studies were carried out.

(B1.6a and B1.6b) The climatic was perhaps one of the features analyzed with more detail as it is the origin for the processes that occur in the hydrologic cycle at the basin level. It is therefore the main issue when the characterization of the water resources is envisaged as it was in the Tejo River basin plan. The precipitation patterns were described at annual and monthly level in terms of spatial and temporal variability.

(B1.7a) The Tejo River basin plan includes a characterization of the water quality though it does not include any impact assessment studies.

(B1.8a and B1.8b) As previously presented (Figures 21 and 22) the Tejo River basin plan includes the identification of the main pollution sources – point sources and diffusive pollution.

B2 Socio-economic situation

Part 1 (B2) – General elements related with the socio-economic situation in the Tejo River Basin Plan

Similarly to **Part B1**, **Part B2** was also organized in **two parts**: the **Part 1 (B2)** provides a general characterization related the socio-economy in Tejo River basin and it resumes all the available information about the subject. If considered more suitable **Part 1 (B2)** can be presented as an annex. The **Part 2 (B2)** provides the answers to the questions listed in the template, those answers being based on the information presented in **Part 1 (B2)**.

The socio-economic characterization carried for the Tagus/Tejo River basin aimed at:

- characterizing the present social-economic situation;
- presenting a perspective about the possible socio-economic evolution in the region;
- characterizing, strictly from an economic point of view, the framing of the water resources as a result of the possible social-economic development previous outlined;
- as result of the previous steps, defining the main development poles as well as the specific conditions they can ensure towards a balanced and healthy future development

In the Portuguese part of Tagus/Tejo River Basin (which represents about 27% of the Portuguese territory) the number of inhabitants in 1995 was a little bit higher than 3.3 millions (which means 30% of the Portuguese population), most of them concentrated in the municipalities of Lisbon region – Figure 25. In the last 50 years the inhabitant number increased about 790 thousands, the annual average growth in the period of 1981/95 being of 0.94% – Table 4.

Table 4 – Evolution of the number of inhabitants

	1950	1981	1995
Portugal main land	7921913	9336780	9418500
Tagus/Tejo River basin	2516827	3357628	3307746

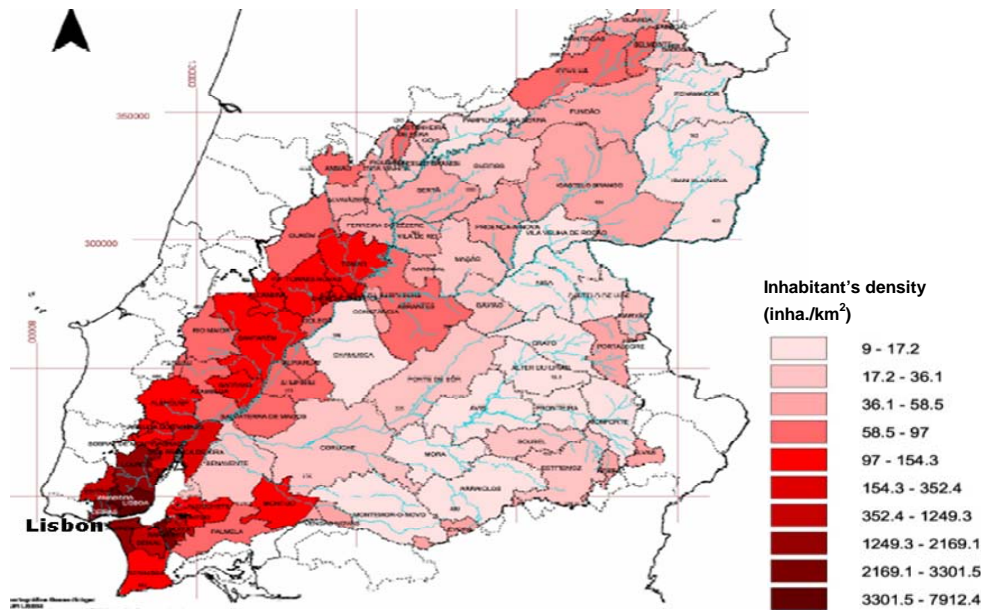


Figure 25 – Inhabitant's density.

The previous figure shows a high concentration in the downstream part of the basin (Lisbon region) and along Tejo River, the eastern inner regions of the basin part suffering a human desertification process. This asymmetry is also visible in several other features: for instances, the less populated regions general have unsuitable or insufficient health basic infra-structures, water supply systems; sewage systems, and so on.

In terms of age categories, the elderly people increased and the younger people decreased, the aging in the basin being higher than the global one for the country – Tables 5 and 6

Table 5 – Age structure in 1981 and in 1991.

	1981			1991		
	Young people	Adolescents and adults	Old people	Young people	Adolescents and adults	Old people
Portugal main land	25.2%	63.4%	11.4%	19.7%	66.6%	13.7%
Tagus/Tejo River basin	22.5%	65.7%	11.8%	17.6%	67.8%	14.6%

Table 6 – Variation of the number of inhabitants grouped by age classes.

	0-14 years	15-24 years	25-64 years	> 65 years
Portugal main land	-21.7%	-0.8%	7.1%	19.8%
Tagus/Tejo River basin	-22.9%	2.4%	1.4%	21.4%

In terms of economic activity the tertiary sector prevails in the whole basin. However, if most of the municipalities belonging to Lisbon area are excluded, the primary sector and the industries related with that sector become the main support of the economy – Table 7.

Table 7 – Employment distribution by sectors in 1991.

Sub-regions	Primary sector	Secondary sector	Tertiary sector
Alentejo Central	10.2%	3.2%	3.0%
Alto Alentejo	9.8%	2.5%	2.6%
Beira Interior Norte	5.0%	1.7%	1.2%
Beira Interior Sul	4.8%	2.2%	1.6%
Cova da Beira	4.8%	3.9%	1.6%
Pinhal Interior Norte	3.8%	1.6%	7.0%
Pinhal Interior Sul	6.4%	1.2%	7.0%
Grande Lisboa	6.5%	47.9%	62.0%
Lezíria do oeste	24.7%	7.8%	4.7%
Médio Tejo	8.9%	8.0%	5.0%
Oeste	5.2%	2.2%	1.2%
Península de Setúbal	10.1%	17.9%	15.7%

In general terms and excepting for the agricultural aspects, the location of the economic activities had never been imposed by factors connected with the water resources.

The water requirements for urban supply and for the industry are ensured either by the public water distribution networks or by means of own water intakes (only in what concerns the industry), and they use both groundwater and surface water, as synthesized in Table 8.

Table 9 summarizes the water requirements for agriculture purposes in an average year, in a dry year and in a wet year, also depicting the water sources (groundwater and surface water).

Figure 26 shows the location of the main surface (and sub surface) and groundwater water intakes for urban supply.

The annual water budget (water availability versus water needs) in an average year, in a dry year and in a wet year is presented in Table 10. Table 11 contains equivalent information though restricted to the dry semester of an average year, of a dry year and of a wet year.

Table 8 – Annual water requirements for urban supply and for the industry (in hm^3).

Supply based on the public water distribution networks (hm^3)		
Groundwater intake	Surface water intake	Total
131	212	343
Supply based on own water intakes (only for the industry) (hm^3)		
Groundwater intake	Surface water intake	Total
60	67	127
TOTAL (hm^3)		
Groundwater intake	Surface water intake	Total
191	279	470

Table 9 – Water requirements for agriculture (in hm^3) in an average year, in a dry year and in a wet year.

Average year		
Groundwater	Surface water	Total
1400	530	1930
Dry year		
Groundwater	Surface water	Total
1562	592	2154
Wet year		
Groundwater	Surface water	Total
1238	469	1707

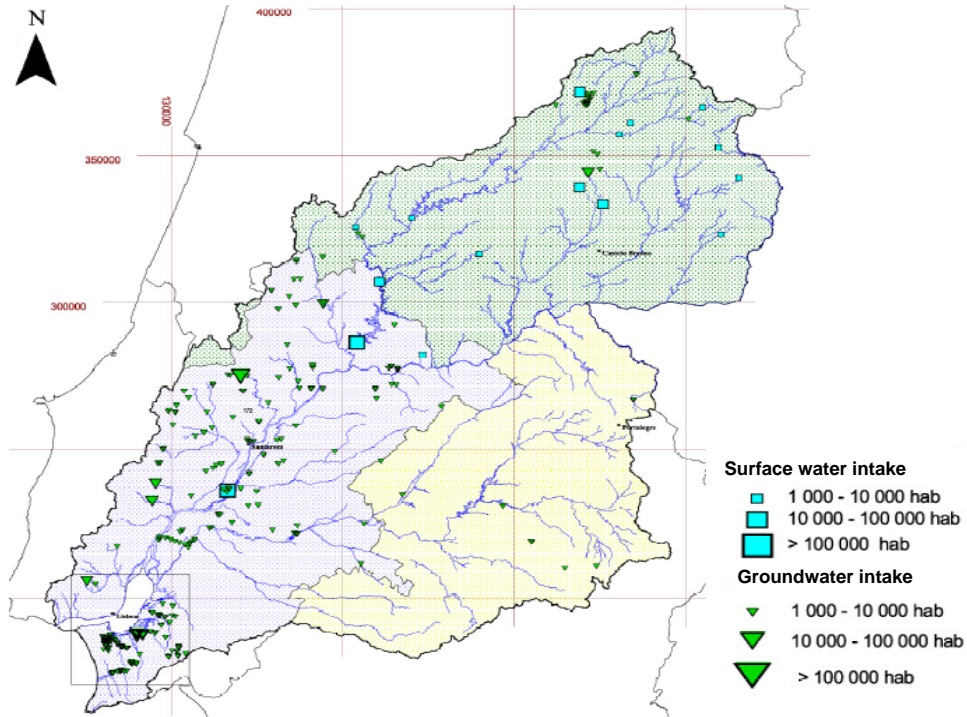


Figure 26 – Main water intakes for urban supply.

Table 10 – Annual water budget (in hm³) in an average year, in a dry year and in a wet year.

Average year									
Water budget for the groundwater					Water budget for the surface water				
Water availability	Water needs			Water budget	Water availability	Water needs			Water budget
	Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture			Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture	
2964	131	60	1400	1372	7098	212	67	530	6289
Dry year									
Water budget for the groundwater					Water budget for the surface water				
Water availability	Water needs			Water budget	Water availability	Water needs			Water budget
	Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture			Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture	
2964	131	60	1562	1209	3269	212	67	592	2399
Wet year									
Water budget for the groundwater					Water budget for the surface water				
Water availability	Water needs			Water budget	Water availability	Water needs			Water budget
	Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture			Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture	
2964	131	60	1238	1535	11444	212	67	469	10695

Table 11 –Water budget (in hm³) for the dry semester of an average year, of a dry year and of a wet year.

Dry semester of an average year									
Water budget for the groundwater					Water budget for the surface water				
Water availability	Water needs			Water budget	Water availability	Water needs			Water budget
	Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture			Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture	
1482	66	30	1386	0	1699	106	33	525	1035
Dry semester of a dry year									
Water budget for the groundwater					Water budget for the surface water				
Water availability	Water needs			Water budget	Water availability	Water needs			Water budget
	Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture			Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture	
1482	66	30	1547	-161	782	106	33	585	58
Dry semester of a wet year									
Water budget for the groundwater					Water budget for the surface water				
Water availability	Water needs			Water budget	Water availability	Water needs			Water budget
	Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture			Urban and industry supply based on the public water distribution networks	Industry supply based on own water intakes	Agriculture	
1482	66	30	1225	160	2739	106	33	465	2135

The tables related with the water budget show that the water availability (groundwater and surface water) in Tagus/Tejo River basin generally fulfils the water needs. In fact and even not taking into account the groundwater, the mean annual flow volume in the Portuguese part of the basin (7098 hm³) is three times larger than the consumptive needs (2400 hm³). Also the Convention between Portugal and Spain imposes that, under non-exceptional conditions, the Spanish dam of Cedilho must ensure a minimum volume of 2700 hm³/year this volume being, by itself, larger than the average annual water needs.

Despite the previous conditions periods with scarcity of water may occur due to the extreme temporal variability (either among years or within each year) of the hydrologic regime of the Portuguese rivers combined with the reduced water storage capacity provided by the Portuguese dams located in the basin. It should be pointed out that the groundwater is subjected to a much greater stress than the surface water.

Part 2 (B2) – Specific answers to the questions listed in the template

B2.1a – Most of the information concerning socio-issues was provided by the national census carried out by the Portuguese Statistics National Institute (INE) each every 10 years. The INE is the only source regarding the population characterization. Some of the results thus achieved were previously presented (Figure 25, Tables 5 to 7).

B2.1b – The plan does not provide information concerning the income distribution.

B2.1c – The plan does not provide the description of the impact of the regulation on the economy of Tejo River basin.

B2.1d – The plan does not describe the impact on employment/occupation in the Tejo River basin.

B2.2a to B2.2e – The Tejo River basin plan presents a general characterization of most of the sectors under consideration – as previously presented (Tables 8 and 9) – though not focused on impact assessment related issues.

B2.3 – The Tejo River basin plan provides a characterization of the social-economic activities in terms of their present situation and not in terms of their history.

B2.4a and B2.4b – The Tejo River basin plan provides a very good characterization of the different sectors use of water (though not considering marginalized groups as this question does not apply the Portuguese context) as previously shown. It also carries out the water budget which shows that the available in the basin fulfills the water requirements and so, for the time being, no alternative origins are required.

C. Have stakeholders been involved in the planning process or preparation of the documents or agreements?

(C1a and C1b) As previously stated during the elaboration of the Tagus/Tejo River Basin Plan the law in force was the Decree-Law n.º 45/94, from February 22, which imposed, both at national and at a basin level, a new model of integrated water resources approach that replaced the case-by-case water management assessment. It was the first framework for an integrated water resources management, also ensuring the public participation in the decision of the basin process.

And so, the stakeholders have been involved not exactly in the planning process, because the Tejo River Basin Plan was not in fact a planning process, but in the studies that provided the characterization for the future planning actions.

During those days the advisory and public participation structure (stakeholders forum) was the Water National Council (created in 1994 and still in force) and the Tejo Basin Council where main stakeholders were represented and all the basin strategic decisions were discussed. Both organisms

received the information regarding the stakeholders meetings being of their responsibility to inform the *fora* they represented.

The Water National Council comprehends representatives from more than 20 agencies belonging to five different Ministries (Environment, Spatial Planning and Regional Development; Economy and Innovation; Public Works, Transport and Communications; Agriculture, Rural Development and Fisheries; and Health), representatives of different local municipalities; representatives of the main water users (electricity production, water supply, irrigation, fishery, industry, associations), representative of non-governmental agencies (NGO) and representative of technical-scientific associations.

According to the Regulatory Decree n.º 18/2001, from December 7, that approved Tagus/Tejo River Basin Plan, the elaboration of such plan was closely followed by Water National Council but also by the Tejo Basin Council, the latter in the quality of consulting organism for the water resources management at a regional level where all the state agencies related with the water utilization as well as all the water users were represented.

Besides participation of the different actors and stakeholders in Tejo Basin Council (to which any common person could also attend), the Tejo River Basin Plan was subjected to a public discussion process from the 1st of November 2000 until the 15th of January 2001. During that period several public *fora* took place either to present the successive studies or to discuss the partial results and methodologies. The meetings were held in Lisbon but also in other cities located in the basin (e.g. Abrantes) in order to facilitate the participation. All the documents related with the Tejo River Basin studies were presented to the participants in the meeting at the beginning, sometimes being also accessible to the general public via specific *websites*, promoted by the Water Institute. After the public discussion period the Water National Council emitted a favorable opinion about the plan (15th February 2001).

So, it can be concluded that the elaboration of the Tejo River basin Plan deeply involved the main actors and stakeholders, without marginalizing any group.

However it should be stated that the public participation in a decision process related either to water or to other issue is mainly a question of civic culture and heritage. In fact and though the legislation in force foresaw an intensive public participation, the public sessions related with the Tejo River Basin Plan had most of the time only a few participants (at least from those sectors that should be more interested in the water resources management decision, such as the agriculture or the industry) as the public in general is not aware of the importance of his involvement in questions related with the water use and preservation.

(C2) No financial support was provided to ensure the participation of the stakeholders in the meetings. Once more, it should be stressed that those meetings did not intend to take any decision regarding an IWRM action but instead to present the studies carried out meanwhile and to identify pertinent aspects that should be included in the further developments of those studies.

(C3) As previously mentioned the meetings were carried out in Lisbon but also in others cities of Tejo River basin in order to facilitate the stakeholders participation.

(C4) In order to include all the pertinent skills in terms of IWRM issues, the Tejo River Basin studies were accomplished by a huge interdisciplinary team with different capabilities that included both natural and social sciences. The identification of the experts that participate in the studies as well their background are explicitly presented in the studies and are summarized in the table presented in the next page.

(C5) In what concerns the distribution of information among the stakeholders, as previously stated besides participation of the different actors and stakeholders in Tejo Basin Council, the Tejo River Basin Plan was subjected to a public discussion process from the 1st of November 2000 until the 15th of January 2001. During that period several public *fora* took place either to present the successive studies or to discuss the partial results and methodologies.

(C6) Most of the times the documents related with the Tejo River Basin studies were presented to the participants only at the beginning of the different meetings. Sometimes they were also make available via specific *websites*, promoted by the Water Institute.

Table 11 – Team that carried out the studies of the Tejo River Basin

General coordination		
Nome	Expertise field	Company
José Vieira da Costa	Civil Engineer	PROCESL
António Bento Franco	MSc in Hydraulics and Water Resources. PhD in Civil Engineer	GIBB
José F. Pinharanda	Mining Engineer	HP
António José Sá	Economist	AJS
Joaquim Evaristo da Silva/Amílcar Ambrósio	Civil Engineer	GIBB
Geology and geomorphology		
António Nazareth/Paulo Rodrigues	Geologist	HIDROTÉCNICA
Carla Jorge	Geologic Engineer	
Miguel Nazareth	Technical Assistant	
Surface water resources (quantity)		
António Pinheiro	MSc in Hydraulics and Water Resources. PhD in Civil Engineer	AQUALOGUS
Maria Manuela Portela	MSc in Hydraulics and Water Resources. PhD in Civil Engineer	
Sérgio Costa	MSc in Hydraulics and Water Resources	
Pedro Marques	Civil Engineer	
Dina Santos	Technical Civil Engineer	
Ground water resources		
João Paulo Lobo Ferreira	PhD in Civil Engineer	GIAS/LNEC
Manuel M. Oliveira	MSc in Economic and Applied Geology	
Teresa Eira Leitão	PhD in Hydrogeology	
Maria Emília Novo/Maria João Moimante	MSc in Economic and Applied Geology	
Paula Moreira	Chemist	
Maria José Henriques	Technical Assistant	
Nature preservation		
Freshwater Ecosystems		
Maria Teresa Ferreira	PhD in Forest Engineering	DEF/ISA
Francisco Nunes Godinho/João Manuel Oliveira	Forest Engineer	
Francisco Frutuoso Aguiar	Agronomic Engineer	
António Albuquerque	Forest Engineer	
Flora and Vegetation		
Maria Dalila Espírito Santo	Expert in Phyto-Ecology	DPPF/ISA
Maria Fernandes Lousã	Agronomic Engineer	
José Carlos Costa	PhD in Agronomic Engineering	SAAP/ISA
Maria do Céu Diogo	Student	
Pedro Arsénio	Landscape Architect	DPPF/ISA
Pedro Bingre	Forest Engineer	
Paula Margarida La-Grange/Cristina Fino	Landscape Architect	
Land Vertebrates		
Susana Dias	Biologist	CEABN/ISA
Manuel Pires da Fonseca	PhD in Animal Behavior	
Estuary		
Maria José Costa	Chemical Engineering Environment Engineer Chemical Engineering	PROCESL
Maria Helena Tavares		
Filipe B. Bastos		
Helena Santos Brito		
Socio-economy		
António José Sá	Economist	AIIS
Land management and inheritance		
Alexandra Cantante/Manuel Bastos	Architect	HIDROTÉCNICA
Madalena Coutinho	Landscape Architect	
Dora Peralta	Territory Engineer	
Maria João Simas/Manuel Nunes	Agronomic Engineer	
João Caninas	Archaeologist	
Non-consumptives water uses		
Rui Leitão	Electronic Engineer	HIDRORUMO HIDROTÉCNICA
José F. Pinharanda	Mining Engineer	
Infra structure inventory		
Eduardo Ribeiro de Sousa	PhD in Civil Engineering	AQUASIS
Ulisses Lages da Silva/Fátima Sousa Dantas/José Júlio Arsénio	Civil Engineer	
Alexandra Betâmio de Almeida	Territory Engineer	
Ana Paula Silva/Cristina Duarte/Cristina Gil/Idalina Andrade	Technical Assistant	
Water budget		
António Bento Franco	MSc in Hydraulics and Water Resources. PhD in Civil Engineer	GIBB
Simon Bailey	Geologist	
Paulo Gameiro	Civil Engineer. MSc in Hydraulics and Water	
Maria João Simas	Agronomic Engineer	
Urban and industrial water supply		
Carlos Almeida Araújo	Civil Engineer	PROCESL
Alexandra Fernandes	Student	
Margarida Fonseca	Environment Engineer	
Miguel Subtil	Civil Engineer	
Paula Farrajota	Landscape Architect	
Rui Mendes	Student	
Sofia Almeida	Civil Engineer	
Water resources quality		
Maria Helena Tavares	Chemistry and Sanitary Engineer	PROCESL
Lúcia Leiria	Environment Engineer	
Carla Teles	Technical Chemistry Engineer	
Conceição Pereira/Filipe P. Bastos	Environment Engineer	
Helena Santos Brito	Chemistry Engineer	
João P. Diniz	Environment Engineer	
Margarida Pina Boto	Chemistry Engineer	
Maria Isabel Pires	Environment Engineer	
Inês Ferraz	Student	
Paula Farrajota	Landscape Architect	
Industry pollution and solid residues		
Margarida Fonseca/Lúcia Leiria/Patrícia Ventura/Raquel Garcia	Environment Engineer	PROCESL
Sónia Alves/Helder Figueira/Nuno Aguiar	Student	
Paula Farrajota	Landscape Architect	
Urban pollution		
Arnaldo Sá Frias/Teresa Melo/Sofia Almeida	Civil Engineer	PROCESL
Miguel Subtil/Rui Mendes	Student	
Paula Farrajota	Landscape Architect	
Urban waste water treatment		
José Cardoso Moura	Chemistry Engineer	PROCESL
Ana Braga/Ana Margarida Ferreira/Conceição Pereira	Environment Engineer	
Inês Henriques/Nuno Vicente Matos	Environment Engineer	
Paula Farrajota	Landscape Architect	
Geographic Information Systems		
Ana Margarida Luis	Civil Engineer; MSc in Ecology, Management and Planning of Maritime Resources	GIBB
Steve Wallace	Geologic Engineer	
Andrew Kervell	MSc in Water Resources Management	
John Savage	Civil Engineer	
Ana Cristina Bucha	Geologist	

D. What are Governance concerns of the plan/planning process?

(D1) At the time the studies were accomplished, the main institution involved in the Tejo River Basin Plan was the Water Institute (which followed up very close the studies, either directly or through the Coordination and Regional Development Commissions). The studies were carried out by a consortium of numerous Portuguese consulting agencies.

(D2a) In terms of governance levels the Tejo River basin was restricted to the river basin, though considering those municipalities partially included in the basin.

(D2b) As the Tejo River Basin was a study and not a decision/implementation process it did not apply to decentralized or centralized planning process.

(D3) The Tejo River Basin plan together with the river basin plans for all the Portuguese main watersheds are compiled in a synthesis document, namely the National Water Plan. From an institutional framework/legal framework the studies were afterwards converted into legal documents (Decree-Law n.º 112/2002 and Regulatory Decree n.º 18/2001) which provided the general guidelines for the national legislation concerning the water resources produced meanwhile. Despite the fact that the Tejo Plan as all the others river basin plans were nothing more than studies some how they changed the relationship between the society in general and the environment, by bringing forward the importance of the environment conservation. In this context special preservation areas where only a few actions are allowed got more visible. Also more restrictions to the arbitrary actions of some the local municipalities were also introduced.

But meanwhile the governance paradigm changed due to the new Water Law (Law n.º 58/2005, 29th December) and to others new legal documents, some of them resulting from the Water Law, and containing relevant matters related with the water resources issues, with emphasis for the Decree-Law n. 226A/2007, 31 May, which rules the titles and the concessions required by the water resources utilization, and for the Decree-Law 197/2005, 8 November, which establishes the framing for environmental impact assessment and which partially transposes into the Portuguese context the Directive n.º 2003/35/CE from the European Parliament and Council, 26 May.

The Water Law transposes into the Portuguese context the Directive n.º 2000/60/CE from the European Parliament and Council, 22 October (Water Framework Directive). According to the Water Law the water resources management should be developed according to the following principles:

- a) Principle of the social value of the water (ensuring the universal right to the water access at a cost socially acceptable, without discrimination or exclusion).
- b) Principle of the environmental dimension of the water (which means that water needs to be highly protected in order to ensure a sustainable utilization).
- c) Principle of the water market price (which recognizes the water potential scarcity which brings forwards the necessity of ensuring an efficient economic utilization, comprehending the costs recovery, including from an environmental point of view; the principle also applies the polluter-payer and user-payer principles).
- d) Principle of integrated management of the water, of the aquatic and terrestrial ecosystems and of the wet zones directly depending of those ecosystems.
- e) Precaution principle (aiming at implementing measures that will avoid negative impacts even if there is nor a clear scientific evidence regarding the cause-effect relationship between those measures and the avoid impacts).
- f) Prevention principle (according to which measures with environmental negative effects need to be equated in a very early stage in order to reduce or to eliminate its impacts).
- g) Correction principle (by directly acting in the source that causes the problems).
- h) Cooperation principle (which recognizes that the water protection is a State attribute and an obligation of the civil society).
- i) Principle of the reasonable and equal utilization of the water in the shared basins.

According to the Water Law the hydrographic region replaces the basin concept and becomes the main geographic units for the water resources planning and management.

Nowadays, the organisms with competence in the water resources related issues are, at a national level, the Water Institute, and at the hydrographic region the Hydrographic Region Administrations. The representation of the activity sectors and of the water users is ensured by the Water National Council (that continues to exist) and by the Hydrographic Region Councils, the latter as consulting organisms at the regional level, which includes the basins located in each hydrographic region.

Some of the attributes of the Water Institute as national water authority are: to promote the water protection and planning; to discipline and to monitor the water uses; to promote and to appraise the necessity of hydraulic infra-structure systems; to keep updated inventories of the existing hydraulic infra-structures; to ensure that the environmental goals are achieved; to accomplish the economical analysis of the water uses; to keep an updated data basis of the protected areas; to keep of update data basis on the titles and concessions related with the different water uses; to produce flood alert warnings under droughts and flood occurrences; to approve the dam safety programs; etc.

In resume, it can be stated that the existing legislation clearly identifies the main goals and strategies of the water resources policies as well as the entities responsible for promoting or accomplishing those targets. It also provides the framing for the management and planning activities. The hierarchical pyramid or governance levels of the decision/licensing process is also well identified.

(D4) The Tejo River basin plan was developed according to the tender documents these documents being based on legislation in force I those days, namely the Decree-Law n.º 45/94, from 22nd February. Nowadays the IWRM principles included in the legal legislation resulted from the analysis of the previous Portuguese legislation as well as from European legislation such as the Directive n.º 2003/35/CE or the Directive n.º 2000/60/CE.

(D5a and D5b) The issue concerning political, financial and managerial constraints to the effective implementation of planning actions was out of the scope of the Tejo River Basin Plan. Instead is a question of the legislation in force in each activity sector.

Planning documents in the Tagus river basin, Spanish part; The Hydrological Plan of the Tagus Basin

CSIC Team

Lana-Renault, N., Beguería, S., Vicente-Serrano, S., García-Ruiz, J.M.

An overview and brief description of all policy documents, legal documents (major agreements, water laws (acts), irrigation laws (acts)), management plans, master (basin) plans, sectoral management plans, participatory irrigation management (PIM) acts and agreements.

Overview of relevant water management documents

Title	Year	Brief description of major agreements					
		Major agreements	Act s	Policy docum ents	Mast er plans	Sectoral managem ent plans	Other ?
Water Law	Law 29/1985, modified by Law 46/1999						
Water framework	2000/60/CE						

directive

National Hydrological Plan (PHN)	Law 10/2001 , modified in 2004 and 2005
AGUA Programme	2004
Hydrological Plan of the Tagus Basin	Ministerial Order, 13 August 1999

Part I. Assessment and description of formal management commitments

The Tagus basin Spanish partners (CSIC) have selected one planning initiative, the Hydrological Plan of the Tagus Basin since it is the master plan and the *main legal tool* for water management within the basin. The territorial decentralisation of the water management was stated and consolidated by the 1985 Water Law. The basin Hydrological Plan should be adapted according to the National Hydrological Plan, that ensures i) the measures to coordinate all the basin hydrological plans, ii) the solution for the alternatives proposed by these plans and iii) the conditions for the water resource transfers between the different territories.

The Hydrological Plan of the Tagus Basin must be adjusted to the Water Framework Directive principles and regulations. The goals of such Directive should be totally accomplished by 2015. Within this new context, the Spanish Government launched the A.G.U.A. (Actions for the Management and Use of Water) Programme, based on the economic, social and natural value of water. The first actions of the Programme (2004-2008 period) will be developed in the Mediterranean basins (<http://www.mma.es/secciones/agua/entrada.htm>). In parallel, a new Hydrological Plan for the Tagus Basin is being elaborated, considering the principles of the Water Framework Directive and ensuring an active participation of all the concerned parts.

HYDROLOGICAL PLAN OF THE TAGUS BASIN

Relevant documents:

- 1985 Water Law that designs the hydrological planning as a tool to fulfil the water demands and to obtain a balanced regional and sectoral development by increasing water availability, protecting its quality and making a rational use of it.
- Royal Decree 1664/1998, of July 24 (B.O.E. 11-8-1998): definition of the basin hydrological plans.
- Ministerial Order of August 13, 1999: publication of the Hydrological Plan of the Tagus Basin (B.O.E. 30.08.1999, error corrections B.O.E. 27.01.2000)

A1 What are the main objectives of the plan? –

1. to ensure present and future water demands by improving a rational and effective use of water.
2. to look for a better territorial and sectoral balance.
3. to implement an efficient water management that takes advantage of the technical innovations in order to increment water resource availability through the rationalisation of its use, by coordinating surface and underground resources.
4. to protect the water resource altogether with the environmental needs and the other natural resources.

5. to ensure water quality for each use and for the environmental conservation. Especially drinking water must be in good sanitary conditions.
6. to protect the population against hydrological extreme events (floods and droughts).
7. to protect, preserve and restore the hydraulic public domain and the management of its cultural and recreation uses.
8. to preserve hydraulic infrastructures and the hydraulic historic heritage.

A2 Do the objectives cover both socioeconomic and environmental concerns?

The objectives of the plan do not cover real socio-economic and environmental concerns. Basically, the problem is the failure to execute the laws because of the slow administrative procedures and of a lack of control. There are several important aspects that should be solved/improved:

- The ecological discharge is not reached. This is in part due to the water transfer to the Segura River in the SE Spain and to the water detraction for water supply in Madrid. Water use is therefore territorial unbalanced.
- There is also a sectoral unbalance: the urban use and the hydroelectric power stations play a main role in water decisions
- Illegal arid extraction
- Excessive use of fertilizers in agricultural areas, especially in Extremadura and Henares
- Urban supply infrastructure and irrigation infrastructure are not well-conserved and there are important water leaks
- Water is not treated enough, especially in Madrid and in many small villages in the basin headwaters. In these areas, suspended solids have been detected in many rivers. Especially during week-ends and summer holidays
- Illegal waste spills
- In Castilla La Mancha a crab has been reintroduced without evaluating the environmental consequences

A3 are these goals/objectives linked to specific strategies to achieve the goals?

The Hydrological Plan of the Tagus basin follows several strategies based on:

1. Definition of hydrological units
2. Definition of priority water uses
3. Assignment of water supply according to the priority water uses
4. Transformation and improvement of the current irrigation system
5. Definition of water quality thresholds
6. Definition of priority river reaches:
 - o priority 1: river reaches that present a high flood risk
 - o priority 2: river reaches where the hydraulic/biophysical/socioeconomic functions must be preserved
7. Wetlands: characterisation of the ecohydrological processes; restoration
8. Reservoirs: control of water quality and reservoir siltation
9. Definition of aquifer perimeters

10. Flood prevention: studies on flood risk (through the SAIH –Automatic System of Hydrological Information) and implementation of the infrastructure to mitigate them.

11. Definition of a Special Plan Against Droughts

A4 are the goals integrated or are they in opposition?

They are integrated

A5 are goals / strategies in line with, integrated with other national goals?

The goals and strategies are in line with other national politics:

- with the goals and strategies of the Ministry of the Environment about inland water:

- Definition of the Hydraulic Public Domain in order to guarantee water availability and water quality depending on the water use, and to protect and improve aquatic and terrestrial ecosystems. *Conservation and Improvement of the Public Hydraulic Domain Programme; National Strategy for River Restoration*
- Surface and underground water: monitoring surface and underground water, water quality evaluation
- Prevention of floods. *National System for Mapping Flood Areas*
- National Observatory of Droughts: elaboration of a database of droughts; prevention, mitigation and monitoring droughts. *Special Plan of Actions In Alert Situations and Possible Droughts*
- Sewage Water: *National Plan of Water quality: water treatment 2007-2015; Action Plan for 0 Sewage*
- Security of Dams and Reservoirs: several security programmes.

- with measures to guarantee biodiversity through the conservations of habitats and wildlife -Nature Net 2000, Royal Decree 1997/1995, of December 7.

- with the measures for hydrological and forestry restoration through the implementation of the *Plan of Priority Actions*. The objectives of this Plan are: to improve the protective role of forests, to control soil erosion, to improve hydrological regimes and discharge regulations. The Priority Actions are:

- to replant with forest cover
- to convert cultivated land into forest
- to improve/replant shrub and/or grass cover
- river restoration

- with the measures established by the Ministry of the Environment and the Regional Governments in order to manage and plan natural resources together with socio-economic development. *Strategies for Rural Development 2007-2013*

- with the *Action Plan for the Modernisation of Irrigation*, formulated in the Royal Decree 287/2006, of March 10 (<http://www.plandechoque-ahorrodeagua.es/pag/eng/010.asp>)

Basin description and impact reports

B1 Does the basin description include a description of- and impact reports of environmental factors (including all biotic, a-biotic and polluting sources

B1.1a Have the main different vegetation zones (alluvial and terrestrial) in the river basin been mapped and described?

Vegetation zones are not differentiated. On the contrary, the Plan includes

- the definition and a map the hydrological units (Figure 1)
- the definition of priority river reaches (see section A3)
- the definition and a map of aquifer perimeters (Figure 2)

B.1.1b Do the report/planning document in particular discuss evaluate the issue of vulnerable or threaten botanical species ? No

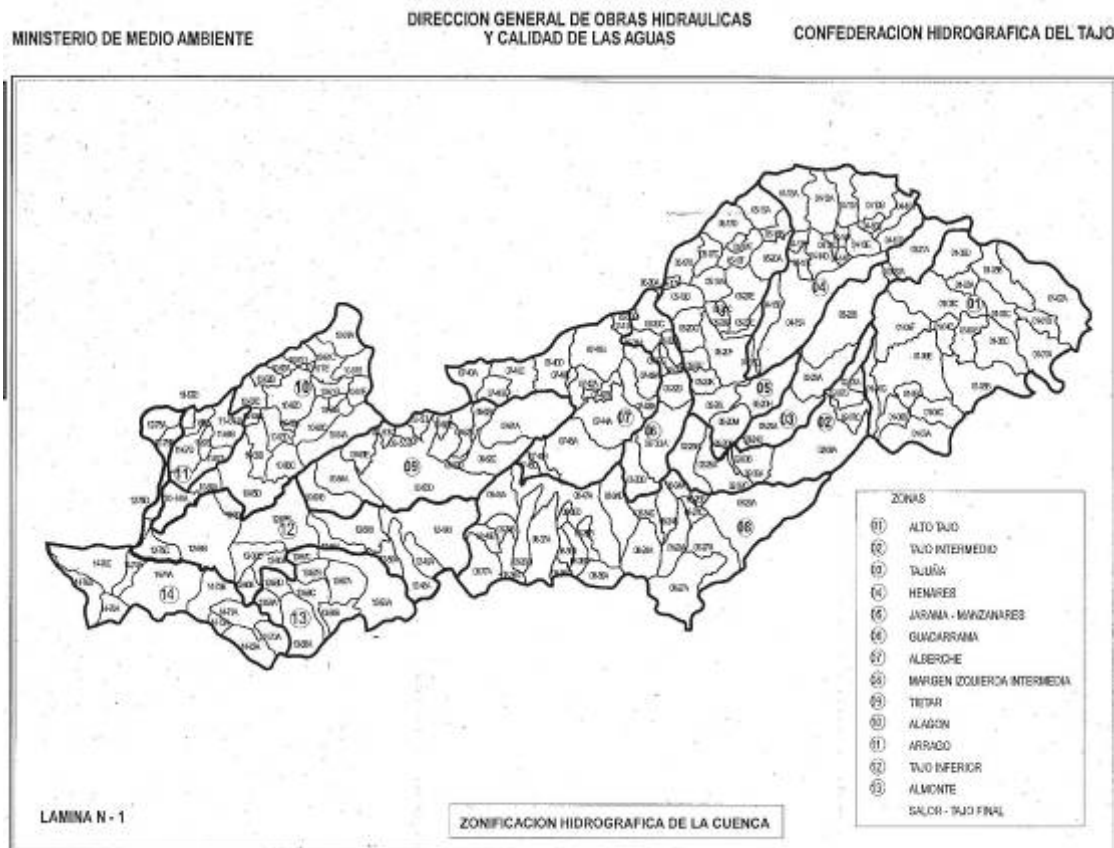


Figure 1. Hydrographic units (Hydrological Plan of the Tagus Basin)

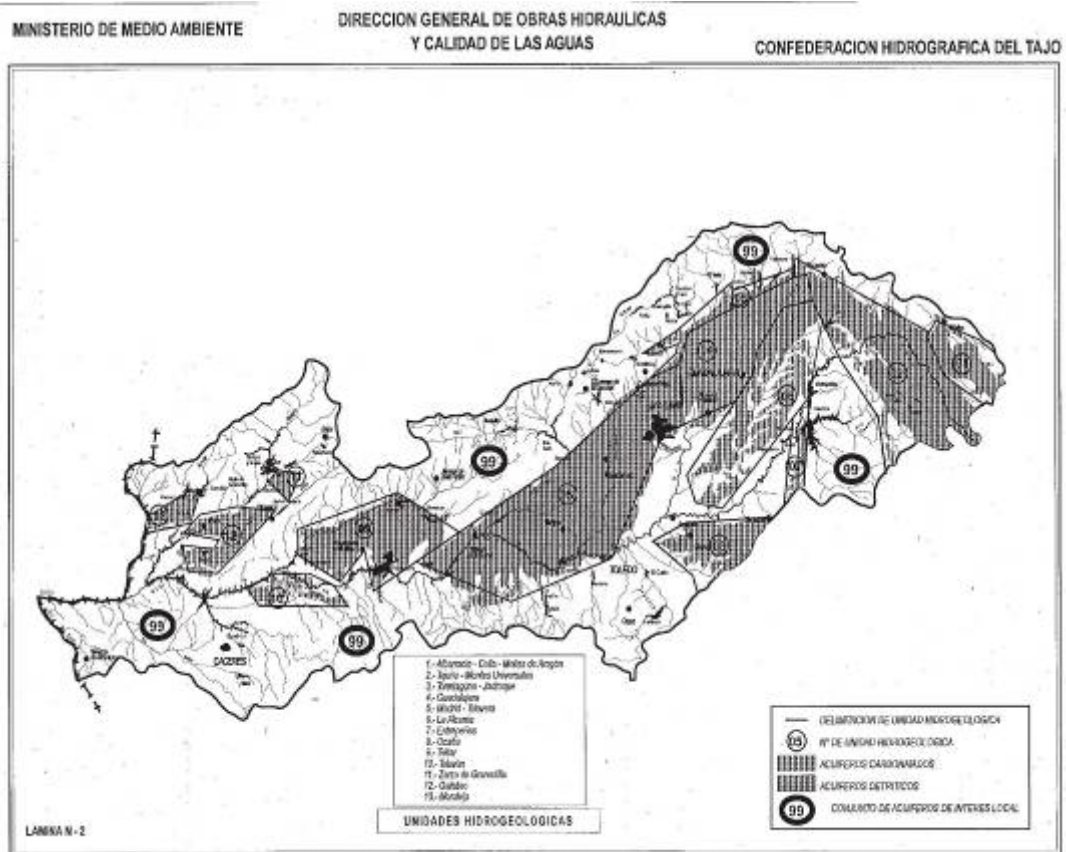


Figure 2. Aquifer perimeters (Hydrological Plan of the Tagus Basin)

B1.2 Do the report /planning document describe the fauna, and the *impact* of the regulation on the fauna? No

B1.2a for birds? No

B1.2b for the benthic fauna? (bottom dwelling) No

B1.2c for mammals? No

B1.2d for reptiles? No

B1.2 e for fish? The Plan just defines the river reaches that have a fishing interest, according to the Directive CEE 78/659.

B1.2f Have vulnerable or threatened vertebrate or invertebrate species (auna; fish, birds, reptiles, amphibians, mammals, macrophytes) in the area impacted by the regulation been registered /evaluated? No

B1.3 Are the geology and the landscape in the area described and impacts identified?No

B1.3a geology (soils?) No

B1.3 b Landscape - No

B1.4 Description of the hydrology / hydro-morphology of the basin for the following elements

B1.4a– Do the plan include a description of change in river water flow, (portion of the river with changed water flow after a regulation or urbanisation, change in water flow in relation to flood, normal water flow and low water flow? No

B1.4 b Are flood data recorded in the basin description? No

B1.4b Do the plan include a description of human made physical barriers or other physical change of the river bank or river basin (ex lowering of lakes, drainage, vegetation removal) in the basin and the impact? No

B1.4c Do the plan describe sedimentation and erosion patterns in the basin, and the impact of the regulation on these two aspects? No

B 1.4c Do the plan include a description of temperature changed due to ice-regime or others? No

B1.5 Ground water

B1.5a Have wells and springs in the basin been registered and described? No

B1.5b Have the impact on the ground water been evaluated? No

B 1.6 Are the climate in the basin described?

B1.6a Temperature patterns? No

B1.6b Precipitation patters? No

Water quality and pollution

B1.7a Do the plan include a description of the water quality in the basin and the impact of the regulation ? No

B1.8a Are pollution point sources described in the planning document? No

B1.8b Do the basin description include description of non point sources – industry, agriculture, forestry, mining activities, polluted sediments, transport, No

B2 The socio-economic situation

B2.1a Has a population survey been performed in the area of impact?

The population census is carried out every 10 years by the National Statistics Institute. The last four censuses were in 1971, 1981, 1991 and 2001. The 2001 census includes information about sex, nationality, residence status, marital status, place of birth, migration variables, training, relationship with the economic activity, social and economic condition, marriage, fertility, kinship relationships, zone, size of the municipality, household structure and family units. Regarding homes: type, zone, installations, useful area in square metres, construction period, number of rooms, tenancy regime type of owner; and by type, number of floors, number of dwellings, type of owner, status and period of construction of the building. This information is given at National, Autonomous, Provincial, Municipal and Infra-municipal scale.

B2.1 b Does the plan provide information concerning the income distribution of people impacted? No

B2.1c Do the plan include an evaluation of the impact of the regulation on the economy in the area? No

B2.1 c Does the plan describe the impact on employment /occupation in the basin? No

B2.2 Does the plan describe the impact on the different land use sectors in area?

B2.2a on agriculture in the area of impact? No

B2.2 b Does the plan describe the impact on the industry in the area of impact ? No

B2.2c Does the plan describe the impact on the tourism in the area of impact ? No

B2.2d Does the plan describe the impact on the recreation the area of impact ? ? No

B2.2e Does the plan describe the impact on the cultural heritage / cultural monuments in the area of impact ? No

B2.3 Does the plan include a general description of the socio-economic history of the area? No

B2.4 a Do the plan include a description of the different sectors use of water (including marginalised groups poor and women)? The spatial and temporal variations in water cycle elements, such as water resources availability (m3/person/year), water use (litres/person/day).

The Hydrological Plan of the Tagus basin considers the following water uses, ordered according to their priority:

- 1) Human supply (urban use), including industrial resources connected to the urban network
- 2) Irrigation and agricultural use
- 3) Industrial use for electricity production
- 4) Other industrial uses
- 5) Aquiculture
- 6) Recreational uses

7) Navigation and aquatic transport

8) Other uses

The plan also designates the water supply for each use and for each Water Use System (Sistema de Explotación de Recursos-SER) -a territorial system division (see Table 1 as an example).

Sistema/subsistema/macro-sistema	Usuarios	Asignación (litros/seg)
Subsistema Alto Tajo	Demanda urbana e industrial	24,11
	Demanda agrícola	175,60
	Refrigeración C.N. Zorita	224,72
	Refrigeración C.N. Trillo	45,00
	Total demandas de refrigeración	269,72
	Total dem. «ex lege» en Aranjuez	185,60
	Demandas sin retorno	370,00
	Total Alto Tajo	1.029,03
Subsistema Tajuña	Demanda urbana e industrial	5,87
	Demanda agrícola	52,64
	Demanda medioambiental	15,72
	Total Tajuña	74,23
Subsistema Henares	Demanda urbana e industrial	59,43
	Demanda agrícola	119,32
	Demanda medioambiental	17,84
	Total Henares	196,59
S. Jarama-Guadarrama	Demanda urbana e industrial	655,57
	Demanda agrícola	216,78
	Demanda medioambiental	68,30
	Total Jarama-Guadarrama	950,65
Subsistema Alberche	Demanda urbana e industrial	25,00
	Demanda agrícola	155,41
	Demanda medioambiental	38,16
	Total Alberche	220,47
Subsistema Tajo Medio	Subtotal demanda urbana e industrial	30,47
	Subtotal demanda agrícola	293,46
	Refrigeración C.T. Aoeca	544,20
	Demanda de refrigeración	544,20
	Demanda medioambiental Toledo	310,80
	Demanda medioambiental	310,80
	Total Tajo Medio	1.178,93
Otras demandas	Demandas sin retorno en la cuenca	8,37
Total macro-sistema	Demanda urbana e industrial	820,72
	Demanda agrícola	1.014,21
	Demandas sin retorno	370,00
	Otras demandas	813,92
	Caudales medioambientales	637,22
	Demanda total	3.655,07
Sistema Tietar	Demanda urbana e industrial	12,58
	Demanda agrícola	249,00
	Demanda medioambiental	17,92
	Total sistema Tietar	279,50

Table 1. Water supply for each Water Use System (Hydrological Plan of the Tagus Basin).

B2.4b If good drinking water is scarce, does the plan describe allocation efforts?

In case of drought, the Plan establishes a limitation of use, by developing a programme for water reduction, and redefines the priority of uses. For instance, underground water from aquifers could be extracted over the established threshold in order to supply drinking water and to preserve permanent crops. During intense droughts, water should be recycled for agricultural use.

B2.4 c Does the plan describe the of quantity of water for irrigation by different user groups?

Table 2 shows (in yellow) the water supply for agricultural irrigation, predicted for a 10 years period (1999-2009).

Sistema/subsistema/macrosistema	Nombre	Asignación (Hm ³ /año)
Total macrosistema	Demanda urbana e industrial	820,72
	Demanda agrícola	1.014,21
	Otras demandas	813,92
	Demanda medioambiental + Demanda «ex lege»	637,22
	Demanda total	3.286,07

Table 2. Water supply for agricultural irrigation (in yellow) (Hydrological Plan of the Tagus Basin).

B2.5 Does the plan describe equity aspects among water using sectors? No

B2.6 Do the planning document include a review of the impact of the regulation on human activities, use of natural resources described (including consequences of the regulation for fishing, game hunting, recreation ? No

B2.4 Are possible conflicts approached and described? No

C. Have stakeholders been involved in the planning process or preparation of the documents or agreements?

Have stakeholders been involved in identifying the problem?

C.1a have stakeholders (private, public and civil society) been involved in the planning process?

The Water framework Directive and the A.G.U.A. (Actions for the Management and Use of Water) Programme have motivated the elaboration of a new Hydrological Plan for the Tagus basin. The elaboration of the new plan involves a greater participation of the regions and also a greater public participation. By doing this, the plan will consider all the concerned parts, achieving an optimum equilibrium during the planning process.

The public participation has already started. More than 1000 invitations have been sent to different actors that are presented in Table 3.

Municipalities	State General Administration
Environmental Advisory Council	Regions
Water National Council	County Councils
Demarcation Water Council	Environmental Associations
Demarcation Government Board	Irrigation Communities + FENACORE+ Farming Cooperatives
Energy Companies + UNESA	Business Associations and Chambers of Commerce
Consumers Associations	Trade Unions
Sport Associations	Fishing Associations
Supply Companies	Professional Colleges
Universities	Research centers: CEDEX, IGME, CSIC

Table 3. Actors invited to the planning process of the new Hydrological Plan.

During last April, some meetings were already held. In separate groups, they included: water managers, social network, private companies/industry, end users and Institutions.

C1b. Have marginalised groups; poor, ethnic groups and women (gender) been involved? No

C2 Did the stakeholders have possibilities for financial support to attend meetings? As in most of the cases the participants had to travel to Madrid, travel and accommodation expenses were paid.

C 3 Was there decentralised localisation of meetings to facilitate participation? The meetings were mostly held in Madrid.

C 4 Have the project management/ project expertise included interdisciplinary representation (natural and social sciences)?

See Table 3

C5 Were information to stakeholders provided in the relevant channels?

- Web site: <http://nuevoplan.chtajo.es:8080/CHTAJO/infopublica3.htm> and
<http://nuevoplan.chtajo.es:8080/CHTAJO/publica.htm>

- Brochures

- Information Office in Madrid and in the following cities within the basin: Aranjuez, Cáceres, Guadalajara, Plasencia, Talavera and Toledo.

- SMS to the concerned participants

C6 Were information of project given in advance to stakeholders?

The concerned participants are continuously informed about each step of the process, relevant activities, etc. For instance, several documents related to the initial steps of the planning process were uploaded with free access in <http://nuevoplan.chtajo.es:8080/CHTAJO/publica.htm>

C7 Were information of the project given in local languages, and in an understandable manner? Yes, Spanish

C8 Do the problem identification reflect the water user interests in the basin?

The representation of all the sectors in the planning process should ensure all the water users interests in the basin

C9 Does decision making follow principles of democracy (i.e. ...)? Yes

C10 Which sectors dominate/influence the documents most and what sectors are poorly represented and what sectors not included at all?

Until now, the urban use and the hydroelectric power stations played a main role in water decisions. The new conception of the new plan elaboration should avoid unbalance situations.

C 11 Were water allocation agreed among stakeholders ?

Some discrepancies are perceived among stakeholders:

- Agricultural users perceive a scarcity of water during dry years
- The extreme concentration in urban areas all together with the “horizontal” urban model implies a greater water demand. In this way, the increasing urbanisation provokes conflicts for water distribution (i.e., irrigation vs. urban consumption)
- Ecological discharge is not well defined (very low threshold)
- Conflicts in relation with water concessions: when establishing new concessions, water availability is not always taken into account. There is also a failure in controlling the changes of use of the concessions. In some cases, concessions for irrigation are overestimated, partially due the inefficiency of the irrigation systems.

D What are Governance concerns of the plan/planning process?

D.1 Which institutions have been involved in the planning process ?

In the new planning process:

- Environmental Advisory Council
- Water National Council
- Demarcation Water Council
- Demarcation Government Board
- State General Administration
- County Councils
- Regions
- Municipalities

D2a What governance levels are included in the planning process? (supra-national, national, state, province, districts, lower levels)? National, Regional, municipal

D2b Has there been a decentralised planning process?

In 1926 water management was decentralised and the first Administration Offices for each basin were created. The Administration Office of the Tagus-Guadiana was created in 1953. Their functions were consolidated in the 1985 Water Law.

D 3. Are the objectives of the plan linked to an institutional framework/legal framework?

The objectives presented in Section A1 are linked to the following institutional framework:

In the Ministry of the Environment:

- Conservation and Improvement of the Public Hydraulic Domain Programme
- National Strategy for River Restoration
- National System for Mapping Flood Area
- Special Plan of Actions In Alert Situations and Possible Droughts
- National Plan of Water quality: water treatment 2007-2015
- Action Plan for 0 Sewage
- Plan of Priority Actions for hydrological and forestry restoration

In the Ministry of the Environment and with Regional Governments:

- Strategies for Rural Development

In the Ministry of Agriculture, Fisheries and Food:

- Action Plan for the Modernisation of Irrigation

D 3. Are objectives linked to regulations or law?

It is difficult to list all of them since there are hundreds of regulations linked to the objectives of the current plan. As an example, we present here the legal framework for droughts protection:

- Protocolo de actuación en sequías en la cuenca del tajo. 2 volumes.
- Royal Decree 10/2005, of June 20. Urgent measures for mitigating damages in the agricultural sector provoked by droughts and other climatic adversities
- Order Pre /2500/2005, of July 29. Determination of territorial limits affected by drought and establishment of criteria for the application of the measures stated in the Royal Decree 10/2005, of June 20.
- Order MAM/698/2007, of March 21. Approval of the Special Plans of Actions In Alert Situations and Possible Droughts within the hydrological basin plans framework

D4 What IWRM principles have been included (e.g., Dublin and/or GWP; see principles in part II).
In the 1999 Plan, none of them. Probably they will be included in the new plan.

D 5a. Is there an adequate understanding of the constraints in the planning documents – political, financial and managerial to effective implementation?

Nothing is said about it.

D5b Where such constraints have been identified, are appropriate measures for overcoming them proposed?

The constraints were identified during the stakeholders and the focus groups meetings:

- There are already numerous policies/laws, etc... the main problem is that they are not correctly implemented. The specific role/responsibility of the different Administrations/Institutions should be better defined.
- There is a lack of coordination between areas, institutions, policies... The water problem is not considered as a global problem.
- There is also a lack of planning coordination among sectors involved in the water cycle. There is not any organisation responsible to coordinate all the water uses. Global management units/institutions should be created.

D 5c. Is there adequate monitoring to assess whether implementation is in line with plans?
There is a lack of monitoring and control to ensure whether the planning measures are implemented or not and the regulations respected.

D 5.d are finances established to ensure monitoring?

The finance is very deficient

Planning documents in the Tungabhadra river basin;

S. Manasi, ISEC India; K. Joy, and S. Paranjape SOPPECOM, India; V.S: Saravanan ZEF-Bonn, Germany

An overview and brief description of all policy documents, legal documents (major agreements, water laws (acts), irrigation laws (acts)), management plans, master (basin) plans, sectoral management plans, participatory irrigation management (PIM) acts and agreements.

Overview of relevant water management documents

Title	Year	Brief description of major agreements					
		Major agreements	Acts	Policy documents	Master plans	Sectoral management plans	Others
		KWDTA	Water Conservation Act Environmental Act Wildlife Act Pollution Control Act Industrial Act Energy Act WUA – byelaw Karnataka Irrigation Act 1957 APFMIS Act 1997 PIM - Model Act 1998	National Water Policy 1987 State Water Policy – Karnataka 2002 Forest Policy Vaidyanathan Committee Report		Detailed Project Reports – Reservoir based Annual Reports – - Tungabhadra Board - Karnataka State Pollution Control Board	

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D5.1 Part I. Assessment and description of formal management commitments (these commitments may include plans and ..

Ideally, the partners will choose for each basin one or preferably two main important master plans on basin or state level in relation to related regional planning documents. In the European countries the European Water framework directive may serve as an example for a master plan. A regional planning document might be a hydropower regulation plan/concession, irrigation plan, etc. We would preferably ask the partners to analyse two such master plans with related regional documents to cover some breadth. We hope to through this to have a relatively “broad” coverage of the situation.

A1 What are the main objectives of the plan? – list the main objectives of the plan, both the objectives of the master plan, and the objectives of the regional management plan.

As there is no specific document or plan for the Tungabhadra basin, we are compiling information from different documents, acts and policies.

A2 Do the objectives cover both socioeconomic and environmental concerns? List both the intentional and the unintentional consequences. An objective might be to reduce the negative impacts of the regulation; then the described negative impacts must be listed.

Objectives of National Water Policy 2002 covers socio-economic and environmental concerns and it says that all Irrigation projects should have a study of the likely impact of a project during construction and later on human lives, settlements, occupations, socio-economic, environment and other aspects as an essential component of project planning. In the planning, implementation and operation of a project, the preservation of the quality of environment and the ecological balance should be a primary consideration.

Source: National Water Policy, 2002

Karnataka State Water Policy addresses various environmental concerns which have been discussed in the respective questions followed.

A3 are these goals/objectives linked to specific strategies to achieve the goals? The objectives include both main objectives of the plan, as well as the objectives to reduce negative impacts, identified strategies should be described.

During the construction and implementation of any projects, if there are any adverse impacts on the environment, then that should be minimized and should be offset by adequate compensatory measures. The project should, nevertheless, be sustainable. NWP says that,

- Both surface water and ground water should be regularly monitored for quality and a phased programme should be undertaken for improvements in water quality
- Effluents should be treated to acceptable levels and standards before discharging them into natural streams. Minimum flow should be ensured in the perennial streams for maintaining ecology and social considerations.
- Principle of ‘polluter pays’ should be followed in management of polluted water.
- Necessary legislation is to be made for preservation of existing water bodies by preventing encroachment and deterioration of water quality

Source: National Water Policy, 2002

The Karnataka State Water Policy, 2002 has one of the objectives of protecting catchments of the storages supplying water to urban centers from environmental degradation and industrial pollution. Steps will be taken to ensure that effluents are treated to acceptable level standards before discharging them in natural streams

Source: Karnataka State Water Policy, 2002

Article 7, chapter III of EPA, 1987, says that No person carrying on any industry, operation or process shall discharge or emit or permit to be discharged or emitted any environmental pollutant in excess of such standards as may be prescribed (Environmental Protection Act, 1987).

EPA, 1987 says that the central government has the powers to take measures that are necessary to protect, control and improve quality of environment and prevent, control and abate environmental pollution and such measures may include

- co-ordination of actions by the state governments, officers and other authorities (acts or rules any other law in force
- planning and execution of a nation-wide programme for the prevention, control and abatement of environmental pollution
- laying down standards for the quality of environment in its various aspects
- laying down standards for emission or discharge of environmental pollutants from various sources whatsoever

Environmental Protection Rules, 1987, in its sub rule (1), says that for the purpose of protecting and improving the quality of the environment and preventing and abating environmental pollution, specified the standards for emission or discharge of environmental pollutants from the industries, operations or processes in Schedule I to IV of EPR. Notwithstanding anything contained in sub-rule (1), the Central Board or a State Board may specify more stringent standards from those provided in Schedule I to IV in respect of any specific industry, operation or process depending upon the quality of the recipient system and after recording reasons therefore in writing.

A4 are the goals integrated or are they in opposition? Describe which objects are in opposition and why.

In the Karnataka State Water Policy, although mention has been made of IWRM, it is not being practiced. The details are as follows.

The Karnataka State Water Policy, 2002 has future plans of achieving its goals in an integrated approach by carrying out Water resources planning, development and management adopting an integrated approach for a hydrological unit such as River basin as a whole or for a sub basin, multi-sectorally, conjunctively for surface and groundwater incorporating quantity, quality and environmental considerations. Formulation of Development projects and investment proposal and considered within the framework of river or sub-basin plan so that the best possible combination of options can be obtained for poverty alleviation, increasing incomes and productivity, equity, reduced vulnerability to natural and economic risks and costs. Solutions to water allocation and planning issues will be found adopting a demand management approach (Source: Karnataka State Water Policy, 2002)

A5 are goals / strategies in line with, integrated with other national goals? (such as PRSPs)? Name the objects and describe how it integrates with other national goals.

No, it is not co-ordinated

B Basin description and impact reports

B1 Does the basin description include a description of- and impact reports of environmental factors (including all biotic, a-biotic and polluting sources

B1.1a Have the main different vegetation zones (alluvial and terrestrial) in the river basin been mapped and described? [Substantiate the answer and List negative and positive impacts.](#)

No, this has not been attempted.

B.1.1b Do the report/planning document in particular discuss evaluate the issue of vulnerable or threaten botanical species ?

No report or planning document evaluates the issue of vulnerable or threatened botanical species

B1.2 Do the report /planning document describe the fauna, and the *impact* of the regulation on the fauna? [Describe the impact of the regulation on the fauna](#)

B1.2a for birds?

B1.2b for the benthic fauna? (bottom dwelling)

B1.2c for mammals?

B1.2d for reptiles?

B1.2 e for fish? [In particular provide in the answer conditions which cause reduced spawning condition or migratory constraints.](#)

The reports or planning documents do not specify them. However, efforts are taken in fragmented ways at different points of river to protect the fauna. The initiatives are a combination of public-private partnership, individual initiatives or private initiatives. However, in reality, spawning conditions are affected with increased pollution from industries and urban sewage disposed off into the water bodies without treatment.

B1.2f Have vulnerable or threatened vertebrate or invertebrate species (auna: fish, birds, reptiles, amphibians, mammals, macrophytes) in the area impacted by the regulation been registered /evaluated?

The vulnerable or threatened vertebrates or invertebrates species have not been registered.

B1.3 Are the geology and the landscape in the area described and impacts identified?

B1.3a geology (soils?)

Geology is described for certain parts of the basin by certain private agencies, however, the data is accessible for certain components while some are restricted.

B1.3 b Landscape - [Describe the briefly the landscape and the impact of the regulation.](#)

Landscape is also described for certain parts of the basin by certain private agencies, however, the data is accessible for certain components while some are restricted.

B1.4 Description of the hydrology / hydro-morphology of the basin for the following elements

No

B1.4a– Do the plan include a description of change in river water flow, (portion of the river with changed water flow after a regulation or urbanisation, change in water flow in relation to flood, normal water flow and low water flow?

No

B1.4 b Are flood data recorded in the basin description?

No

B1.4b Do the plan include a description of human made physical barriers or other physical change of the river bank or river basin (ex lowering of lakes, drainage, vegetation removal) in the basin and the impact? [Describe the change and the impact.](#)

No

B1.4c Do the plan describe sedimentation and erosion patterns in the basin, and the impact of the regulation on these two aspects? [Describe change and impact.](#)

Water Resources Department documents sedimentation at the reservoir levels only. However, the impacts are assessed in terms of reduced water storage levels.

B 1.4c Do the plan include a description of temperature changed due to ice-regime or others? [Describe the change and the impact.](#)

Not applicable

B1.5 Ground water

B1.5a Have wells and springs in the basin been registered and described

The Karnataka Groundwater (Regulation and Control) Bill, 1996 has the provision to provide for regulation and control of extraction and prevention of waste of groundwater in the State. Sub-Section (1) of section 3, Chapter II says that the State Government shall by notification establish an authority to be known as the Karnataka Ground Water Authority for the whole of the State of Karnataka. The section 10 speaks regarding the registration of every existing groundwater users who has been using groundwater before the commencement of this Act within a period of ninety days from the date of such commencement apply to the Authority, shall have regard to the following .

- the purpose for which water is being used;
- the existence of other competitive users;
- the availability of water; and
- any other factors relevant thereto.

The Bill also specifies that no person shall sink a well or install devices to extract groundwater for any purpose either on personal or community basis unless he has obtained a permit from the Authority in accordance with the provisions of this Act and the distance between the two successful Borewells and the successful Dug-cum-Borewell shall be 250 mts. And between two Dug wells shall be 182 mts, in command areas the distance between two Dug wells shall be 120 mts. However, these are not practiced in reality.

(Source: The Karnataka Groundwater (Regulation and Control) Bill, 1996)

B1.5b Have the impact on the ground water been evaluated? [Describe the impact.](#)

Section 9 of Chapter II of The Karnataka Groundwater (Regulation and Control) Bill, 1996, has made provision for the closure of wells if the appropriate authority feels that any existing well in the area of over exploited taluk is found to be adversely affecting any public drinking water source and not withstanding anything contained in any Law for the time being in force and also having regard to material or equipment used in connection with such extraction of water.

(Source: The Karnataka Groundwater (Regulation and Control) Bill, 1996)

B 1.6 Are the climate in the basin described?

B1.6a Temperature patterns? [What has been described?](#)

Temperature and Evaporation losses are documented at the Reservoirs only and not for the whole basin.

B1.6b Precipitation patterns? [What has been described?](#)

Rain gauge stations are installed and precipitation levels are recorded by Drought Monitoring Cell (State Department) and Indian Meteorological Department (National level). Day wise rainfall data is specified.

Water quality and pollution

B1.7a Do the plan include a description of the water quality in the basin and the impact of the regulation ? [Describe the status and the foreseen impacts.](#)

- a. According to nitrate pollution
- b. Phosphor pollution
- c. Pesticides
- d. Toxic chemicals
- e. Microbial pollution
- f. Organic matter
- g. Heavy metals
- h. Algae

The Karnataka State Water Policy, 2002, highlights the water quality problems like degradation from Agro- Chemicals, industrial and domestic pollution, groundwater depletion, water logging, salinisation and siltation issues which are responsible for reducing the effective water availability

It highlights there will be increase in the demand for drinking water in the urban and rural areas in the coming years. This demand cannot be met entirely from groundwater sources. In about 4500 villages groundwater is not fit for drinking purposes on account of high fluoride or iron content or brackishness. Therefore, in the next two decades water supply systems for larger habitations will have to be based on surface water sources like perennial rivers and reservoirs and reduction in the irrigation water use may be inevitable

(Source: Karnataka State Water Policy, 2002)

B1.8a Are pollution point sources described in the planning document? [List and describe the pollution point sources with impact on the basin, describe the recipient situation of the river /lake?](#)

The Environmental Protection Act, 1986 prohibits and restricts on the location of industries and the carrying on processes and operations in different areas. According to this, the Central government may take into consideration the following factors while prohibiting or restricting the location of industries and carrying on of processes and operations in different areas-

- (i) Standards for quality of environment in its various aspects laid down for an area.
- (ii) The maximum allowable limits of concentration of various environmental pollutants (including noise) [or an area.
- (iii) The likely emission or discharge of environmental pollutants from an industry, process or operation proposed to be prohibited or restricted.
- (iv) The topographic and climatic features of an area.
- (v) The biological diversity of the area which, in the opinion of the Central Government needs to be preserved.
- (vi) Environmentally compatible land use.
- (vii) Net adverse environmental impact likely to be caused by an industry, process or operation proposed to be prohibited or restricted.
- (viii) Proximity to a protected area under the Ancient Monuments and Archaeological Sites and Remains Act, 1958 or a sanctuary, National Park, game reserve or closed area notified as such under the Wild Life (Protection) Act, 1972 or places protected under any treaty, agreement or convention with any other country or countries or in pursuance of any decision made in any international conference¹ association or other body.
- (ix) Proximity to human settlements.
- (x) Any other factor as may be considered by the Central Government to be relevant to the protection of the environment in an area.

While prohibiting or restricting the location of industries and carrying on of processes and operations in an area, the Central Government shall follow the procedure hereinafter laid down.

- (a) Whenever it appears to the Central Government that it is expedient to impose prohibition or restrictions on the locations Of an industry or the carrying on of processes and operations in an area, it may by notification in the Official Gazette and in such other manner as the Central government may deem necessary from time to time, give notice of its intention to do so.
- (b) Every notification under clause (a) shall give a brief description of the area, the industries, operations, processes in that area about which such notification pertains and also specify the reasons for the imposition of prohibition or restrictions on the locations of the industries and carrying on of process or operations in that area.

B1.8b Do the basin description include description of non point sources – industry, agriculture, forestry, mining activities, polluted sediments, transport, [List and describe the pollution non point sources with impact on the basin, describe the recipient situation of the river.](#)

This information has already described in Part 2. Please refer it.

B2 The socio-economic situation

B2.1a Has a population survey been performed in the area of impact? [State in the answer what has been surveyed and what has not been surveyed.](#)

No

B2.1 b Does the plan provide information concerning the income distribution of people impacted? [Describe the income distribution.](#)

No

B2.1c Do the plan include an evaluation of the impact of the regulation on the economy in the area? [Describe how the regulation impacts the economy on the area of impact.](#)

No

B2.1 c Does the plan describe the impact on employment /occupation in the basin? [Describe the impact.](#)

No

B2.2 Does the plan describe the impact on the different land use sectors in area? B2.2a on agriculture in the area of impact? [Describe the agricultural setting and the impact.](#)

Runoff from agricultural lands results in water logging, desertification, salinization, erosion, etc., that affects the irrigated areas and water quality. Tillage or ploughing activities results in sedimentation, which carry phosphorus and pesticides particles resulting in siltation and loss of habitat. Fertilizing the agricultural fields results in runoff of nutrients, especially phosphorus, leading to eutrophication causing taste and odour in public water supply, excess algal growth leading to deoxygenation of water and fish kills.

Across Tungabhadra river basin, fertilizer consumption has increased to 700 tonnes in 2001-05 from 510 tonnes in 1995-96 (Table 2.1) indicating nutrient loss in the soil. Manure spreading carried out as a fertilizer activity; spreading on frozen ground results in high levels of contamination of receiving waters by pathogens, metals, phosphorus and nitrogen leading to eutrophication and potential contamination.

Table Fertilizer Consumption in the River Basin

Years	Fertilizer consumption in Tonnes			Total
	Nitrogen (N)	Phosphorous (P)	Potash (K)	
1991-92	305.18	192.9	102.14	600.22
1995-96	272.65	145.28	92.08	510.01
2001-02	369.88	200.36	129.77	700.01
2004-05	353.98	199.31	146.73	700.02

Source: Taluk-wise Areas Affected with Salinity, Alkalinity and Water Logging in the TB Basin

	Area affected (Area in Hectares)			
Dist / Taluk	Salinity	Alkalinity	Water logging	Total
Tungabhadra Command Area				
Koppal dist				
Koppal	41.08	50.02	82.57	173.67
Gangavati	6,875.43	978.86	3,932.02	11,786.31
Total	6,916.51	1,028.88	4014.59	11,959.98
Raichur Dist				
Sindhanur	9,077.41	1,271.23	8,324.98	18,673.62
Manvi	15,613.66	2,616.24	11,888.43	30,118.33
Devdurga	48	96	77	221
Raichur	1,192.5	563.29	3,548.47	5,304.26
Total	25,931.57	4,546.76	23,838.88	54,317.21
Bellary Dist				
Hospet	2,486.99	442.39	365.51	3,294.89
Bellary	11,536.65	2,039.01	3,339.05	16,914.71

Siruguppa	5,146.87	288.8	4,292.83	9,728.5
Total	19,170.51	2,770.2	7,997.39	29,938.1
Grand Total	52,018.59	8,345.84	35,850.86	96,215.29
Bhadra Command Area				
High	2,317	836	18,692	
Normal	1,509	807	10,527	
Total	3,826	1,643	29,219	

Source: Tungabhadra Command Area Development Authority and Bhadra Command Area Development Authority

B2.2 b Does the plan describe the impact on the industry in the area of impact ? ? Describe the industrial setting and the impact.

No

B2.2c Does the plan describe the impact on the tourism in the area of impact ? ? Describe the tourist setting and the impact.

No

B2.2d Does the plan describe the impact on the recreation the area of impact ? ? Describe the recreational setting and the impact.

No

B2.2e Does the plan describe the impact on the cultural heritage / cultural monuments in the area of impact ? ? Describe the cultural setting and the impact.

No

B2.3 Does the plan include a general description of the socio-economic history of the area? Describe the history

No

B2.4 a Do the plan include a description of the different sectors use of water (including marginalised groups poor and women)? The spatial and temporal variations in water cycle elements, such as water resources availability (m³/person/year), water use (litres/person/day). Describe the different sectors use of water.

The Karnataka State Water Policy 2002, identifies different sectors use of water – drinking, irrigation, hydropower, aquaculture, agro-industry, non-agricultural use and navigation and other users. Drinking water use is recommended to provide at the rate of 55 litres per person per day in the rural areas, 70 litres per person per day in towns and 100 litres per person per day in the city municipal council areas and 135 litres per person per day in city corporation areas.

(Source: Karnataka State Water Policy 2002)

National Water Policy, 2002 classifies the water allocation priorities as follows during the planning and operation of systems:

□ Drinking water

□ Irrigation

- Hydro-power
- Ecology
- Agro-industries and non-agricultural industries
- Navigation and other uses.

However, it also says that these priorities could be modified or added if warranted by the area / region specific considerations. Special efforts should be made to investigate and formulate projects either in, or for the benefit of, areas inhabited by tribal or other specially disadvantaged groups such as socially weak, scheduled castes and scheduled tribes. In other areas also, project planning should pay special attention to the needs of scheduled castes and scheduled tribes and other weaker sections of the society. The economic evaluation of projects benefiting such disadvantaged sections should also take these factors into account.

(Source: National Water Policy, 2002)

B2.4b If good drinking water is scarce, does the plan describe allocation efforts? [Describe the drinking water allocation efforts.](#)

The State water policy and the National Water Policy, 2002, says that first priority should be given to provision of drinking water in planning and operation of water resources projects.

(Source: Karnataka State Water Policy, 2002)

The Government of Karnataka in partnership with urban local bodies in the State, the Karnataka Urban Water Supply & Drainage Board (KUWS&DB) and the Bangalore Water Supply and Sewerage Board (BWSSB) will continue and strengthen its efforts to provide all residents of urban areas of the State, piped water supply and sanitation services at or near their dwellings. The objectives/efforts of the Government of Karnataka and its partner agencies will be to

- Ensure universal coverage of water and sanitation services that people want and are willing to pay for and
- To do so in a manner that preserves the sustainability of the precious water resources of the State, project and enhances the commercial and economical sustainability of the operations at the same time.
- Ensure a minimum level of service to all citizens

To achieve the above said objectives, the Government of Karnataka will continue to be responsible for:

- Policy Formulation
- Ensuring provision of the bulk of the resources required for capacity creation
- Regulation, monitoring and evaluation of the efficiency of operations, including prescribing reporting requirements, procurement procedures, etc.,
- Setting minimal service standard
- Encouraging the use of public private partnerships as well as private sector participation to achieve the sector goals
- Promotion of the economic and commercial viability of water supply systems and the exploitation of economies of scale and scope by appropriate aggregation options
- Institution of necessary incentives for urban local bodies and other service providers to implement sector reforms
- Ensuring co-ordination and collaboration among the various agencies both at the policy and operational level through the establishment of appropriate committees and agencies.

Urban Local Bodies (ULBs) will be responsible for water supply and sewerage services from water catchments to waste water treatment. The Government of Karnataka, however, will have the responsibility to monitor that ULBs provide quality services in accordance with the standards prescribed at the State level. ULBs will have the choice of providing the services directly through public bodies or through such appropriate Private Sector Participation (PSP) arrangements. Given however, the paramount need for financial and commercial viability of the operations, the State will monitor strictly policies relating to minimal tariff operations autonomy of the municipal water operations, etc.

The Karnataka Urban Water Supply and Drainage Board will continue to be responsible for capacity creations and augmentation in all ULBs and O & M in selected ULBs for the present. Over the medium term, the KUWS&DB will be restructured and its role redefined. In the longer term the KUWS&DB could become a publicly owned independent provider of technical assistance and management support to ULBs who do not have adequate capacity. Similarly, the appropriate role of BWSSB will be defined in the action for the Bangalore City and surrounding areas.

(Source: Karnataka Urban Drinking Water and Sanitation Policy, 2002)

The National Water Policy emphasises on providing adequate safe drinking water facilities to the entire population both in urban and in rural areas. Irrigation and multipurpose projects should invariably include a drinking water component, wherever there is no alternative source of drinking water. Drinking water needs of human beings and animals should be the first charge on any available water

(Source: National Water Policy, 2002)

B2.4 c Does the plan describe the quantity of water for irrigation by different user groups? Describe the irrigation measures.

The state has an ultimate irrigation potential of 45 lakh hectares under major, medium and minor irrigation projects. Facilitate creation of an additional irrigation potential of 16 lakh hectares by individual farmers using ground water.

Irrigation planning will take into account the irrigability classification of land, cost effective irrigation techniques and the needs of drought prone and rain shadow areas. Wherever water is scarce, the irrigation intensity will be such as to extend the benefits of irrigation to as large an area as possible in order to maximize production. Land and Water are mutually reinforcing resource systems, which are limited in the State. Land use pattern has perceptible influence on the hydrological characteristics, the soil erosion factors and soil is nonrenewable and irreplaceable beyond a certain point of damage. Water availability is limited but it's irrational and overuse has resulted in low overall project efficiencies and considerable land degradation. The management of water and land resources and water and land use planning and management are closely intertwined and hence, there will be close integration of water use and land use policies. Appropriate cropping patterns will be adopted in co-ordination with the Agriculture Department. Drip and sprinkler irrigation to improve water use efficiency will be promoted. Irrigation and multi purpose projects will invariably include drinking water component.

It also highlights need of efforts to improve productivity of irrigated agriculture by involving users in irrigation management.

(Source: The Karnataka State Water Policy, 2002)

The National Water Policy says that there should be a close integration of water-use and land-use policies. The irrigation planning either in an individual project or in a basin as a whole should take into account the irrigability of land, cost-effective irrigation options possible from all available sources of water and appropriate irrigation techniques for optimising water use efficiency. Irrigation intensity should be such as to extend the benefits of irrigation to as large a number of farm families as possible, keeping in view the need to maximise production. Irrigation being the largest consumer of fresh water, the aim should be to get optimal productivity per unit of water. Scientific water management, farm practices and sprinkler and drip system of irrigation should be adopted wherever feasible. Reclamation of water logged / saline affected land by scientific and cost-effective methods should form a part of command area development programme.

(Source: National Water Policy, 2002)

B2.5 Does the plan describe equity aspects among water using sectors? [Describe these equity aspects.](#)

The National Water Policy states that the water allocation in an irrigation system should be done with due regard to equity and social justice. Disparities in the availability of water between head-reach and tail-end farms and between large and small farms should be obviated by adoption of a rotational water distribution system and supply of water on a volumetric basis subject to certain ceilings and rational pricing.

Concerted efforts should be made to ensure that the irrigation potential created is fully utilised. For this purpose, the command area development approach should be adopted in all irrigation projects.

(Source: National Water Policy, 2002)

B2.6 Do the planning document include a review of the impact of the regulation on human activities, use of natural resources described (including consequences of the regulation for fishing, game hunting, recreation ? [describe the impact on the human activity.](#)

The following are some of the initiatives taken which regulate human activities in use of natural resources.

a) Matsya Dhama

Matsya Dhama are prohibited locations for fishing located at 4 different locations along the river Tunga at Sringeri, Hariharapura, Balehonnur monitored and managed by different religious institutions (Sringeri Mutt, Sri Mutt, Dharmasthala Manjunatha Trust). The Fisheries department aims to protect endangered fish species and promote eco-tourism. The religious institutions have contributed financially apart from taking care of the maintenance. The religious institutions and the Fisheries Department have good rapport in managing this initiative.

b) Kuvempu bio-diversity Park

Karnataka Biodiversity Board was set up in 2003 with a mission to target conservation, sustainable utilization and equitable benefit sharing. It has set up over 575 biodiversity management committees in local bodies of 15 districts and the first state to take up this activity. Among them, in the homage to the National poet and naturalist, Shri. Kuvempu, Bio-park in Shimoga is being developed as a model heritage site. Kuvempu Biosphere reserve at Kuppalli is spread across 6866 acres, and 3230.50 acres has been declared as Biosphere reserve.

c) Bhadra Wild Life Sanctuary

Bhadra Wild Life Sanctuary is located in the tropical forests of the Western Ghats in Chikmagalur district. It is about 275 kms north of Bangalore and covers an area of 492.46 Sq. km. It was declared as the 25th Project Tiger of India in 1998. Home to a large variety of flora and fauna and it is regarded as one of the best Wildlife Sanctuaries in India. Various initiatives are taken to protect the sanctuary from forest fires and encroachments.

d) Watershed Programmes

The watershed development approach, as implemented in Karnataka, consists of the following components – (a) Human resource development (b) Soil and land management (c) Water management (d) Afforestation (e) Pasture/fodder development (f) Livestock management, rural energy management and (g) Farm and non-farm value addition activities.

This system has led to overall development of the human resource and environment in the watershed. The Department has multi-disciplinary technical experts drawn from Agriculture, Horticulture and Forest Departments through various sector schemes from the Central, State and District level governments.

The broad objectives of the Watershed Programmes are:

1. Conservation, development and sustainable management of natural resources including their use.
2. Enhancement of agricultural productivity and production in a sustainable manner.
3. Restoration of ecological balance in the degraded and fragile rainfed eco-systems by greening these areas through appropriate mix of trees, shrubs and grasses.
4. Reduction in regional disparity between irrigated and rainfed areas.
5. Creation of sustained employment opportunities for the rural community including the landless

In the Tungabhadra Catchment area 3.232 lakh ha. of priority area have been treated since inception of the RVP Scheme which accounts for 64.38 per cent of the total priority area of 5.02 lakh ha. Identified as high and very high priority as in 2001, further 138 watersheds have been saturated out of 154 watersheds. The districts of Bellary, Haveri, Chitradurga, Koppal and Davanagere are included in the Tungabhadra Catchment of River Valley Project.

B2.4 Are possible conflicts approached and described? [Describe the conflicts.](#)

The Karnataka State Water Policy says that it is necessary to assess the overall water resource availability, current and future problems and conflicts and identify drought and flood risk zones in each river basin. It mentions about the disparities that may arise regarding availability of water between head reach and tail-end farmers and between large and small farmers and this should be resolved by adopting a rotational water distribution system and supply of water on a volumetric basis subject to certain ceilings and rational pricing.

(Source: Karnataka State Water Policy, 2002)

C Have stakeholders been involved in the planning process?

Documents used:

- 1) National Water Policy, 2002
- 2)

- 3) State Water Policy: Karnataka, 2002
- 4)
- 5) Karnataka Urban Drinking Water and Sanitation Policy, 2002
- 6)
- 7) The Karnataka Irrigation Act, 1965
- 8)
- 9) The Karnataka Irrigation and Certain Other Law (Amendment) Act, 2000
- 10)
- 11) Andhra Pradesh Farmers' Management of Irrigation Systems Act, 1997
- 12)

(All these documents have been uploaded by ISEC to the STRIVER website)

7) Directorate general for International Cooperation, The Netherlands and Command Area Development Authority, Tungabhadra Scheme, Muridabad, Karnataka State, India; May 1998; Main Report: Draft Final Report of the Tungabhadra Irrigation Pilot Project, Phase II; (the report has apart from this Main Report has four annexures, namely, Annexure I: Land and water; Annexure II: Farmers' Organisations and Gender; Annexure III: Agricultural Livelihoods; and Annexure IV: Recommendations to the ID/CADA accomplished with IPEA); The report is prepared by DHV Consultants BV, Amersfoort, The Netherlands in association with IWACO BV Delft Hydraulics, JPS Associates – India, and Operations Research Group

(This document is not uploaded on the website. We have the hard copy)

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General comments about Stakeholder involvement ad participation

It is rather difficult to answer the main question that is posed here, namely, “Have the stakeholders been involved in the planning process” as part of the larger issue of “Assessment and description of(a) water management plan(s), mainly because we do not have a planning document for the Tungabhadra basin. Individual projects on the river would have detailed project reports (DPRs) and very often the DPRs contain only the design of the project, cost estimate, planned water use, designed cropping pattern, etc. These documents are not prepared keeping in mind integrated water resource management within the basin as IWRM was not talked about when these projects were planned and also do not talk about governance issues including stakeholder involvement.

However there are water policy documents as well as specific legislative acts like Participatory Irrigation Management Act, which deal with some of the issues, related to governance, participation of users and involvement of stakeholders. Some of the important documents are listed above. Thus our response to the specific questions below is based on these documents and our own experience in this area.

National Water Policy, 2002

The National Water Policy, 2002, mentions the word “stakeholders” only twice in the entire document. The first time it appears under the section “Planning” and as sub-section or clause 6.8 and it says, “The involvement and participation of beneficiaries and other stakeholders should be encouraged right from the project planning stage itself.” (page 5). The second time it talks about stakeholders is in the section on “Participatory Approach to Water Resources Management” as clause 12. It says, “Management of the water resources for diverse uses should incorporate a participatory approach; by involving not only the various governmental agencies but also the users and other stakeholders, in an effective and decisive manner, in various aspects of planning, design, development and management

of the water resources schemes. Necessary legal and institutional changes should be made at various levels for the purpose, duly ensuring appropriate role for women. Water Users' Associations and the local bodies such as municipalities and *gram panchayats* should particularly be involved in the operation, maintenance and management of water infrastructures / facilities at appropriate levels progressively, with a view to eventually transfer the management of such facilities to the user groups / local bodies." (page 6).

Karnataka State Water Policy, 2002

In the Karnataka State Water Policy, 2002, the word stakeholder appears only once and it is used more in the context of participatory irrigation management and water users' association to manage irrigation water. To quote from the policy document, "Mobilize community and stakeholder participation through Users Organizations, empower them, provide training, technical support and create public awareness. Form and empower Water Users Co-Operative Societies and Federations for Participatory Irrigation Management. (page 11)

None of the other documents listed above mention the word "stakeholder". Though the National Water Policy, 2002 and the Karnataka State Water Policy (Andhra Pradesh has not yet come out with its water policy) do mention about the involvement of the stakeholders, nothing much has been done on the ground. The only area where involvement of the stakeholders is sought is in the area of irrigation water management as part of the sectoral reforms. Thus almost all documents do mention about participation of water users in the management of water, especially irrigation water. In Andhra Pradesh the state government has passed a legislative Act titled, Andhra Pradesh Farmers' Management of Irrigation Systems Act, 1997, making participatory management of irrigation water as part of the official policy of the government. In fact Andhra Pradesh is the first state in India to have passed such an Act. It also established more than 10,000 WUAs immediately after this Act. Though in Karnataka no such Act exists, the state government did encourage setting up of WUAs on a "voluntary" basis and made suitable amendments to the Karnataka Irrigation Act, 1965, in the years 2000 and 2002.

In the drinking water sector also efforts are being made to involve the users in the management of the drinking water schemes both in the urban areas and rural areas. For example Pani Samitis (Water Committees) are being promoted and they are supposed to be involved in source identification, supervising the installation of the scheme, collection of part capital costs and later regular water charges, operation and maintenance, etc. This is also part of sectoral reform programme.

Another area of people's participation is the watershed development sector. Micro-watershed development is a major programme in the rural areas, especially in the dry land agricultural and drought prone areas (areas which are outside the purview of irrigated agriculture). These programmes are promoted and funded by the Ministry of Rural Development, Ministry of Agriculture and also through multi-lateral and bi-lateral agencies. All these programmes have their own guidelines for the implementation of the programmes and one of the common factors across all these guidelines is the participation of the watershed community. For this different institutions are supposed to be set up. Gram Sabha (or village assembly – all adult members of the village) has to give consent to take up the programme and major decisions have to be taken in consultation with the gram sabha and at least once in a year the gram sabha should meet. Then there is the Watershed Development Committee (WDC) consisting of different sections including the resource poor sections (like shepherds, Scheduled castes, scheduled tribes and also women) and it is responsible for the proper planning, implementation, O&M. Very often the money is also controlled by the WDC. There are also Self Help Groups and user Groups promoted.

Thus one can see that in all the three major sectors – irrigation, drinking water and watershed development – efforts are being made to bring in participation. Of course there are various

studies which show that there is a large gap between the official/policy rhetoric and what is being practiced on the ground.

In all these three specific provisions are also made for training and capacity building especially of those who are the office bearers of the various institutions like WUAs, Pani Samitis, WDCs, SHGs, etc.

One of the critiques of the sectoral reform programme in India and the efforts at bringing in participation is that they are more pre-occupied by efficiency and not much about sustainability, equity and democratisation.

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Have stakeholders been involved in identifying the problem?

C.1a have stakeholders from the three civil societies (private, public and civil society) been involved in the planning process?

As cited above, The National Water Policy, 2002, does talk about the need to involve different stakeholders in an effective and decisive manner in all aspects on water management including planning. However, on the ground this seldom happens. The planning is mainly done by the officers (and that too mainly engineers) from the Water Resource Departments of both Karnataka and Andhra Pradesh. In fact till recently the department was known as the irrigation department and may be over the last 4-5 years the nomenclature has been changed from “Irrigation Department” to Water Resources Department. The public is not involved in problem identification at all. Involvement of the public comes only during the public hearing that has been made compulsory for clearing projects which has environment and displacement related impacts. In these public hearings civil society organisations as well as any interested parties can put up their viewpoints. However, the experience of many civil society organisations have not been very encouraging because these public hearings are very often manipulated to suite the interests of the proponents of the project and these public hearings often do not make any significance on the final outcome.

However, participatory irrigation management has been mainstreamed in both Andhra Pradesh and Karnataka and the farmers are involved in the management of irrigation water. Here too the involvement of the water users is only at the lowest level of canal management and the main functions are basically operation and maintenance of the distribution system, distribute the water allocated to the WUA by the Water Resources Department. In Karnataka the WUA is also involved in water charge collection. participation is also designed at different levels like Water User Society, Water Users Distributary Level Federation, Water Users Project Level federation and Water Users Apex Level Federation.

To make the irrigation sector more participatory the Government of Karnataka amended the existing Karnataka Irrigation Act, 1965 in 2000 (Amending Act 24 of 2000). The main objective of this amendment was “to achieve better results in water management, it is considered necessary to involve and empower farmers through Water Users Co-operative Societies and their Federations in irrigation water management. Accordingly, it is considered necessary to amend the Karnataka Irrigation Act, 1965,-

- (i) to provide for entrustment of control, maintenance and monitoring of irrigation works to Water User Societies;
- (ii) to enable, Water Users Societies to provide the means of crossing canals and to construct culverts etc., to prevent obstructions to drainage;
- (iii) to empower the Water User Society to construct drainage works wherever necessary;
- (iv) to empower the Water User Society to repair the field channel in the event of failure by the user to repair the field channel and recover the costs from the user;
- (v) to provide for consulting the Water Users Project Level Federation for regulating water supply from irrigation work;
- (vi) to empower water user society to levy water charges when water is temporarily made available as well as when water is used unauthorisedly;
- (vii) to empower Water User Society to stop supply of water in the event of violation of cropping pattern and non-payment of water charges and to levy penal water charges in cases of crop violations;
- (viii) to exempt levy of maintenance cess in respect of lands situated within the jurisdiction of Water User Societies;
- (ix) to provide for compounding of offences;
- (x) to provide for compensation of Water Users Apex Level Federation;
- (xi) to outline the functions of Water User Society, Water Users Distributary Level Federation, Water Users Project Level federation and Water Users Apex Level Federation.

(Source: The Karnataka Irrigation Act, 1965; p. 4-5)

The Karnataka Irrigation Act, 1965, was further amended in 2002 (Amending Act 8 & 9 of 2002) for the following:

(Amending Act 8 of 2002)

“It is considered necessary to provide for Water Users Societies to become members of the Water Users Project Level Federation by suitably amending the Karnataka Irrigation Act, 1965“.

(Amending Act 9 of 2002)

(i) A separate definition of "Water Users Association" and to make a provision for continuing the existing Water Users Societies registered prior to the commencement of this Amendment Act in respect of the minor Irrigation tanks irrigating less than 2000 hectares till a Water Users Association is registered under the Karnataka Societies Registration Act, 1960.

(ii) Conferring certain powers under Sections 4, 10, 14 and 27 on the Water Users Association.

(iii) Exempting Water Users Association from the levy of maintenance cess.

(iv) Defining the functions of the Water Users Association.

It is also considered necessary to amend the Karnataka Irrigation (Levy of Betterment Contribution and Water Rate) Act, 1957 enable levy of water rate on Water Users Association who in turn may collect water charges from the water users.

(Source: The Karnataka Irrigation Act, 1965; p. 5-6)

Chapter IX A of Karnataka Irrigation Act 1965 (pp. 25 to 28) deals with the various functions and roles of Water Users' Society and water Users' Associations at various levels.

The Karnataka State water policy is also seeing a greater role for private sector in all aspects of water management. To quote from the document: "Private sector participation will be encouraged in various aspects of planning, investigation, design, construction, development and management of water resources projects for diverse uses, wherever feasible. Private sector participation will help introducing corporate management in improving service efficiency and accountability to users. Depending upon specific situation, various combinations of private sector participation, in building, owning, operation, leasing and transferring of water resources facilities will be considered. (Page 8)

C1b. Marginalised groups; poor, ethnic groups and women (gender) been involved?

Again the answer is no. None of these groups are involved in problem identification.

C2 Possibilities for financial support to attend meetings?

In the three sectors – irrigation, drinking water and watershed development – there are provisions for the office bearers of various committees to participate in meetings.

C 3 Decentralised localisation of meetings to facilitate participation?

The location of the meetings depends on the type of decisions that are taken. For example issues related to a particular WUA are discussed at a very local level (within the village), but issues of policy etc are discussed at the state capital.

C 4 Have the project management included interdisciplinary representation (natural and social sciences)?

Project management is by and large done by engineers. In fact in the erstwhile irrigation departments (or now renamed as Water Resource Department) the officers are all from engineering background. Even other streams of natural science are not represented. The case of social science is still worse off. Also all the officers are males, hardly any females are there.

But as part of the sectoral reform programme (irrigation, drinking water) and watershed development there are efforts to put in place a multi disciplinary team to guide the process.

Has the process of selecting stakeholders been open ?

C5 Were information of on the selecting of stakeholders provided in the relevant channels? Newspapers, community councils etc?

This question is not much relevant here because, as we have said above, there is no multi-stakeholder involvement or forums.

C6 Were information of project stakeholder given in advance, (what is needed)

C7 Were information of the project given in local languages, and in an understandable manner?

In some cases the information, mainly about the physical structure and expenditure, is displayed in local language (for example on gram panchayat notice board, or at the site of the scheme, etc.)

Were stakeholder given voice in the problem identification process?

C8 Do the stakeholders feel that they are involved in water decision making?

Wherever there are WUAs, pani samitis, or WDCs, we can say that at least the members of these committees or institutions are involved in decision making. Here too they play very limited role as the officers of the respective departments take most of the decisions.

C9 Do the stakeholders feel they have a good access to information

Access to correct data and information has been one of the limitations. Very often the people do not get access to data and information. Proper data collection and making it available to the different stakeholders in an understandable form has been one of the weak areas. Also sometime there is no consistency in the data sets maintained by different agencies. This is more glaring in the case of interstate rivers as the different states have different data sets that they use for negotiation. Thus having a commonly agreed upon data set and making it available to stakeholders is important for stakeholder involvement. The situation has slightly improved with the Right to Information Act now in place in most of the states.

The Karnataka State Water Policy, 2002, has said that it would set up data information centre to remedy the situation. To quote from the document, “mentions the Establish Water Resource Data Information Center and collaborating arrangements with concerned Departments / Agencies. Develop protocols for data sharing and exchange. Establish direct access by water management units to water resource Data Center’s databases and decision support systems like GIS and MIS. Make water accounting and audit mandatory. (p. 10)

C10 Do the problem identification reflect the water user interests in the basin?

Since planning is still done on a sectoral basis there is nothing like a problem identification process within the overall framework of IWRM. Each sector tries to identify problems keeping the interests of that particular sector and tries to get the maximum out of the system.

In fact the Karnataka State Water Policy, 2002, is aware of this fragmentation in water management and thus the document mentions certain step that the government would take to bring in more integration. To quote from the document:

“There are no institutional arrangements at the State level to consider sectoral water, demands, plan and manage water between them. Responsibilities of water issues are fragmented between different departments without formal mechanism to ensure co-ordination.” (p. 3)

“Water resources planning, development and management will be carried out adopting an integrated approach for a hydrological unit such as River basin as a whole or for a sub-basin, multi-sectorally, conjunctively for surface and ground water incorporating quantity, quality and environmental considerations. Development projects and investment proposal will be formulated and considered within the framework of river or sub-basin plan so that the best possible combination of options can be obtained for poverty alleviation, increasing incomes and productivity, equity, reduced vulnerability to natural and economic risks and costs. Solutions to water allocation and planning issues will be found adopting a demand management approach.” (page 5)

“For multi-sectoral water planning, inter sectoral water allocation, planning of water development programmes, management decisions, and resolution of water resources issues, a State Water Resources Board will be established. The Water Resources Development Organization will act, as technical secretariat for the State Water Resources Board. A State Water Resources Data and Information Center will also be established.” (page 6)

C11 Does decision making follow principles of democracy (i.e. ...)?

Basically it is the department officers who take the decisions and very little involvement of the direct stakeholders. Also most of the decisions are taken keeping the local politics and political interests in mind. For example the report of the Tungabhadra irrigation Pilot Project, Phase II (this is a pilot project taken up in the command area of the Tungabhadra dam, the biggest irrigation project in the basin): “Due to lack of institutionalised farmers participation in scheme management ten political dimensions developed strongly. Not only was the command area pushed far beyond the water delivery capacity of the reservoir, also in the present water distribution practice political influences are predominant. Because farmers opt for productive irrigation (head reach) farmers had immediate access to irrigation water developed into a well-to-do and influential group with well established relations. This group developed interests in rice mill, act as input suppliers, money lenders and middle men. A shift from paddy to other crops would mean considerable loss of investment which is not likely to happen and also not necessary from agriculture point of view. (*Source: Directorate general for International Cooperation, The Netherlands and Command Area Development Authority, Tungabhadra Scheme, Muridabad, Karnataka State, India; May 1998; Main Report, Draft Final report – Tungabhadra irrigation Pilot Project, Phase II; report prepared by DHV Consultants BV, Amersfoort, The Netherlands in association with IWACO BV Delft Hydraulics, JPS Associates – India, and Operations Research Group – India; p. 4*)

C12 Which sectors dominate/influence the documents most and what sectors are poorly represented and what sectors not included at all?

Till now it is the irrigation sector that used to dominate/influence the documents basically because agriculture is the main user of water. Recently the industry sector has also become more assertive and they are demanding more water. Also urban areas are also influencing the policies and allocations as the urban areas demanding more water to meet their requirements often at the expense of the rural areas. Also the recent policy documents are also influenced by the private sector as there is more talk of public-private partnerships, privatisation, etc. All these are also leading to various types of conflicts – rural vs. urban, agriculture vs. industry type of conflicts.

Also see the response given under C11 above.

C 13 Were water allocation agreed among stakeholders

There is no consultation amongst the different stakeholders on the question of inter-sectoral water allocation. Allocation is done at the level of the government departments.

Training

26. (page 10): A perspective plan for standardised training should be an integral part of water resource development. It should cover training in information systems, sectoral planning, project planning and formulation, project management, operation of projects and their physical structures and systems and

the management of the water distribution systems. The training should extend to all the categories of personnel involved in these activities as also the farmers.

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D What are Governance concerns of the plan/planning process?

D.1 Which institutions have been involved in the planning process ? List the institutions involved and describe how they have been involved.

There are no institutional arrangements at the State level to consider sectoral water, demands, plan and manage water between them. Responsibilities of water issues are fragmented between different departments without formal mechanism to ensure co-ordination

(Source: Karnataka State Water Policy, 2002)

D2a What governance levels are included in the planning process? (supra-national, national, state, province, districts, lower levels)

At the state level, a State water Resources Board is the responsible organisation for multi-sectoral water planning, inter sectoral water allocation, planning of water development programmes, management decisions, and resolution of water resources issues. The Water Resources Development Organization will act, as technical secretariat for the State Water Resources Board. Also at the state level a State Water Resources Data and Information Center will also be established.

(Source: Karnataka State Water Policy, 2002)

D2b Has there been a decentralised planning process ? If no, argue for the point of view, if yes described how it is decentralised.

The Karnataka State water policy, 2002 states that the management of water resources shall be done adopting a participatory approach. Awareness will be created among citizens on de-centralization user participation, involvement in decision-making, implementation and management of water resources projects and campaigns. Minor Irrigation works and sub-systems of Major & Medium Irrigation works is rehabilitated with participation by the users of these tanks and sub-systems and handed over to Users Organization for operation, maintenance and management. Technical assistance are rendered to Water Users Societies /Associations and they are encouraged to undertake land leveling and also take up cultivation of high value crops requiring less water for efficient use of scarce water.

It says that the ultimate goal will be to transfer operation, maintenance, management and collection of water charges to users groups.

(Source: Karnataka State Water Policy, 2002)

The National Water Policy, 2002 also speaks the management of the water resources for diverse uses that should incorporate a participatory approach; by involving not only the various governmental agencies but also the users and other stakeholders, in an effective and decisive manner, in various aspects of planning, design, development and management of the water resources schemes. Necessary legal and institutional changes should be made at various levels for the purpose, duly ensuring appropriate role for women. Water Users' Associations and the local bodies such as municipalities and *gram panchayats* should particularly be involved in the operation, maintenance and management of water infrastructures / facilities at appropriate levels progressively, with a view to eventually transfer the management of such facilities to the user groups / local bodies

(Source: National Water Policy, 2002)

D 3. Are the objectives of the plan linked to an institutional framework/legal framework? Describe how they are linked to an institutional / legal framework (for more explanation see brief example from Glomma below).

The National Water Policy 2002, with a view to give effect to the planning, development and management of the water resources on a hydrological unit basis, along with a multi-sectoral, multi-disciplinary and participatory approach as well as integrating quality, quantity and the environmental aspects, the existing institutions at various levels under the water resources sector will have to be appropriately reoriented / reorganised and even created, wherever necessary. As maintenance of water resource schemes is under non-plan budget, it is generally being neglected. The institutional arrangements should be such that this vital aspect is given importance equal or even more than that of new constructions.

In addition, appropriate river basin organisations should be established for the planned development and management of a river basin as a whole or sub-basins, wherever necessary. Special multi-disciplinary units should be set up to prepare comprehensive plans taking into account not only the needs of irrigation but also harmonising various other water uses, so that the available water resources are determined and put to optimum use having regard to existing agreements or awards of Tribunals under the relevant laws. The scope and powers of the river basin organisations shall be decided by the basin states themselves

(Source: National Water Policy, 2002)

D 3. Are objectives linked to regulations or law? Provide a brief explanation of this relationship (for more information see brief example from Glomma below).

Participatory Irrigation Management

a) Provisions in PIM Acts: Recognizing the need for sound legal framework for PIM in the country, the Ministry of Water Resources has brought out a model act to be adopted by the states for facilitating PIM. The legal framework provides for creation of farmers' organizations at different levels of the irrigation system as under:

- Water Users' Association (WUA): will have a delineated command area on a hydraulic basis, which shall be administratively viable. Generally, a WUA would cover a group of outlets or a minor.
- Distributary Committee: will comprise of five or more WUAs. All the presidents of WUAs will comprise the general body of the distributary committee.
- Project Committee: will be an apex committee of an irrigation system and presidents of the distributary committees in the project area shall constitute the general body of this committee.

The associations at different levels are expected to be actively involved in (i) maintenance of irrigation system in their area of operation; (ii) the distribution of irrigation water to the beneficiary farmers as per the warabandi schedule; (iii) assisting the irrigation department in the preparation of water demand and collection of water charges; (iv) resolving disputes among the members and WUA; and (v) monitoring flow of water in the irrigation system.

b) Enactment of Legislation for PIM

As a result of various conferences/seminars, there has been an increased consciousness in the states about the need for actively involving farmers in management of irrigation system. Some states have already taken steps for providing legal backup for the implementation of PIM.

Legislative changes in implementing PIM were made at in different stages. Special committees have been formed to promote PIM and address specific issues in some states. In states that are already successful like Andhra Pradesh, the focus is more on transparency and accountability at the WUA level. In Gujarat and Maharashtra, draft bills have been circulated and yet to be finalized. In Assam, the Irrigation Water Users Act is being finalized and stress is given to formation of committees. In Tripura, guidelines for handing over irrigation schemes to panchayats for collection of water charges have been drawn up for O and M and a notification has been issued. In short, PIM is at various stages of refinement.

The need for legal recognition of water users' associations is largely satisfied by registering WUAs under the Central Societies Registration Act of 1860, various state Societies Registration Acts, or Cooperative Societies Registration Acts. However, Maloney and Raju (1994) have suggested that registration should be provided through new legal enactments by including such recognition in revised state irrigation acts which was provided in the Gujarat's 1996 draft irrigation act. Joint management committees may not require formal registration but their functions need legal recognition. There is concern about the structure of WUAs to be specified in law.

No state has yet provided full legal support for transfer policies. This is appropriate in those states where the policy has not yet been fully defined and where experiments are still going on. Tamil Nadu has issued a government order defining its policy, but it is clear that time is still needed to ensure that the policy will work as expected. Maharashtra and Kerala have fully defined their policies. Kerala has the most comprehensive law but it fails to allow for farmers' initiative, provide means for WUAs and joint management committees to enforce their decisions, is applicable to only some irrigation schemes. Comparatively, the Maharashtra Irrigation Act provides better legal support for the state transfer policy, but does not recognize WUAs. Gujarat's draft law provides sufficient powers to WUAs to make transfer work as expected. It blends needed changes in water allocation and resource mobilization procedures together with the powers needed by WUAs. No state law provides adequate means for rapid and fair resolution of disputes among WUAs and the irrigation agency.

Policy and Legal Frame

State	Policy Focus	Legal Framework
Andhra Pradesh	a) Setting up WUAs and management transfer to Water User's Associations (WUAs) b) Integrated water resources development through 'Neeru-Meeru' programme c) Promote water conservation, tree cover and regulate the exploitation and use of ground and surface water.	a) Andhra Pradesh Farmers Managed Irrigation Systems Act, 1997. b) Andhra Pradesh Water, Land and Trees Act, 2002.
Karnataka	a) Setting up WUAs in and transfer of management responsibilities b) Community-based rejuvenation of tanks and management transfer	a) Karnataka State Irrigation Act, 2000 (with amendments to promote participatory irrigation management.

	c) improve rural livelihoods and reduce poverty by developing and strengthening community-based approaches to manage tank systems	b) Community-based Integrated Tank Management Act (under preparation)
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In Karnataka

- Weaker sections, and women have reservations in the managing committee, whereas tailenders have effective representation in WUAs as per the model byelaws. However, for federal societies the Karnataka Cooperative Societies Act, 1959, does not allow for such reservation.
- For an irrigated area of 15.28 lakh hectares covered under the CAD and WM Programme (including a few projects now deleted) the government is planning to organize 2910 WUAs. Till November 2005 about 2314 WUAs have been registered and 1184 WUAs have taken over irrigation management. The area managed by WUAs is about 5.73 lakh hectares.
- The existing policy allows a WUA to retain 20 per cent of the volumetric water bill to meet the management cost plus maintenance grant @ Rs.40/ha. After retaining the set-off, the remaining amount has to be remitted to the government agency.
- Budgetary allocation was: Rs 123 lakh in 2003-04; Rs. 181.31 lakh in 2004-05, and Rs 236 lakh in 2005-06.

In Andhra Pradesh

- Permanency to WUA. Amendments have been made to make WUA continuous functional for a six year term for each territorial committee (TC) member of the WUA. Initially one-third of the TC members would retire at the end of two years. Second one-third would retire after four years and the last batch would retire after six years. All the vacancies so caused will be filled regularly. Thereafter each member will serve a term of six years. The provision would bring permanency to WUA.
- Tail reach representation. Position of a vice president is provided. TC members elect president and vice-president. The person will have a two years term. The command area of WUA is broadly divided into upper and lower half. If the president is from the upper half, then the vice-president will be from the lower half and vice versa.
- Fixed size. The extent of command area for WUA in major projects is limited to 1600 ha and WUA shall have a fixed number of TCs six in minor projects and 12 in medium and major projects.
- Keep MLA/MP away. There is a provision of disqualifying members of legislative assembly, parliament and members of the constitutional committees from being elected members of the WUA. However, in the act/draft bills of Maharashtra, Gujarat, Rajasthan, and Madhya Pradesh, there is no such provision.
- Co-opting members of PRI bodies. The government of Andhra Pradesh has recently (ordinance issued in 2002) decided to co-opt office bearers of panchayat raj bodies, MLAs, and MPS into the managing committees of WUAs with no rights to vote.
- System repairs by WUA with water fee retention funds. WUAs are permitted to take up O & M works only with the water fee retention amount, with the upper limit of Rs. 1 lakh at a time. Works costing more and with higher technical know-how have to be done by WRD.

Though WUA members have received a copy of the APFMIS Act which clearly mentioned their roles and responsibilities, they hardly go through it. They are not motivated in following the roles as given in the act. Out of 57 WUAs visited (in Andhra Pradesh) no WUA has asked its share of water from the distributory / project level committee. The upper tier which can monitor these works of WUA does not exist and hence WUAs are not performing their duties as responsible as they should be. Presently, none of the states in India has made legal provisions that are complete.

D4 What IWRM principles have been included (e.g., Dublin and/or GWP; see principles in part II)..

Not included

D 5a. Is there an adequate understanding of the constraints in the planning documents – political, financial and managerial to effective implementation? [Argue for your point of view.](#)

During discussions with concerned officials of various departments they do identify various issues as lacunas of management, financial inadequacies, political interferences, corruption, technical problems and social issues. For example – violation of cropping pattern is oft repeated by the officials, tail end farmers complain of inequity etc. All these issues are discussed but there has been no integrated effort to curtail them at a basin level.

D5b Where such constraints have been identified, are appropriate measures for overcoming them proposed? [List constraints and describe measures](#)

Constraints have been identified at various points of the basin, however it is dealt by various agencies depending upon the issue.

1. Pollution is a major issue. Pollution Control Board is responsible for collecting samples and test them, the results are documented at the local level at regional offices across the basin and sent to the main office at Bangalore. Warnings are given to the concerned polluters. But there has been no effort to analyse and understand the trends in pollution levels which is a constraint for future planning or to take adequate steps to curtail pollution.
2. Impacts on health have not been studied at a basin level except for few studies undertaken by few researchers and civil society organisations.
3. Violation of cropping pattern and not able to adopt right measures.
4. Co-ordination across departments are poor.
5. Inequitable distribution of water and upstream and downstream conflicts.

D 5c. Is there adequate monitoring to assess whether implementation is in line with plans? [What monitoring has been prescribed?](#)

- Monitoring has been prescribed but most of the times monitoring methods do have loop holes. For instance, industries let effluents adhere to the norms of the Pollution Control Board but they still affect the people and environment.

- In few other cases, monitoring is prescribed but implementation remains poor. Issues on encroachment, violation of cropping pattern, pollution, water sharing are prominent ones.

D 5.d are finances established to ensure monitoring?