

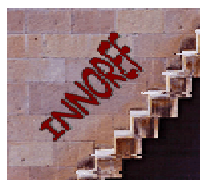


EFFICIENT  
WATER  
RESOURCE  
USE

## E.W.A.R.U. Efficient Water Resource Use

# ANNEX N.7 WATER MANAGEMENT PLAN DRAFT

JANUARY 2007





## CHAPTER 1

### WATER FRAMEWORK DIRECTIVE AND PUBLIC PARTICIPATION

EU Water Framework Directive (WFD) implementation Public participation: allowing Stakeholders and the broad public to play a key role influencing the outcome of plans and working processes

The key objective of the European Water Framework Directive (WFD) is to promote sustainable water use by protecting water resources.

EWARU, INNOREF Sub-project, aimed at developing the potential of project financing for improving the efficiency of water collection, distribution and use, investigates also how the economic consequences of a set of water management regulations (i.e. in the partner regions) is received by a group of stakeholders in the partners catchment areas. The main item to explore have been identified and synthetized in three themes from an economic point of view:

- i) perceived causes of eutrophication;
- ii) preferences regarding water use;
- iii) the extent to which the polluter-pays principle should be applied.

Therefore, a context analysis is being carried out in order to provide a common action framework to the four partners and to outline the specific conditions at which the general participation process can be carried out efficiently in the various regions.

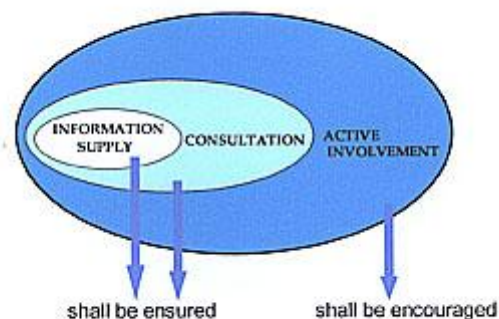
There is a common understanding about the intentions in the WFD to enhance cost-effective water use. All stakeholder groups largely share a similar picture of the causes of water quality deterioration. However, there is not one cost-effective and fair solution. Several mixes of remedial measures within the same catchment are possible, depending on the scale of action. Despite potential economic gains from cooperation between sectors, the participants regard the individual polluter-pays principle as the most feasible mode of funding for remedial programs and efficiency improvement, supported by a project financing scheme. There is little demand for more market institutions (emission fees, tradable emission permits). The stakeholders have a conservative view of water management, i.e. they accept the present combination of regulations and economic costs, and they are fully aware of the complexity of the issue. In general, the WFD recommendations for the calculation of cost-effective abatement strategies seem to imply an underestimation of the value of external effects in the decision-making process

There are many reasons to start a public participation process. The key benefits include:

- better-informed and more creative decision making;
- increased public acceptance, less litigation, fewer delays and more effective implementation;
- more open and integrated governance and more transparency in the planning process;
- a broader knowledge base through the use of stakeholder's knowledge and experience;
- promotion of social learning through a constructive dialogue in which all relevant parties involved - the various publics, governments and experts - learn from each other.

The WFD, therefore, brings new and innovative concepts to sustainable water management in Europe. Although some provisions concerning public participation are contained in Annex VII A. 9 and 11, the starting point for the consideration of participation is found in Article 14 of the WFD which provides that:

- *“Member States shall encourage active involvement of all interested parties in the implementation of the Directive, not only regarding the development of a river basin management plan, but from the very beginning of the implementation of the WFD (transformation into national laws, characterization and analysis of water bodies, establishment of monitoring programmes, development of the programmes of measures)”*.



Requirements of Article 14 WFD (Public information and consultation)  
Reference: Guidance on Public Participation in relation to the Water Framework Directive, December 2002

- *“Member States shall ensure a three-phased public consultation process on the RBMP by:
 
  - allowing the public to participate in the drafting of the timetable and work program (due by December 2006), in the identification of significant water management issues in the river basin (due by December 2007) and in the drafting of the river basin management plan (due by December 2008);
  - allowing a six-months´ period for comments in each phase;
  - changing the relevant documents taking into account the received comments”.*

Throughout the process, the public should be provided access to background documents and information. In order to provide specific guidelines on the implementation of this Article, the "Guidance on Public Participation in Relation to the WFD" was developed under the Common Implementation Strategy for WFD. The Guidance is a horizontal document, which means that it is also of relevance for other guidance documents, designed to guide and steer the implementation of the WFD. However,, the Guidance for Public Participation can not be seen as a "blueprint" because political, organizational and cultural conditions differ between river basin countries. Therefore, the main aims of the Guidance for Public Participation are

- to create a common understanding regarding public participation;
- to illustrate the usefulness of public participation from the beginning of the implementation of the WFD on. Public participation must be seen as a benefit rather than a hindrance;
- to analyse the provisions of Article 14 WFD in detail;
- to provide advice on how these provisions can be implemented in practical terms;
- to highlight the need to evaluate the participation process together with the participants in order to improve the quality of public participation;
- to identify key success factors regarding effective public participation (such as political commitment, capacity building, mutual respect, flexibility, valuing diversity of knowledge).

It is obvious that public participation has to be organized in the river basin districts. In international river basins a lot of coordination is necessary to harmonize the activities with regard to public involvement on the different levels, i.e. international, national, regional and local.

Key questions and answers provided by the Guidance Document:

What is public participation?

Allowing the public to influence the outcome of plans and working processes.

Who should participate?

The broad public as well as stakeholders, based on a detailed stakeholder analysis.

What is access to background information?

The WFD requires access to background information, which means sufficient information supply in the different implementation steps (via brochures, websites, etc.).

What is consultation?

The lowest level of public participation, which is based on information supply. Consultations include the providing of documents for comments, the organization of public hearings, etc..

What is active involvement?

A higher level of participation, which implies that stakeholders are invited to contribute actively to the planning process by discussing issues and proposing solutions.

## WATER MANAGEMENT IN ITALY

### 1 Historical and Administrative Aspects

At the beginning of the twenties and thirties, on the basis of the R.D. 30/12/23 n. 3267, a great number of institutional interventions for the management of the territories within mountain watersheds were put in action through hydraulic-forest works for the stabilisation and control of the slopes, reforestation and hydraulic works for the control of the torrent (bank defences with dry and concrete walls, transversal check dams built with stones) and construction of embankment structures, already started in the previous centuries along the main rivers were continued as well.

The hydraulic-forest rearrangement activity pursued till the fifties and sixties when the construction of new works was almost stopped in the mountain portion of the watershed while in the lower portion of the hydrographic network big embankment structures, bank protection works and, in some cases, the complete covering of the river banks were made along the river stretches close to urbanised areas.

The negligence and lack of maintenance of the existing works during the last thirty years has caused the deterioration of the previous interventions in the upper part of the watershed with the collapse of the oldest structures along the torrent stretches interested by strong hydraulic conditions and/or instability of the slopes and of the torrent beds.

The progressive deterioration of the works made in the previous period was favoured by the separation of competencies regarding the hydraulic management of the territory among many different Authorities. In the last years, the State law n. 183/89, regarding the soil defence has overcome the problems concerning the correct management of the hydrographic network by establishing a global policy for the defence of the territory and by the identification of the watershed in the organic unit for the reduction of the hydraulic and hydrogeological risks in order to carry out physical studies of the watershed that can identify the necessary interventions.

The management of the watershed is entrusted to the Basin Authority that handles the State financing the studies and interventions.

The same principle that identifies the watershed as the physical unit for a correct management of the territory (law 183/89) drives L.R. 36/94 about the global management of the water resources.

Water resources and environment management are typically of the competence of the Ministry of Environment while land use planning the Ministry of Environment share responsibilities with Ministry of Public Works.

The Italian legislative framework foresees a national co-ordinating action through laws and directives that represent a point of reference for the legislative action of the regional institutions.

Each regional administration, on the basis of these national guidelines, has the power to make its own regulations in different matters. In particular, on the basis of the National Law n. 616/77, the competencies in matters concerning agriculture, forestry, water resources, pollution, land use planning, hydraulic risks, land reclamation etc were transferred from the State to the Regions.

Local administrations, namely Provincial and Municipal administrations prepare and actually carry out local management plans in accordance with the main regional plans that gives general and some peculiar indications on the management of the territory.

Three other institutions operate on the territory with different functional tasks:

- § In hillside and mountain areas, a series of municipal administrations act together by forming Consortium of Mountain Communities, that manage activities principally in matters of agriculture, forestry and hydraulic interventions.
- § In flood-plains areas and where the Consortium of Mountain Communities are not in charge, Land-reclamation Syndicates carry out the planning, construction and management of works of land-reclamation and soil defence on one or more hydrographic watershed.

§ National and Regional Parks are managed by specific entities called Park Authorities which must always be consulted by the Institutions (Regions, Provinces, Municipalities, River basin Authorities and Land reclamation Syndicates) when dealing with any type of intervention on their territory.

The evolution of water policies reflects the process of change occurring at the institutional level of the country. Italy in fact is facing a gradual process of institutional decentralisation which started with the creation of the Regional (1972-1978), and which evolved towards the progressive empowerment of the Regions and of the Local Authorities (Law 112/99).

## 2 Watershed Legislation: Law 183/89

National law 183/89 "Norms for the organization and functional realignment for the defence of soil" has the object to assure the defence of the soil, the cure of the waters, the correct use and management of the water resources for a rational, economic and social development, and for preservation of the related environmental aspects.

To reach such objectives, the national territory is divided in watersheds of national (PO, Adige, Arno etc), interregional (Magra, Reno etc) and regional significance, that define organic areas of study and intervention.

The operating tool with such hydrological homogeneous areas represented by the Basin Plan, that constitutes the cognitive, normative and technical-operational base that programs the norms and actions for land use management and correct exploitation of territory in relation to the physical and environmental characteristics of the basin. Local administrations must respect the indications fixed in the Basin Plan especially regarding land use management.

Among the different sectors of intervention of the Plan, one part concerns hydraulic risks and another one the hydrogeological risks.

The Law provides that planning and carrying out of interventions must be directed towards:

- § Defence, re-arrangement and regularization of the torrents;
- § Moderation of the floods events and reduction of the inundations risks;
- § Re-arrangement and conservation of the soil with hydraulic, hydraulic-forestry and forestry interventions.

Financial resources for the planned interventions are given by the State and are assigned by means of triennial programs of intervention for soil defence.

### 3 The Galli Law (36/1994)

This Law make sure that the government, organisation and control functions in each Optimum Territorial Area are performed by local authorities working in association, under the co-ordination of the Province with the biggest interest in order to guarantee the unitary management of services.

The introduction of the 1994 Galli Law has rationalised the Italian water industry from a state of extreme fragmentation and has given to the Regions the responsibility for restructuring and regulation. Thanks this law the water cycle is managed by a unique body in more efficient and economic way.

For this reform process the general management and control tasks have being performed by Central Government, whilst the Regions and Local Authorities (Provinces and Municipalities) are responsible for defining and adopting the most suitable solutions and organisation models for their individual, and often very different territorial situations. Specifically, the Regions are responsible for:

- delimiting the optimum territorial areas (ATO – Ambito Territoriale Ottimale) on the basis of which the water services will be reorganised;
- defining the forms and methods of cooperation between the local authorities within the ATO;
- defining the rules (adopting a standard agreement and the corresponding conditions) on the basis of which the local authorities in the ATO will entrust the management and the integrated water service to public or private bodies;
- updating the planning and programming instruments concerning water resources and issuing directives for the preparation of the investment plans for ATOs.

#### 3.1 State of implementation of the law 36/94

Rules and regulations have been defined at national level for a standard method for determining tariffs. These are indispensable for application of the Galli law, since all the investment and the costs of service provision have to be covered by revenue generation from the tariffs themselves. The legislation does not provide for any funding from the central taxation system.

The most important new feature is the separation between the owner of assets, which are public, and the manager, with the allocation of distinct tasks and functions. In the ATOs defined by Regions, local authorities will have to form associations or consortia to guarantee the unitary government of the services. The new organisation of the service includes a “Management Agreement” to be signed by the associated Municipalities and the management responsible for the operative performance of the service (consortium, public or private limited company, concessionary).



The essential tool for operation of the services is the definition of a technical and financial plan (Piano d'Ambito) by the local associated bodies. This must include:

- state of the infrastructures and services
- new service standards and the investment necessary to achieve them
- schedule for implementing the investments
- minimum increases of productivity
- tariff and the method of adjusting this in relation to the improvements in service obtained.

## 3.2 Organisation of the ATO

### Role of the Province

- Coordinating functions of the ATO
- Organise the Conference of the mayors
- Stipulate agreements of management
- Adopting initiatives and measures of competence of the ATOs

### Role of the Conference of mayors

- Programming
- Control
- Planning
- Determination of the charges

### Role of the ATO Committee

- Support of the conference of mayors

### Role of the Technical Secretariat Office

- Information, help and support to local authorities
- Monitoring of quality service
- Elaboration of data and results
- Economic and management control

Preparation of technical proposals

## 3.4 D.L. 152/99

Defines and integrated action picture for the aquatic ecosystems protection-

- ✚ Unifies all the norms for preventing waters from pollution and for the implementation of the Council Directive 91/271 on urban wastewater treatment and the Council directive 91/676 on the water protection against pollution caused by nitrates from agricultural sources

- ✚ Foresees a water body monitoring network including some biological parameters. The regulation includes a protection plan whose objective is to achieve good water body quality status by 2016, similarly to the WFD concept.

### 3.5 Decree 152/2006

Although the new Environmental Code laid out in Decree 152/2006 was adopted just before the general election of 2006, Italy now has a new Environment Minister, who is leader of the Green Party. Not surprisingly, Mr Scanio's first act as minister was to declare that he would seek a way to suspend the Decree before it could have 'damaging consequences' on the environment. The minister has already appointed a study group to work on modifications to the vast and complex decree.

In practice, this could be very difficult, as Decree 152/2006 abolished many of the old provisions that would have made modifications possible. Furthermore, many new regulations based on the Decree have already been adopted. In fact, the government would probably have to publish a new Decree which would:

- § suspend or revoke Decree 152/2006, while retaining the few good provisions;
- § reinstate previous framework legislation (such as the 'Ronchi' Decree), modifying and updating it as necessary;
- § revoke regulations made under the auspices of Decree 152/2006;

The present situation is causing considerable confusion to all, including industry groups such as packaging recovery consortium Conai, who are doing their best to comply with new regulations while waiting to see what happens.

### 3.6 Conclusions

The complexity of public participation is at the same time its most problematic feature and a great potential of enrichment, as it constitutes a capability of bringing together contrasting views and necessities. Due to its complexity, public participation has to be institutionalised, modelled and administered; this is the only way to guarantee it is efficient and operative. The necessity to submit concrete proposals have been put forward to Italian policy makers in order to promote public participation in the water sector. First of all, representative bodies of all the stakeholders should be established in each watershed district, with at least a consultation role. The dialogue has to be pursued by scheduling regular meetings with the competent authorities. Subsequently, in order to model and organize the public participatory systems, new expertise, funding and budgeting have to be employed. An accurate and institutionalised evaluation process has to be established and organized in order to constantly monitor the correspondence between planning and results achieved. This can be achieved with the support of economic tools (i.e. sustainability final balance), and with technological and interactive systems (i.e. GIS). Last but not least, professional training of experts and administrators must not be disregarded

However, to cover the gap of inefficiency where the Italian water sector has been left in the previous years, Italy has to begin with legislative reforms and innovations and, above all, the implementation of the WFD. Italy has not completely transferred the WFD into its legal system. The proposal focuses on the redistribution of administrative and managing powers among public bodies in charge of water management, and aims to strengthen the role of the River Basin Authorities as optimal management units. This redistribution will allow the unification of planning power (now detained by the River Basin Authorities) and power of administer and manage water and land (now fragmented among different regional and local public bodies), the first step towards the establishment of an IWRM system. The Regions seem to be the most appropriate administrative public bodies to promote such action, and to move the Italian water management system towards the implementation of the WFD.

## National Framework

### 1.1 National Policy and Regulatory Framework

Greece is generously endowed with freshwater resources. Some 85-90% of freshwater resources are in the form of surface water and 10-15% are groundwater. Mean annual precipitation is about 700mm, of which nearly half is lost to evaporation. However, freshwater resources are unevenly distributed throughout the country, and as such a reliance on infrastructure has been seen and continues to spark controversy across the country. Intensity of water use is 12%, slightly above the OECD average. Around 87% of total freshwater withdrawals are used for agriculture. Main water quality problems - although not severe - include eutrophication of lakes, high nutrient concentrations in water bodies and salt-water intrusion in groundwater.

The Greek environmental policy and legislation is deeply influenced by the Community environmental legislative measures and policies. Consequently, the domestic environmental policy has been so far a hard regulatory one. However, the recent shifts at the European level, combined with the undergoing changes in the domestic administrative, economic and societal models and behaviours has led the Greek environmental policy in a stage of transition. However, the EU Directives and guidelines are only partially embedded in Greek laws and policy measures while command and control, regulatory approaches are still dominant. The available legal instruments are binding land use-plans, installation and building permits and emission, discharge or operating licences, while more innovative, sustainable or market-based practices are still unknown. Additionally, the fragmentation of responsibilities at central level, as well as the lack of co-ordination between ministries with conflicting interests and overlapping authorities characterise the Greek environmental policy. The most important domestic laws are presented below:

#### Law N.1650/1986 on Protection of the Environment:

This document has a declarative character and various imperfections, as it needs regulatory decisions to be enforced. However it is the basic environmental law of the state. Concerning the water, Article 1 of N.1650/1986 refers to the target of water policies being '...the assurance of the possibility of natural recharge...the protection of surface and ground waters...the specification of the quantitative and qualitative standards for water bodies as well as the allowed volume and quality of discharges with the use of suitable parameters, indicators and marginal values...'. Article 9 refers to the necessity and means of monitoring water quality while Article 10 attempts a description of the policy instruments to be used. The problem of monitoring and protecting the environment through the instalment of waste treatment plants is discussed in Article 16.

### Law N.1739/1987 on Management of water resources:

It attempts the systemisation and rationalisation of the water resources legal framework. The legal document divides the Greek territory in 14 water units according to their geographical, morphological, climatic and hydrological features. In that way, the efficiency of surveys and regional planning and policies, is considerably increased. Likewise, the areas of Ministerial responsibilities are defined, based on the water use. Although important, law N.1739/1987 hasn't been enforced yet. Moreover, the structure of the document is weak as it concerns ground and surface waters in 10 general, without distinction between their quality, quantity and potential uses.

### Law N.1069/1980 on the establishment of municipal drinking water corporations:

The document settles matters of drinking water supply and sewage by issuing water permits. According to that law '...every legal and/or physical person is entitled to use water under the condition of issuing a permit by the relevant authority...' The permit determines the quantity, the prerequisites and the conditions of use and it is confined to the maximum of the real needs of the person. Such permits are not needed for private or household use. The rest of legislation about the drinking water is reflected by regulations contained in Ministerial Decisions (YA), which embody the EC Directives setting up quality standards, critical loads, uses of surface waters etc. Worth noticed is the YA A5/2280/1983, which takes strict measures, to prevent the pollution of water used for watering Athens.

The rest of legislation about the drinking water is reflected by regulations contained in Ministerial Decisions (YA), which embody the EC Directives setting up quality standards, critical loads, uses of surface waters etc. Worth noticed is the YA A5/2280/1983, which takes strict measures, to prevent the pollution of water used for watering Athens. Drinking water quality in Greece is within the limits of the EU legislation (EYDAP, 1999). In fact, recent studies have shown that the drinking water quality consumed not only in the two largest Greek cities -Athens and Thessaloniki- but in other areas as well, is extremely high, and compared with other European states. Furthermore, water sampling and monitoring are satisfactory and efficient. Besides the drinking water, 23,312 samples taken from Greek beaches during the year, indicates that the overwhelming majority (98.84%) of the Greek bathing waters are being in harmony with the EU limits.

An effective institutional framework and an executive instrument are needed to materialise the existent environmental policy measures. It is indicative that the Greek Ministry for the Environment, Spatial Planning and Public Works (YPEHODE), empowered with the formulation and implementation of environmental policy, has been characterised as a 'weak' ministry, since it does not have exclusive competence over environmental issues nor concentrated environmental responsibilities. Moreover, a public company such as EYDAP, although controlled by the State, mentions the environment rarely. However, it is true that in recent years, the natural environment has become a factor of increased importance and nearly all new watering plans take under consideration the environmental impact of construction works, abstractions' environmental

costs, conservation of biodiversity, protection of the aquatic environment, 'sustainable use of water' as defined by world organisations and EU etc.

Table1 : Division of Ministerial Responsibilities (**Source: Skourtos and Makri, 1997**)

Ministry	Responsibility
Ministry of Agriculture	Agricultural Uses (irrigation, livestock, aquaculture etc.)
Ministry of Interior	Drinking water supply (Athens and Thessaloniki excluded)
Ministry of Environment and Public Works (YPEHODE)	Protection of water quantity and quality
Ministry of Development	Industrial and energy uses, other uses not allocated otherwise.
Ministry of Transport	Transportation use of water bodies
Ministry of Culture	Sport, recreational and medical uses

## 1.2 Implementation of WFD in Greece

### 1.2.1 The Law 3199/2003

Since December 2003, a new legislative and institutional framework has been put into force in the country. It consists of Law 3199/9-12-2003 (OJG 280A/2003) on "water protection and the sustainable management of the water resources" with which the EU Water Framework Directive (WFD) (2000/60/EC) is transposed into the national legislation. This new framework Law foresees a radical reorientation of the respective administrative capacities in Greece and introduces an innovative and holistic approach concerning water management that recognizes explicitly the ecological function of water. It also lays emphasis on the management of water on the basis of river basins as well as on the water pricing so that it reflects its full costs. In more detail, the main objectives of the new Law include:

- the long-term protection of water resources,
- the prevention of deterioration and the protection and restoration/remediation of degraded water resources and wetlands,
- the reduction and, in cases, the phase out of harmful and polluting discharges,
- the reduction of groundwater pollution and the prevention of its further deterioration, as well as
- the mitigation of the effects of floods and droughts.

The 3199/03 Law also incorporates the 'polluter pays principle' and the objective of maintaining or reaching a 'good ecological status' for all water resources through the control of pollution by use of thresholds levels and standards. It also introduces innovative approaches concerning the protection of water quantity and the transnational cooperation for the protection of transboundary water courses and lakes. The new legislation for the protection and the sustainable management of the water resources in Greece, provides a detailed identification of 13 River Basin Districts (RBDs) according to the administrative units of the

country, the competent authorities and their respective responsibilities in water management in Greece. In this context, Regional Water Directories and Councils will be established within each River Basin District / Water Region (RBDs) and they will have the responsibility for organising and coordinating water policy activities (including water pricing) and specific Water Programmes and Action Plans with specific measures for each RBD. They will be in charge for implementing the WFD in the RBDs of the country and they will be supervised by the National Water Agency, a governmental authority with the overall responsibility for establishing water policy. In the new legislation there is also consideration about the most effective options for setting up legal coordination mechanisms relating to the designation and management of the River Basins that cross the Water Region borders. The appointment of the new authorities will be legally binding once it is integrated into the new legislation.

The 3199/03 Law also integrates the public participation requirements of the WFD. The active involvement of the interested parties is ensured by their representation at the National and Regional Water Councils that will be developed as a part of the new administrative framework. In order to complete the transposition of the WFD, besides this new law, further instruments, Presidential Decrees and Joint Ministerial Decisions are under preparation, for the incorporation of the technical provisions of the Directive.

### 1.2.2 The implementation problems

#### a. Integrated management of water resources

In Greece, there are no formal water resource management structures. The 2003 law transposing the WFD assigned responsibility for river basin planning and management to the regional authorities under whose territory lies a river basin. In reality, implementation has been centralized. The State designs, finances and constructs waterworks and delegates their use and maintenance to municipalities or irrigation associations. Water agencies in small municipalities are independent public entities, headed by the vice-mayors and with a staff of 2-3 people. Water allocation and network development policies are ad hoc, responsive to demands and governed by personal relations.

During the first phase of the WFD implementation in Greece, the main problems encountered were related to compatibility issues with current administrative bodies and lack of information and data, especially for biological quality elements. This, consequently, has created difficulties in the definition of reference conditions and the development of classification systems. In describing the Greek water resources management context, the most pressing issue seems to be that there are many government departments dealing with water problems, but their activities are not well coordinated.

The existing management of water resources is therefore neither integrated nor adequate. The Law on "Management of Water Resources" (Law 1739/87) divides the national territory into 14 water districts and foresees the establishment of regional authorities for the management of water resources within the

boundaries of each district. Still, this Law was never fully implemented, as the various Ministerial decisions and Decrees required for its activation were never issued. The main weakness of this Law was the division of responsibilities for water management resources into a number of different authorities and Ministries.

Also, the water law system is old-fashioned and widely scattered, thus permitting overlapping functions, multiple advisory bodies and insufficiently decentralized management responsibilities through regional organizations. The law tends to be also deficient in case of pollution issues, where quality standards for water bodies and/or effluent have not been clearly established. Furthermore, the sporadic consideration of water quality from a policy point of view and the absence of systematic, uniform and enforceable pollution charges have compounded problems of integrated water management.

Finally, an important problem relates to the fact that Greece shares water with neighbouring countries. Greece is in most cases the downstream country, hence having additional constraints for the development and management of such water resources. Greece shares five rivers and three lakes and has signed a number of bilateral agreements and protocols addressing water management issues with neighbouring countries, which, however, are still pending with regard to various water uses, as well as water discharges and water quality levels for the watercourses crossing the Greek frontiers<sup>1</sup>.

All of the above imply that in Greece there are not only continuous conflicts at all levels (individual, local, national, and trans-national), but that incongruence and conflicts will further increase as demands change and the social structure of the country transforms. Such observations are reinforced by increasing demands, misuses and abuses of water arising from rapid urbanization, industrialization, uncontrolled agricultural practices and the overall economic pressures from rising standards of living. Thus, present and potential future conflicts become the driving reasons for a comprehensive framework of integrated planning and management of water resources and for developing an institutional framework in order of properly implementing conceived and articulated resource policies.

#### b. Public participation in water management

There is no essential contribution of non-governmental stakeholders in freshwater management. Information provisions on decision-making processes related to freshwater management is insufficient – information is not proactively provided and procedures to get background documents are quite time-consuming. Wide public consultation and active involvement in decision-making about freshwater management is quite limited, as no timely and transparent

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<sup>1</sup> Still, the establishment of the Prespa Park, on 2 February 2000 (lying between Albania, the Former Yugoslav Republic of Macedonia and Greece) was a significant step towards the joint management of a transboundary river basin. Since the establishment of the Park, trilateral, basin-wide institutions have been set up aiming to promote the sustainable development of the region and actions are being taken in order to lay the foundation for trilateral formal agreements on water management in Prespa.



consultation process is followed. There is a need for the establishment of open public participation procedures regarding water management issues.

Furthermore, the Ministry of Environment contracted private consortia for the collection of data and the drafting of river basin plans. However, the process of defining the boundaries of river basins has not been yet completed. To date, neither the Ministry nor any of the Regions have expressed intentions to extend public participation beyond the conventional administrative processes of public notification on new plans and open invitations to submit comments [EEB, 2005].

#### c. Wetlands management

The management of wetlands is not satisfactorily integrated into freshwater management. The importance of wetlands is recognized and a National Strategy for Wetland Resources has been developed. However, this Strategy is not legally-binding, it is not used as a central policy reference point, and therefore is not being implemented on a national level. A positive development is the recent formulation of management bodies for 25 Greek protected areas (June 2003). It is therefore deemed necessary that a formal National Wetland Strategy document is adopted and used as the basis for wetland management.

#### d. Important Impacts on freshwater ecosystems

Overall, pressure on quantities of water resources is moderate in Greece, but there are severe water shortage problems, especially during the irrigation season, when about 87% of total freshwater withdrawals is consumed by agriculture. The existing approach to alleviate the problem – based on increasing water availability through large-scale exploitation of groundwater and building of storage and water diversion infrastructures – has high environmental costs and is not delivering sustainable solutions. There is no complete national overview of the quantitative water use related to irrigation and other agricultural activities, essential to design a credible holistic strategy. The existing legal and financial instruments are not sufficient to tackle the problem, and their correct application on the field is not efficiently monitored. Information/voluntary instruments should be applied more widely and their effectiveness should be periodically assessed for their continuous improvement.

Water quality in Greece is quite good. However, the intensive and unwise use of fertilisers and pesticides has resulted in the deterioration of ground and surface waters in certain areas of the country. Various projects are implemented for the identification of the root causes of quality problems in certain regions and the proposal of appropriate solutions. Still, an integrated approach should be applied. Although good legal instruments exist (e.g. the Joint Ministerial Decision “Terms and measures for the protection of waters from nitrogen pollution caused by agriculture”), these are not extensively applied and their correct implementation on the ground is not adequately monitored. In addition, there is a need for the implementation of economic instruments, which promote the

reduction of water pollution caused by agricultural activity, and which at the moment are only rarely and occasionally used.

Currently 15 big and nine small hydro-electric power plants are operating in Greece mainly aimed at energy production, irrigation purposes and flood protection. Until recently the Public Power Corporation was responsible for their construction and operation, now private investors can also be involved. The negative impacts of such infrastructures have been identified as: the alteration of river hydromorphological processes and ecosystem balance, as well as the alteration of the landscape and the socio-economic activities. It is important to ensure that measures for the mitigation of these impacts (e.g. fish ladders or passes, minimum flow regime, etc.) or for monitoring the effects of existing dams on the environment are systematically applied.

### 3. Regional Framework

The river basin of Western Greece is one of the 14 river basins in which the Greek territory is divided for administrative purposes. It includes three main river basins (Acheloos, Evinos, and Mornos) of a total catchment area of 6891 km<sup>2</sup>. River Acheloos is the river with the highest flow in Greece (4000 Hm<sup>3</sup> / yr). Rivers Evinos and Mornos are diverted for the water supply of Athens.

Western Greece includes Lake Trihionida, Lisimachia, Ozeros and Ambrakia and the Ramsar Convention protected area of the "Messologhi Lagoons". It is the second most water abundant region in Greece, but also the least populated (total population 304,701) and the second least economically developed (80% of average national regional GDP). There are problems with the allocation of water between local communities, farmers, the National Power Production company and distant regions which want to divert the regions' waters for their own benefit (Athens, and Thessalia which wants to divert river Acheloos for irrigation purposes). Pollution from agriculture and untreated sewage, reduced flows from abstractions and urbanisation are damaging unique ecological sites protected by international conventions. There is a need for a more rational and integrated management of water resources with preservation of environmental values. For this it is necessary to increase collaboration and understanding between different stakeholders.

### 4. Experience of Integrated Water Resources Management in Greece: The Pinios Pilot River Basin Project

#### a. Description of the Initiative

Since December 2003, a new legislative and institutional framework has been put into force in Greece. It consists of Law 3199/9-12-2003 (OJG 280A/2003) on the "protection and the sustainable management of the water resources" with which the EU Water Framework Directive (WFD) (2000/60/EC) is transposed into the national legislation.

Within this innovative institutional and legislative framework, the Pinios Pilot River Basin Project (Pinios PRB) is being implemented; The overall aim of this Project is to

identify the technical and management problems that may come up in real cases of the WFD implementation in the country and to develop pragmatic solutions for their addressing, to test the practicability and efficiency of the technical and supporting Guidance Documents on key aspects of the Water Framework Directive before they are widely applied in the country, to attain a concrete example of the application of these technical Guidance Documents and to inform the interested parties on the implementation of the WFD, through real circumstances, allowing the stakeholders (including local and regional authorities) to learn and be involved in the process from an early stage. The project commenced in mid-2003 and is expected to run for 4 years (until the end of 2006).

Pinios River (216 km) is located in the central section of mainland Greece, in Thessaly (Thessalia) Water Region. The total surface area of Pinios River Basin is 10.550 km<sup>2</sup>. The number of inhabitants in the area is about 700.000. The main economic activities are agriculture, industry, tourism, breeding, fisheries and forestry. Water used for irrigation reaches 96% and for water supply 3,3% of total water consumption. Total water availability is about 3.209 hm<sup>3</sup> and consists of 2.596 hm<sup>3</sup> surface water and 613 hm<sup>3</sup> groundwater.

Pressures in the surface, coastal and ground waters in Pinios river basin are being exerted from point and diffuse pollution sources, the over-exploitation of groundwater during the summer irrigation period, the water abstraction for irrigation purposes, channels for flood protection and tourist infrastructure in the coastal area. The surface water quality in the river basin is generally in good condition and only in a few sampling sites the nitrites and the pesticides show elevated levels. Concerning the groundwater, nitrate and ammonium exceed, in some cases, the critical value for drinking water.

The Hellenic Ministry for Environment, Physical Planning and Public Works is supporting the Pinios Pilot River Basin project (directly or through other on-going projects) financially with the amount of around 1,000,000 €; 600,000 € are part of the overall budget for implementation tasks of WFD in Greece whereas additional funds from other on-going and scheduled activities /projects, at national and regional level, will also be allocated.

The Hellenic Ministry for Environment, Physical Planning and Public Works and the Regional Directory of Planning and Development in Thessaly are jointly promoting and implementing this project. Active involvement of all stakeholders throughout project implementation is ensured through the participation of all local and regional authorities, NGOs, Educational Institutes, scientists, the Greek Biotope-Wetland Centre, WWF, MedWet, regional agricultural administrations etc, in the working group that has been established.

Such a holistic and participatory approach is expected to add real value to national efforts for IWRM through introduction of innovative schemes, both from an administrative but also from a scientific and social-participatory point of view. Through implementation of this project the capacities and understanding of both local and central governments as well as of stakeholders is expected to be further developed, having a significant contribution to reaching the Johannesburg targets and the MDGs.

## b. Mainstreaming – Sustainability

The targets of the National Strategy for Sustainable Development (NSSD) (2002), regarding the management of water resources, are set out in the National Strategy for Water Resources (NSWR) (2002) and aim at the sustainable use of water resources, the efficient protection of water ecosystems and the attainment of high quality standards for all surface and ground water bodies by the year 2015. The basic objectives of the NSWR, include: promotion of an integrated approach for water management at river basin level (nation and transboundary) and protection of water quantity, decentralization of water management authorities-bodies, upgrading and expanding of infrastructure (including monitoring, data banks, modelling etc), incorporation of socio-economic considerations in water management as well as protection of water resources against pollution.

In line with these broad objectives, the Pinios Pilot Project has been fully mainstreamed into national planning as a front runner effort, with secured funding (see above) that will provide valuable experience and know-how for applying innovative approaches for IWRM, throughout the whole country, as a next step.

## c. Replicating the Initiative

Once the project is completed, the results will be readily applicable to all other river basins in the country. Moreover, experience gained from implementation of this pilot project is being widely diffused both within Greece and amongst other partner countries of Greece's broader geographic region, through bilateral cooperation and experience sharing.

The lessons learned from this project are many and, broadly, regard identification of deficiencies or lacks in the existing mechanism for IWRM and for implementing the WFD in Greece. More specifically, during the first phase of the WFD implementation in Greece, the main problems encountered were related to compatibility issues with current administrative bodies and lack of information and data, especially for biological quality elements. This, consequently, has created difficulties in the definition of reference conditions and the development of classification systems. However, the passing on of Law 3199/03, the establishment of new operational monitoring networks and, most importantly, the implementation of Pinios PRB Project, as a pilot for trouble shooting, will be the best way to identify problems and develop sustainable solutions for their addressing, at an early stage.

## 1. History of the Legislation in the Czech Republic

Water rights and duties in the Czech Republic are stipulated by Act on Waters (Water Act), Act on State Administration in Water Management Sector, and a number of associated legislation acts that constitute an integrated system.

In The Czech Republic water act No. 138/1973 Coll. applied for a very long time. As well as Act No. 130/1974 Coll. on State Administration in Water Management Sector. In the area of protection of the water sources has been existing others regulations, above all law the Act No. 20/1966 Coll. on Care of the Health of the Population, to which already obtained several legal regulations. Above all on the Decree of the Ministry of Health and Head No. 45/1966 Coll. on Creating and Protecting of Healthy Living Conditions was going.

In the year 1979 was approved Directive of Ministry of Health and Head Hygienist – of the main health officer of the Czechoslovak Republic – No. 51/1979 on main hygienic principles for determination and use of protected zones of water resources intended for public supply with drinking and technological water and for establishment of drinking water supply reservoirs – which is still good.

In 1989 after democratic, political and social changes happened, legislation changes in all sectors as well as make alterations to the sector of water management changes was needed. The changes contributed to retrieving the ownership rights and appropriate competencies, changing the price and investment policy of the state (the principle of these changes was based from the Constitutional Act Nr. 23/1991 Coll., which proclaims the Charter of fundamental rights and freedoms from 9.1.1991), and later starting the process of approximation of EC legislation and broader international co-operation and establishing the tools necessary for realisation of the water management policy.

Therefore it was needed to approach the novel of the Water act. The Change in some paragraphs had to be done in short time, so it wasn't possible to wait till the issue of the whole amendment of the Water Act. Regarding these circumstances the process of updating eventualized in two phases named „ small amendment" and „ grand amendment" of the Water Act. Small amendment was related to protect zones of water resources and subsequently to more several troubles (for a total of about 6 § of the Act) and stand good till 6.3.1998 like an Act. No. 14/1998 Coll.

Preparations for a new water law – so - called „ grand amendment" - began in the early 90's. The main need and reason for changes was to clear up ownership relationships toward water, water works, and even land, and the

application of regulations conforming to EU law. After long discussions, the final text was approved on July 25, 2001.

The purpose of this Act No. 254/2001 Coll. is to protect surface water and groundwater, stipulate conditions for economic utilisation of water resources whilst preserving and improving the quality of surface water and groundwater, create conditions for reducing the adverse effects of floods and drought and ensure the safety of water management structures in accordance with European Community Law. This Act also contributes to the protection of aquatic ecosystems and directly dependent terrestrial ecosystems.

The Act regulates legal relationships involving surface water and groundwater, the relationships of natural persons and legal entities with surface water and groundwater utilisation, as well as the relationships with plots of land and buildings directly connected with these waters, in the interests of ensuring sustainable water utilisation, the safety of water management structures and protection against floods and the impacts of drought.

## 2. Water management authorities

### 2.1. Legislation laying down the legal status of competent authorities

Act No. 2/1969 Coll. on the Establishment of Ministries and Other Central Bodies of the State Administration of the Czech Socialistic Republic, as later amended; establish the legal status of Ministries.

The legal status of regional authorities ensures Act No. 129/2000 Coll., on municipalities (municipal establishments).

Legislation laying down responsibility of competent authorities adopted for Water Framework Directive 2000/60/EC

Act No. 254/2001 Coll., on Water and Amendments to Some Acts (The Water Act) as later amendment.

Act No. 274/2001 Coll. on Water supply and sewerage systems for public use and amendments to some acts (Act on Water supply and sewerage systems) as later amendment.

Act No. 258/2001 Coll., on the prevention of public health and on the amendment of some other connected regulations as later amendment.

### 2.2. Execution of State Administration in Water Management

The water authorities and the Czech Environmental Inspectorate execute the state administration. The district hygiene station inspects the quality of surface water determined by a decree for bathing.

The water authorities are as follows:

- a) Ministries, as a central water authority,
- b) Regional authorities,
- c) Authorities of municipalities with extended jurisdiction,
- d) Military zone authorities in military zones,
- e) Municipal authorities,

### Supreme Water Management Supervision

Within the framework of supreme water management supervision, the Ministry of Agriculture and The Ministry of the Environment executes supervision of water authorities and the Czech Environmental Inspectorate in the area of implementation of the provisions of Water Act and the secondary legislation issued pursuant to this Act.

### The Ministry of the Environment

The Ministry of the Environment has been established on 19. December 1989 by the Act No. 173/1989 Coll., like central body of the State Administration of the Czech Republic in matters relating to the environment.

It shall execute the powers of the central water authority in the following matters for example:

- protection of the quantity and the quality of surface water and groundwater,
- monitoring and assessment of the status of surface water and groundwater together with the Ministry of Agriculture,
- production and approval of plans in the water sector and the preparation of the programs of measures,
- assessment of the plans in the water sector in terms of their impact on the environment
- flood control,
- fulfilment of tasks resulting from the relation to European Communities in the area of water protection, submitting reports on the fulfilment of the respective EC directives and co-ordinating the adoption and implementation of EC legislation in the water sector,
- co-ordinating the water management plans and programs of measures as part of the international cooperation in water protection in the Elbe, Danube and Oder River Basin Districts.

Organizations subordinates to that authority:  
T. G. Masaryk Water Research Institute  
The Czech Environmental Inspectorate  
Agency for Nature Conservation and Landscape Protection of the CR  
Czech Hydrometeorological Institute

#### T. G. Masaryk Water Research Institute

The T.G. Masaryk Water Research Institute is the direct successor of the State Hydrological Institute, which was set up in 1919 on the basis of a high level of scientific quality, national interest, and the political attention that is traditionally devoted to managing and treating water in the Czech Republic. Presently the T.G.M. WRI is a partly state-funded organisation under the auspices of the Ministry of Environment (ME). Its main activity is focused on research, conceptual, professional, and methodological activities, including forming and operating information systems, protecting the quality and amount of surface and underground water and its usage in technical, economic, and other relations, and in mutual interaction. It is an objective, professional service provided preferentially to public administration, particularly in accordance with the Water Act and for the creation and implementation of state policies in the area of water.

#### The Czech Environmental Inspectorate

The Czech Environmental Inspectorate is a professional body of state administration, which is charged to supervise observing rules of law in the field of the environment. This body also keeps a watch on observing binding decisions of administrative authorities in the environmental realm. The Czech Environmental Inspectorate was established by the Act No. 282/1991 of the Czech National Council in 1991 and it is an independent budgetary organization subordinate to the Ministry of the Environment of the Czech Republic.

These are five fields of activities carried out by this institution: air pollution control, water protection, waste management, nature protection (conservation) and forest protection.

Apart from other things the Czech Environmental Inspectorate finds out drawbacks or possible damages incurred to the environment. The Czech Environmental Inspectorate also participates in a solution to disasters or accidents, especially in water protection.

#### Agency for Nature Conservation and Landscape Protection of the CR

The Nature Conservation Authority (NCA) is a state budgetary organization, a state organizational body. It was established as the Administration of Protected Landscape Areas of the Czech Republic on March 1st 1995. On May 1st 2004 it became the Nature Conservation Authority by a decision of the Ministry of Environment (No. 1/04, No. M//200174/04). The NCA carries out administration and



management in landscape protected areas, national nature reserves, national nature monuments and administration and data preparation for their designation.

In addition, it provides regional offices with expert, methodical, educational, information and documentation services.

The administration of each protected landscape area represents the state administration body as well as the expert nature conservation organisation for the given territory. For our pilot area it's Administration of Poodří Protected Landscape Area. They carry out essential nature inventories, documentation and nature conservation assessments. Furthermore, they cooperate with research and science centres; provide wardens and conduct information, cultural and educational activities.

### Czech Hydrometeorological Institute

The charter of CHMI was amended in June 1994 and August 1995 pursuant to a decision adopted by the Minister of the Environment of the Czech Republic. The amendment defines the aim, object, and functions of the Institute.

The Czech Hydrometeorological Institute is a central State institute of the Czech Republic in the fields of air quality, hydrology, water quality, climatology, and meteorology.

### The Ministry of Agriculture

The Ministry of Agriculture is a central authority of state administration for agriculture excepting preservation of agricultural land fund, for water management excepting preservation of natural water accumulation, preservation of water sources and preservation of water quality, and for food industry. It is also a central state authority administrating forests, hunting and game keeping and fisheries outside territory of national parks.

Organizations subordinates to that authority:

River basin administrations: Odra River Basin (Baltic Sea)

Agricultural Water Management Authority

### River basin administrations

The overall task of managing any river basin includes the management and administration of the basin's major watercourses and their tributaries. Besides managing and administering watercourses, river basin administrations it also evaluate the state of surface and ground water within our basin and carry out other tasks that river basin administrators are required to do by Water Act No. 254/2001 of the Register of Laws and Regulations, by River Basins Act No. 305/2000 of the Register of Laws and Regulations and by other related legal provisions. Our pilot area falls into the scope of Odra River Basin administration.

## Agricultural Water Management Authority

The Agricultural Water Management Authority (AWMA) is an integrated government unit, established by the Ministry of Agriculture of the Czech Republic in 2001. Its performance assumes the activities of the National Melioration Authority, which had been operating within the field of water resources management and watercourse administration for more than 30 years. AWMA performs the administration of minor watercourses of a length over 35 thousand kilometres, more than 12 thousand kilometres of drainage and, apart from this, 441 reservoirs in addition (as of 30 June 2004). It concerns watercourses flowing via landscape exploited in agriculture, but also via residential areas. For the Land Fund of the Czech Republic, the AWMA provides the main care of main melioration devices.

## CHAPTER 2

### THE NEW PARTICIPATION CULTURE IN THE WFD

The Water Framework Directive (WFD) marks a new era in European water resource management by bringing previously fragmented policy interventions under the unifying governance structure of the river basin. Through integrated resource planning the aim is to achieve good ecological status and chemical quality for all the European Union's fresh and coastal waters. This implies a fundamental shift in environmental regulation. For example, in the case of protected areas designated under the Habitats Directive, the ultimate target of the WFD is the achievement of the water-related biological criteria that sustain a particular habitat rather than ambient pollution thresholds traditionally applied. Problems will arise in terms of judging how different policy options and projects should be assessed and decisions made as to which should be pursued and why? River basin authorities have to monitor the state of water quality in their territory and identify a programme of measures in order to achieve the environmental objectives of the Directive.

As shown in Figure 1, the full-cycle of any assessment process requires stages moving from scoping to assessment to implementation. These need to be tailored to the several stages proposed for implementation of the WFD, such as the establishment of reference conditions (analyzing existing pressures and impacts), the justification of potential derogations and the definition of River Basin Management Plans (RBMP) with the accompanying programmes of measures.

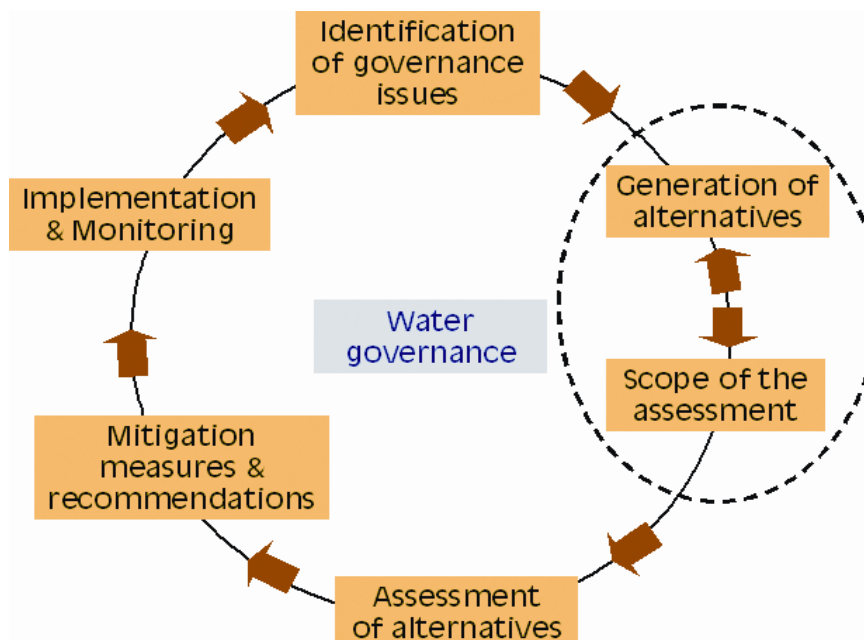


Figure 1. Sustainability assessment framework

Box 1 summarises the main provisions of the WFD. The Directive introduces a new planning process at the river basin level (Figure 2). The outcome is a river basin plan. The goal is the achievement of the environmental objectives of the Directive for the waters of the river basin district. The process follows the basic logic of the planning process described in Figure 1. Issues are identified, objectives are defined, alternative measures are evaluated and a cost-effective programme is designed and implemented. Monitoring and ex-post evaluation follow, identifying continuing gaps and leading to a reformulation of the plan and the programme of measures.

The WFD river basin planning process is only a subset of a broader water resource planning process. Quantitative aspects are addressed in the WFD only to the extent that they affect the achievement of the environmental objectives of the Directive. Some MS may opt and combine resource/quantitative planning processes (e.g. decisions for water allocation, new waterworks, demand management programmes, etc) with the WFD river basin planning process. Others might not. Furthermore, the Directive allows for additional plans at the sub-basin level, specific issues or sectors, etc. Water utilities or irrigation organisations for example, will continue having their own planning processes for their systems, in parallel to the WFD planning process.

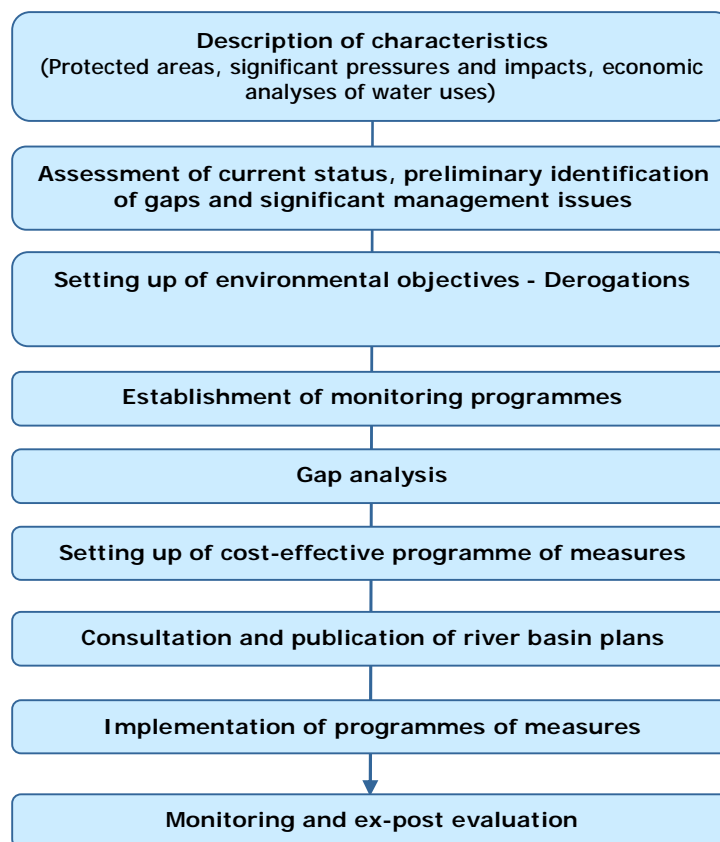


Figure 2 | The WFD River Basin Planning process

**Box 1 | The EU Water Framework Directive  
(2000/60/EC, Official Journal L 327/1, 22.12.2000)**

The WFD sets a common legal framework for the protection of all waters (including inland surface waters, transitional waters, coastal waters and groundwater) which:

- § Prevents further deterioration of, protect and enhance the status of water resources;
- § Promotes sustainable water use based on long-term protection of water resources;
- § Aims at enhancing protection and improvement of the aquatic environment through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation of phasing-out of discharges, emissions and losses of the priority hazardous substances;
- § Ensures the progressive reduction of pollution of groundwater and prevents its further pollution; and
- § Contributes to mitigating the effects of floods and droughts.

The core environmental objective of the Directive is the achievement of a “good” status for all waters in terms of ecological, chemical and quantitative (for groundwater only) parameters within 15 years (with possibility for 12 years extension) and to prevent any further deterioration of aquatic ecosystems.

The river basin is the spatial unit upon which to plan and coordinate measures for the achievement of objectives. MS have to designate authorities responsible for the preparation and implementation of river basin plans and programmes of measures. The programme should include existing legally-set instruments (e.g. secondary sewerage treatment, good agricultural practices in nitrate sensitive zones, industrial installation permits) plus a number of mandatory new instruments defined in the WFD (costing/pricing, zoning of designated areas, abstraction and discharge permitting and authorisation of activities that impact water quality). If the aforementioned “basic measures” do not suffice to achieve the environmental objectives of the Directive, additional measures should be implemented by river basin authorities, such as applying stricter permit standards, zones for good farming practices beyond the nitrate sensitive areas, implementing water demand management programmes, etc.

The WFD also strengthens a combined approach to the control of pollutants, provides the public with rights to information and participation in decisions, and establishes a detailed system of monitoring and reporting.

The key actions that Member States need to take include:

- § To identify the individual river basins lying within their national territory and assign them to individual River Basin Districts (RBDs) and identify competent authorities by 2003 ;
- § To characterize river basin districts in terms of pressures, impacts and economics of water uses, including a register of protected areas lying within the river basin district, by 2004 ;
- § To carry out, jointly and together with the EC, the intercalibration of the ecological status classification systems by 2006;
- § To make operational the monitoring networks by 2006;
- § Based on sound monitoring and the analysis of the characteristics of the river basin, to identify by 2009 a cost-effective programme of measures for achieving the environmental objectives of the Directive ;
- § To produce and publish River Basin Management Plans (RBMPs) for each RBD including the designation of heavily modified water bodies, by 2009 ;
- § To implement water pricing policies that enhance the sustainability of water resources by 2010;
- § To make the measures of the programme operational by 2012;
- § To implement the programmes of measures and achieve the environmental objectives by 2015.

Participation in the river basin planning process is a key requirement of the WFD. The Directive requires explicitly that (at least) the significant water management issues and the draft river basin plans are available for comments to the public (for a period of 6 months to comment in writing). A timetable and work programme for the production of the plan, including a statement of the consultation measures to be taken, should also be made available at least three years before the beginning of the period to which the plan refers. Then the final river basin management plan shall include a summary of the public information and consultation measures taken, their results and the changes to the plan made as a consequence.

Beyond consultation, the Directive calls for the active involvement of all interested parties in the implementation of this Directive, in particular in the production, review and updating of the RBMPs.

## WHY PUBLIC PARTICIPATION?

There is a growing trend in favour of participation of the public in environmental decision-making, including management of water resources and the planning of urban areas. There are five key factors that contribute to the support for participatory processes:

1. At a political level, globalisation and the “retreat of state” have created a “governance void”; governments often do not respond effectively to environmental problems. The advent of an active civil society is calling for more participatory forms of democracy.
2. The public starts questioning the supremacy of professional expertise and science. This relates to a growing public suspicion of links between state and scientific expertise and has been intensified by some notable failures of scientists to foresee crises, and a number of scientific controversies where experts came with very different opinions.
3. Environmental problems (including water resources related) are very complex, with uncertain outcomes and risks. Experts are seen as no better equipped to decide on questions of acceptable levels of risk than any other group of citizens.
4. There are rising and intensifying conflicts owing to multiple, often contradictory, values and interests. Issues of water allocation are a notable case. Some groups and their interests remain marginalised and disadvantaged by the decisions of central governments. Inclusive processes are expected to lead to more socially fair outcomes.
5. Participatory processes can lead to more effective implementation of environmental policy because they can reduce reactions and conflict at an

early stage of the process incorporating different views in the design. The quality of decisions based on participation can also benefit from local knowledge and context-aware proposals.

In relation to the above, the goals of a participatory process include in a scale of increasing ambition:

- awaring the public and educating the participants in the issue discussed,
- learning from the participants and their local knowledge and improving the quality of the decision,
- allowing marginalized voices to be heard and enhancing mutual understanding between the participants,
- reaching a common agreement,
- reducing conflict and delays further along the decision and policy implementation path,
- empowering the local community to take action.

The need for involvement of the public in decisions has been recognized in several recent international and European policy initiatives (Box 2).

#### Box 2 | Policy initiatives for public participation in decisions

##### White Paper on European Governance (COM 428 final, 25.07.2001)

*With the underlying purpose of connecting more closely to its citizens while achieving more effective policies, the EU launched a wide debate on the reform of European governance with this paper in 2001. The foreseen changes in EU policy include: better involvement and more openness; better policies, regulations and delivery; acknowledgment of global governance and refocusing policies and institutions. Five principles for good governance underpin these changes: openness, coherence, accountability, effectiveness and participation.*

Aarhus Convention, UN/ECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters

This Convention was adopted at the Fourth Ministerial Conference "Environment for Europe" in Aarhus, Denmark, on 25 June 1998. Since then 40 countries and the European Community have signed it. This multilateral environmental agreement focuses on the interactions between the public and public authorities, providing a linkage between environmental and human rights. It covers obligations that Parties have to the public with respect to access to information, public participation and access to justice in environmental matters. The negotiation process of the Convention has build on the UN/ECE guidelines on "Access to Environmental Information and Public Participation in Environmental Decision-making" (1995), where public participation was recognized as one of the key elements for the long-term environmental programme for Europe.

EU Participation Directive (Directive 2003/35/EC of 26 May)

*This Directive aims to contribute to the implementation of the obligations arising under the Aarhus Convention. It aligns Community environmental law with the second pillar of the Aarhus Convention (public participation in respect of the drawing up of plans and programmes related to the environment) and amends, with respect to public participation and access to justice, the Environmental Impact Assessment and the Integrated Pollution Prevention and Control Directives.*

## ORGANISING A PARTICIPATORY PROCESS

Box 3 presents some general steps for the organisation of a participatory process. The sequence is not strict. Many steps feedback one into the other and may be developed more or less in parallel. Clarifying the goals of the participatory process is essential as it determines the subsequent selection of process, techniques and participants. A first basic decision is whether the process aims to information, consultation, or even, self-determination and empowerment. The specific goals may depend on the nature of the decision and the stage of the planning process. In initial planning stages, education and information of the public will be more important. In the mid stages learning from the participants about alternatives and important criteria is more critical. In the assessment stage, reaching a final decision with consent may be the goal, whereas in the implementation stage reduction of conflict or empowerment become key goals.

A successful participatory process will not be based on a one-off event but in a well-sequenced process of events, each achieving a specific goal (e.g. education of participants in an early stage and dialogue and consensus later on). It is generally advisable that each participatory event (e.g. a hearing or a workshop) avoids conflating all goals together, as these can not easily be achieved at once.

Box 3 Organisation of a participatory process  
(adapted from IEMA, 2002)

1. Clarification of purpose of the participation process and recognition of issues that may arise.
2. Identification of aims, objectives and expectations from the process, both from organizers and participants.
3. Consideration of the decision-making process in which participation contributes and determination of the time-scale for participation.
4. Selection of an appropriate procedural method (or methods) and design of specific application.
5. Identification of potential participants.
6. Identification of needs in resources and staff (training of existing staff or external expertise).
7. Planning how the results of participation will be analysed and used.
8. Determination of evaluation criteria and processes upon which to appreciate success of the process.
9. Actual implementation of process and event(s).
10. Evaluation and Reporting

A participatory process should be clear from the outset about its goals and expectations; creating over-expectations which are not fulfilled leads to lack of public trust in future processes. These goals should be seen in relation to the broader policy process in which the participation will fit and impact. Linking the participatory process to acute decisions is important if participants are to believe in the value of the exercise. Different parties may have different expectations from



the participatory process. Decision-makers may want a decision to be taken quickly, proponents of a controversial project to have opposition convinced, and marginalised actors to have time and space to express their point of view. It is the role of organisers to decide which goals are to be served, make them clear to participants and design the process accordingly.

Given the goals of the participatory process, a method (a “platform” for the process) has then to be selected. An inventory of available techniques is presented in the next section. These techniques or different designs of those may be more or less suitable to achieve certain purposes. More than one technique may be combined in a longer participatory process running throughout the planning/decision cycle. Standard methodologies should be adjusted to local circumstances and the specific features and goals of the participatory process.

In an ideal inclusionary process “all whose interests will be affected ought to have the opportunity to take part, and all citizens feel that their interests are being properly represented even if they do not choose to become involved themselves”. But this is much easier said than done. In practice, there are three generic selection procedures. The first is self-selection based on the volunteer principle (“self-identification”). The participatory process is advertised through mass media and individuals or groups can step forward and declare an interest to be included in the process. The second is selection of participants by the facilitating agency and their invitation to the process. The term stakeholder analysis is given to the process through which organisers select participants. This includes a mapping of the main parties affected by or affecting the decision. Interviews, brainstorming meetings of organisers, analysis of literature on the subject or “third party identification” (i.e. initially selected stakeholders indicting others that should be included in the process) can all be used. Box 4 shows the basic groups of stakeholders identified by the EU Working Group for Public Participation in river basin planning. The third option is the random or systematic selection of a representative sample of citizens from the relevant public. Systematic selection builds upon certain criteria of representation (demographic, socio-economic, etc). Problems with these procedures and issues of representation are discussed later on this chapter.

Box 4 Typology of possible stakeholders involved in water management  
(CEC, 2002)

Professionals: public and private sector organisations, professional voluntary groups and professional NGOs (social, economic and environmental), statutory agencies, conservation groups, business, industry, insurance groups and academia.

Authorities: government departments, statutory agencies, municipalities, local authorities.

Local groups and non-professional organised entities – communities centered on place (residents associations, local councils, etc) and communities centered on interest (farmers’ groups, fishermen, birdwatchers, etc)

Individual citizens, farmers and companies representing themselves - key individuals such as land-owners, vocal individual residents.

*Selection of participants clearly depends on the purposes of the exercise and the technique used (see next chapter).* For example, adequate representation may not be important if the goal is education, but it will be crucial if the goal is to have a consensual decision. Inclusion of powerful, marginalised or reacting voices will be important if the goal is to reduce conflict further down the process. Certain methods can work with an open number of participants but others face constraints. A poll/referendum can target all population but a workshop may not exceed 80 participants for practical purposes. If there is a constraint on the number of participants, self-identification is ruled out. An advanced participatory process can combine more than one method with more than one selection procedures. In the Blue Ribbon example, there was both a committee of representative stakeholders with voting privileges selected by the municipality as well as a more open hearings with volunteer self- participation.

A proper planning and execution by the organisers of the actual event(s) (resources, staff expertise, location and facilities, mode of facilitation) is essential for its success and for committing participants in the process. A neutral, professional facilitator (or team of facilitators) is a must for an effective event.

Evaluation of the process or of separate events is crucial in order to assess impact, added value and to learn in order to improve future processes. The design of evaluation should be built-in from the early stages. Evaluation of results will have to be done with respect to the goals of the process; these will differ from case to case. Evaluation of results can be done by organisers, looking whether initial objective aspirations were fulfilled (e.g. reaching a consensual decision, agreeing on an Action Plan, etc). Some results however may be superficial (e.g. an agreement may mask still unresolved differences) and some goals may not be easily quantifiable by the organisers (e.g. education of participants). Interviews and questionnaires of the participants can help in appraising these dimensions. In addition to performance assessment, it is important also to appraise the quality of the process itself.

## TECHNIQUES FOR PARTICIPATORY WATER RESOURCES PLANNING

Information provision and enhancement of public awareness is an important first step in engaging people in decisions. Relevant techniques include leaflets and brochures, newsletters, unstaffed or staffed exhibits or displays, advertising or other presentations in public space, newspapers, radio, television, dissemination of audiovisual material, organised site visits, information made available on the internet and public meetings. Getting information from the public is a way to incorporate some of the public's opinions into policies and decisions. Relevant tools include staffed telephone lines to receive comments, interactive internet pages, surveys and opinion polls, interviews with selected stakeholders or with random samples of the population and focus groups. These are well established market research techniques. They have been used by some advanced water

utilities though only for service-related purposes (e.g. telephone line for complaints, service satisfaction surveys).

There are several platforms for consultation or deliberation processes. These platforms (e.g. an open meeting) may be used also to fulfil purposes of informing and getting information from the public. Public hearings are a widely used method for consultation. They consist of formal meetings with scheduled presentation offered. The process usually starts with the presentation of the full set of project components to the public and the provision of a forum for answering all questions and collecting/defending opinions. A public inquiry is a more formal legal process. An investigator (preferably with legal and scientific background) holds an open to the public hearing where he/she invites "witnesses" on a contentious issue (e.g. approval of construction of a new dam). The investigator then issues a report justifying his/her final proposal. Depending on legislation, the investigator's proposal can range from mere consulting to binding (e.g. can be turned down only with minister's intervention). A public inquiry is not deliberative and the direct involvement of the public is limited. It can be however more legitimate because it can be linked to a formal, judicial system, and more effective when acute decisions need to be taken quickly.

Advisory committees are typically small member groups of representative stakeholders, with a statutory or informal role in making proposals for a specific issue or monitoring the implementation of a decision or a policy. A User's or Resident's committee for example, can be set up to monitor the performance of an urban water utility with respect to performance indicators. The Committee can also assume a more active role in making proposals for specific policy issue (e.g. the Blue Ribbon Committee on water tariffs). Depending on the desired degree of involvement, less or more power may be given to the Committee (e.g. it can range from simple advice to powers in approving urban water or investment plans).

Citizens' panels or forums include typically more members than do committees. A "standing citizen's panel" for example can include 100-200 citizens who meet on a regular (monthly) basis to act as a sounding board of an issue of concern (e.g. implementation of an urban water master plan, supply reliability, cost of water, etc). "Users panels" have been used extensively in the utilities sector. These may consist of 50 to over 750 people who are provided with information and then reconvene in smaller groups or forums (potentially divided upon some common characteristic of participants, e.g. young people, landowners, etc) to discuss an issue or assess a policy (orally in group work or with the use of questionnaires). Panels and forums can be linked to environmental or social impact assessment processes.

There are several standard techniques to organise and facilitate proceedings in smaller group works (e.g. committees or small panels) or in larger workshop-like events (panels, forums, hearings). Group facilitation techniques can be used for creative purposes (generating new ideas and solutions) as well as for mediation and negotiation and the building of sustainable agreements. A group is

manageable with maximum 8-10 people. Group facilitation builds on a two-tier logic (often corresponding to respective days of a 2-day meeting): the first is devoted to “divergence”, where all ideas are freely debated opening up the spectrum of solutions. The second focuses on “convergence”; participants are helped with specific techniques (including voting) to conclude in a specific plan/decision. *Conflict resolution* processes usually include a group of representatives of conflicting interests coordinated by an experienced facilitator. The process follows a sequence of identifying the problem and relevant data, identifying alternative, innovative solutions that reduce conflict and then planning for implementation. *Consensus building* processes are somewhat similar only that the process follows a more open flow, with ideas and suggestions first listed (e.g. in a flip chart), discussed, voted and then debated in order to reach consensus.

Workshops may include higher numbers of participants, up to hundred plus. Work is divided into smaller manageable groups where facilitated discussion takes place, reconvening in plenary sessions where a synthesis of group inputs is performed. Workshops may also include additional tools such as presentations or exhibits. A workshop requires experienced and skilled facilitators, especially for the synthesis of group work and diverse perspectives in the plenary sessions.

Deliberative Inclusion Processes (DIPs) refer to more structured methods and techniques to organise and run group or committee meetings and negotiations, panel or forum workshops and hearings. DIPs are based on formal and tested methodological processes based on theoretical foundations and often linked to decision-support systems or assessment procedures. There are several basic techniques and hundreds of variations and combinations. There is some confusion with terminology; practitioners use often different names for marginally different techniques and there is a relative lack of cross-referencing between works in similar strands because they take place in different disciplines or policy spheres. An exhaustive presentation of all techniques is impossible. Here only the most important types of processes are presented.

A citizens’ jury is a group of citizens brought together to consider a particular issue or confrontational decision. The jury is chosen in random from the local population (as in normal court juries) with or without certain representation social profile criteria (e.g. gender, age, income). After agreement of the jury, expert witnesses are invited and provide evidence. Cross-questioning can occur. The more sessions (and thus the longer the process), the more time for the jury to assimilate facts and reach a more informed decision. Typical events last up to four days, at the end of which a report is drawn setting out the views of the jury, including differences in opinion. Citizens’ juries have been used more as consultative bodies, but they could be also used as delegated decision-making bodies (with voting on contentious decisions), potentially in conjunction with public inquiry processes.

A consensus conference is very similar to a citizen’s jury. A panel of 10-20 volunteers convenes after advertisement, and briefed in two weekend sessions on the issue under consideration. The panel identifies the questions to be asked to experts / witnesses. The conference (hearing) is open to the public and lasts

typically 3-4 days. Members of the public can also pose questions to experts. The panel then retires and issues a report with a judgement on the issue and presents it to the audience and to the mass media in a special press conference. Whereas in citizens' juries there is more room for different opinions in the final verdict, in a consensus conference the emphasis is more on reaching consent in the final decision,

Visioning is a tool which has seen applications in public and private organisations, urban planning, technology assessment and planning for urban sustainability. A visioning event (workshop) lasts typically 2 to 2 ½ days. Participants might range from 20 to 80. They work on sub-groups of 5-8 people and then reconvene to synthesise ideas in the assembly. The first day is devoted to "*vision making*" and the second day to "*idea generation*". During vision-making participants are asked to articulate, discuss and finally agree on a vision statement about the issue under question. For example, a group of 48 stakeholders working on a plan for improving the water quality of the upper Colorado river basin agreed on a vision of "water management as a collaborative process with a structure based on shared data". The underlying assumption of the method, resting partly on insights from psychology and organizational science, is that by working on finding a common vision and by liberating discussion from the burden of the present and focusing on the future, a "widest common ground" can be found without forcing or compromising. The Colorado statement for example, reflects a willingness of participants to break through a stalemate that hindered river agencies in sharing their information. Realization of this common ground and commitment to a future goal can energize the next process, this of "*idea generation*". In this phase, participants are divided into groups working on specific implementation tasks relating to the vision (e.g. in the Colorado example working on the formation of shared databases or permanent multi-agency committees) and propose concrete ideas. Ideas are then debated in detail, barriers and opportunities for their implementation identified and an "Action Plan" is formulated.

In the "future search" variant of visioning the emphasis is on generating innovative ideas and empowering the participants to take action. The process is less constrained in comparison to the "scenario workshop" variant, where pre-prepared future scenarios are used as the basis of discussion upon which participants formulate their own vision. Scenario workshops have fewer participants (max 32) and in the first day participants are divided in four homogenous groups: policy makers, experts, economic actors and citizens. Scenario workshops open with presentations (rejected in future search) and follow a more streamlined process based on the use of pair-wise interviews, etc. Box 5 summarises the results of a visioning workshop for water management in a coastal city in Greece.

## WHY A VISION?

A vision is a practical picture of a desirable future. Thus it is an image of a future that can be achieved and is worth achieving. Just as thought may stir action, a vision may generate our world. A vision can contribute to trends, as well as respond to them. It can create new trends we want and prevent those we don't. A vision provides a sense of mission and an enduring foundation for strategies and actions.

Planning from a vision requires a different mindset to planning from today to tomorrow. Planning from a vision demands working backward from it, before making strategies. A vision concentrates on "where we want to be" as a starting point rather than concentrating on "where we are". Therefore it helps to identify the changes needed to make this future possible.

Defining a vision as "where we want to be" immediately raises the question about which changes in attitudes and approaches are required to accomplish what is expressed in the vision. These necessary changes are represented through specific goals, which in turn form the basis of strategies. Plans, the roadmaps on "how to get there", are based on these strategies. Schematically, the sequential process could be given as follows:

*vision>changes>goals>strategies>plans>actions*

A Vision is also a kind of assessment. There are two main possible purposes of an assessment: one describes how a system functions and the other sees to what extent a system works according to expectations. Obviously the Volga-Caspian project should not only be a description of how the system works. More useful and challenging is an assessment that strives to see whether the system works satisfactorily and is producing a desired situation. But to accomplish this goal, it is first necessary to describe what the desired situation is.

The purpose of a vision is to arrive collectively at an idea and description of a realistic desirable future, which would give the initial momentum to the development of strategies and plans to move towards the desirable situation. It would also give indications as to what knowledge is needed for improving the situation. A vision is therefore useful for guiding focused scientific research.

A vision, or at least its main objectives, should remain valid for a long time. Consequently the vision should concern basic human aspirations. It would be of no use going into technical details in a vision as these would be obsolete anyway in a decade's time.

A vision is by definition somewhat vague, as it refers to a future set approximately in a generation's time, but it is best to relate it to quantifiable parameters, so that progress may be measured. This not only permits more realistic planning at a later stage, but also increases confidence in the ultimate success of the endeavor and keeps the objective clear and visible. Furthermore it allows accountability.

A vision of a future situation is always built on knowledge of the present. However, limitations of availability and reliability of detailed data must be accepted for the time-being. As a vision describes a desired future situation, vision building is very different from scenario building, where a possible future is projected by fixing certain parameter values at an assumed level. A scenario ultimately reflects the "when if" situation in case the estimated parameter value becomes reality.

Box 5 Visioning workshop for sustainable water management in the Greek island of Naxos (Kallis et al, 2003)

The island of Naxos (103 n.m. SE of Athens) has a permanent population of 18,000, increasing in July-August by 15-30,000 tourists, visitors and tourism employees. In dry years, water conflicts occur between tourism and agriculture and between the coastal, tourist city of Naxos and the mountainous, rural municipality of Drimalia. The Workshop took place on the 1<sup>st</sup> and 2<sup>nd</sup> of November 2003 and was attended by 36 selected participants. Awareness, dialogue and agreement on an Action Plan were the initial goals.

In the first participants were divided into four homogeneous groups: policy makers and economic actors from Naxos, policy makers and economic actors from Drimalia, scientists/experts and citizens/community groups. Participants were provided in advance with four water-development scenarios for the year 2020. The "business-as-usual" scenario (S1) was for growth of mass tourism served by big water works. The other scenarios were: (S2) economic modernization of the island, globalization-fuelled growth with use of new water technologies and administrative approaches; (S3) balanced development, environmental protection, an emphasis on water conservation and small-scale, appropriate technologies; and (S4) radical "ecology" with self-sufficiency, communitarian self-organisation and dramatic reduction of water consumption. Scenarios were provided both in a technical format (including data tables and spatially differentiated demand forecasts) and in a "user-friendly" form of imaginary letters written by visitors to Naxos in the summer of 2020.

Each groups reached a vision which was then debated with other groups in the assembly. Helped by a experienced facilitator participants reached a shared vision or hybrid that some of them described as a combination of S3 with a touch of technology from S2 and autonomy and self-sufficiency from S4. They stressed a diversified island economy where income and job opportunities for the young would be provided by a soft and qualitative tourism development and exploitation of competitive advantage in quality agricultural products. Water in sufficient quantity and quality would be secured primarily through water conservation and new water works, both technologically "state-of-the-art" and based on "traditional knowledge". Finally, they debated the organizational structure of the water sector favouring decentralization, but without agreeing on the appropriate division of state, regional and local competencies.

On the second day, participants worked in four mixed thematic groups: water quality, supply, conservation, and institutional design. Ideas were prioritized by voting. Each thematic group voted for the three most popular ideas. Then the assembly voted and ordered the 12 final ideas. More than 60 ideas were recorded with the three scoring highest being: school education programmes for water-saving, preservation and repair of rural land terraces to control rain-water flow, and establishment of a laboratory to analyse water quality. Participants proposed to distinguish in planning and allocation between drinking water for local and tourist purposes. The workshop achieved an unprecedented dialogue between conflicting parties and generated a momentum for the setting up of an inter-municipal water authority to govern water allocation and manage reservoirs. The Naxos' experiment demonstrated that SW works particularly well as a platform to foster awareness, mutual learning and dialogue, opening-up the public debate. Almost all participants expressed their deep satisfaction (and surprise) with the quality of the dialogue and contrasted it with the traditional lack of co-operation and intense conflict in the island. Debate matured quickly benefiting from the linkage in the scenarios between development and water; discussion over visions shifted to a broader debate on issues of democracy and sustainability. Scenarios also worked particularly well in promoting long-term thinking and opening-up the time horizon of solutions. It fell short though of producing an Action Plan, as participants felt they lacked the necessary technical knowledge and information.

The workshop was organised by the Laboratory of Environmental Planning (Aegean University) as part of the ADVISOR, a research project funded by the European Commission under the Energy, Environment and Sustainable Development RTD Programme.

## EWARU: THE PARTICIPATORY PROCESS.

This project seeks to test the hypothesis that an investment in the social capital through a dedicated deliberative community visioning process<sup>2</sup>, can help to break through the stalemate of inaction as regards sustainable management of shared water resources. The project will simulate such a deliberative community process through an adaptive approach, providing at the same time a hands-on training of Municipality personnel and citizens.

This project is focused on developing the best suitable methodology for finding ways to mobilize the local society and key stakeholder groups in order to participate actively in the sustainable development process and the better implementation of the *Water Framework Directive* through enhanced networking, participation and awareness. At the same time it will achieve capacity building of the participant Municipality staff and awareness of the citizens. The "Community Visioning" method provides a suitable platform for such an integrated process with use of multiple tools that will be simulated for hands-on educational purposes.

In order to provide a more holistic and integrated framework the project aims to address all planned levels of participation: *Information – Consultation – Deciding together – Acting together*.

As such it will be divided in the following implementation phases, as regards the development a shared vision for the River Basin Partnership and the training of the participating Municipality personnel and citizens in actual River Basin Planning:

### 1.1 - Stakeholder mapping

The main stakeholders/ actors and users of water resources in each region will be identified and divided in the following categories:

- a) Public Administration of all tiers and public equivalent bodies responsible for water management and other related management issues.
- b) Associations of private contractors and professional unions (i.e. farmers, fishermen, tourist enterprises).
- c) Civic Associations with the aim of environmental protection and protection of citizens' and consumers' rights
- d) Other marginal social groups (i.e. students, women, etc) acting as resource users

Development of River Basin Partnership (Stakeholder Forum) comprised of representatives (25-50 individuals) from the above mentioned categories that will follow the simulation of the participatory/ consultation process. Research team compiles economic, socio-environmental indicators (context analysis)

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<sup>2</sup> A deliberative decision process is one in which decision is the outcome of interaction through dialogue between a broad and inclusive range of people with respect for their different viewpoints.



Outcomes:

- Context Analysis
- Stakeholder mapping
- Dissemination of questionnaire and survey development
- Creation of River Basin Partnership

1.2 - *Information and Awareness*

- Ø Presentation of project:
  - Partnership
  - Themes of interest/ priority
- Ø Training Seminar on:
  - Participatory processes and active role of stakeholders
  - The role of facilitators in deliberative planning
- Ø Distribution of a questionnaire to know and to involve active participation of stakeholders on the project themes
- Ø Environmental education and awareness activities

Outcomes:

- Kick-off meeting. Introducing participants of the local network to the process, presenting the process to broader public and the press
- *Workshop 1: "River Basin Scanning"* workshop. Research team presents key *environmental and community well-being indicator*, trends and scenarios, resulting from the *Context Analysis*. Participants deliberate with the help of facilitators over likely future and problems and settle common priorities of action. Local key actors will undertake a simulation exercise on how to organise such scanning workshop and will be introduced to facilitation techniques best suited in their socio-political context.
- Open public events in the participating municipalities (at least one per country)
- Training sessions on how to organise successful consultation processes, environmental education and awareness campaigns
- Realisation of wide spread environmental education and awareness campaigns

1.3 – *Consultation and deciding together*

- Plenary session: Discussion upon answers to questionnaire/ survey and results of the 1<sup>st</sup> workshop
- Group session: Participants are divided into groups according to their role:
  - a) Managers (Public Authorities and public related bodies with an institutional role of management)
  - b) Users (including private contractors and representatives of citizens and consumers)

During the group work each group examines the existing difficulties in actual management of water resources and build a desirable vision to solve actual difficulties. Participants will be introduced in scenario development for

building a common vision as well as facilitation techniques in order to achieve the needed collaboration during project implementation.

- Plenary session: Discussion upon group works to examine closely the solution of actual problems based on scenario analysis and development of a common vision for the future. .

Outcomes:

*Workshop 2: "Future Search – Vision Making"* workshop. Participants build on a shared vision for a River Basin Plan, identify key "action areas" to make the vision happen and set task forces for their elaboration. Definition of shared target scenarios.

#### 1.4 – *Deciding together – Acting together*

- Presentation of selected expertises
- Summary of results and needs come out from Workshop 2
- Examination of possible already existing solutions
- Shared decision on the particular themes that all participants need to deepen and order to experts to begin their work in order to elaborate guidelines and studies on the themes of the River Basin Plan.

Outcomes:

1. Task forces' meetings. Task Forces elaborate on detailed action plans (timetables, resources, partnerships) through a series of *action planning and implementation workshops*. Identification of key performance areas in river basin and water management.
2. Consensus Workshop and Community Celebration. Final agreement on Action Plan and presentation to the public and the press with a closing ceremony. Participants will elaborate and evaluate process based on outcomes of deliberation and simulation.

CHAPTER 3

LOCAL WATER NETWORK STUDY  
POTSTAT MUNICIPALITY

.....NOT FINISHED YET.....

## CHAPTER 4

### A BRIEF INTRODUCTION TO GEOTHERMAL ENERGY

Heat is a form of energy and geothermal energy is, literally, the heat contained within the Earth that generates geological phenomena on a planetary scale. 'Geothermal energy' is often used nowadays, however, to indicate that part of the Earth's heat that can, or could, be recovered and exploited by man, and it is in this sense that we will use the term from now on.

The geothermal gradient expresses the increase in temperature with depth in the Earth's crust. Down to the depths accessible by drilling with modern technology, i.e. over 10,000 m, the average geothermal gradient is about 2.5-3 °C/100 m. For example, if the temperature within the first few metres below ground-level, which on average corresponds to the mean annual temperature of the external air, is 15 °C, then we can reasonably assume that the temperature will be about 65°-75 °C at 2000 m depth, 90°-105 °C at 3000 m and so on for a further few thousand metres. There are, however, vast areas in which the geothermal gradient is far from the average value. In areas in which the deep rock basement has undergone rapid sinking, and the basin is filled with geologically 'very young' sediments, the geothermal gradient may be lower than 1 °C/100 m. On the other hand, in some 'geothermal areas' the gradient is more than ten times the average value.

Geothermal systems can therefore be found in regions with a normal or slightly above normal geothermal gradient, and especially in regions around plate margins where the geothermal gradients may be significantly higher than the average value. In the first case the systems will be characterised by low temperatures, usually no higher than 100 °C at economic depths; in the second case the temperatures could cover a wide range from low to very high, and even above 400 °C.

Let's see what is a *geothermal system* and what happens in such a system. It can be described schematically as '*convecting water in the upper crust of the Earth, which, in a confined space, transfers heat from a heat source to a heat sink, usually the free surface*' (Hochstein, 1990).

A geothermal system is made up of three main elements: a heat source, a reservoir and a fluid, which is the carrier that transfers the heat. The heat source can be either a very high temperature (> 600 °C) magmatic intrusion that has reached relatively shallow depths (5-10 km) or, as in certain low-temperature systems, the Earth's normal temperature, which, as we explained earlier, increases with depth. The reservoir is a volume of hot permeable rocks from which the circulating fluids extract heat. The reservoir is generally overlain by a cover of impermeable rocks and connected to a surficial recharge area through which the meteoric waters can replace or partly replace the fluids that escape from the reservoir through springs or are extracted by boreholes. The geothermal fluid is

water, in the majority of cases meteoric water, in the liquid or vapour phase, depending on its temperature and pressure. This water often carries with it chemicals and gases such as CO<sub>2</sub>, H<sub>2</sub>S, tc.

The next figure is a greatly simplified representation of an ideal geothermal system.

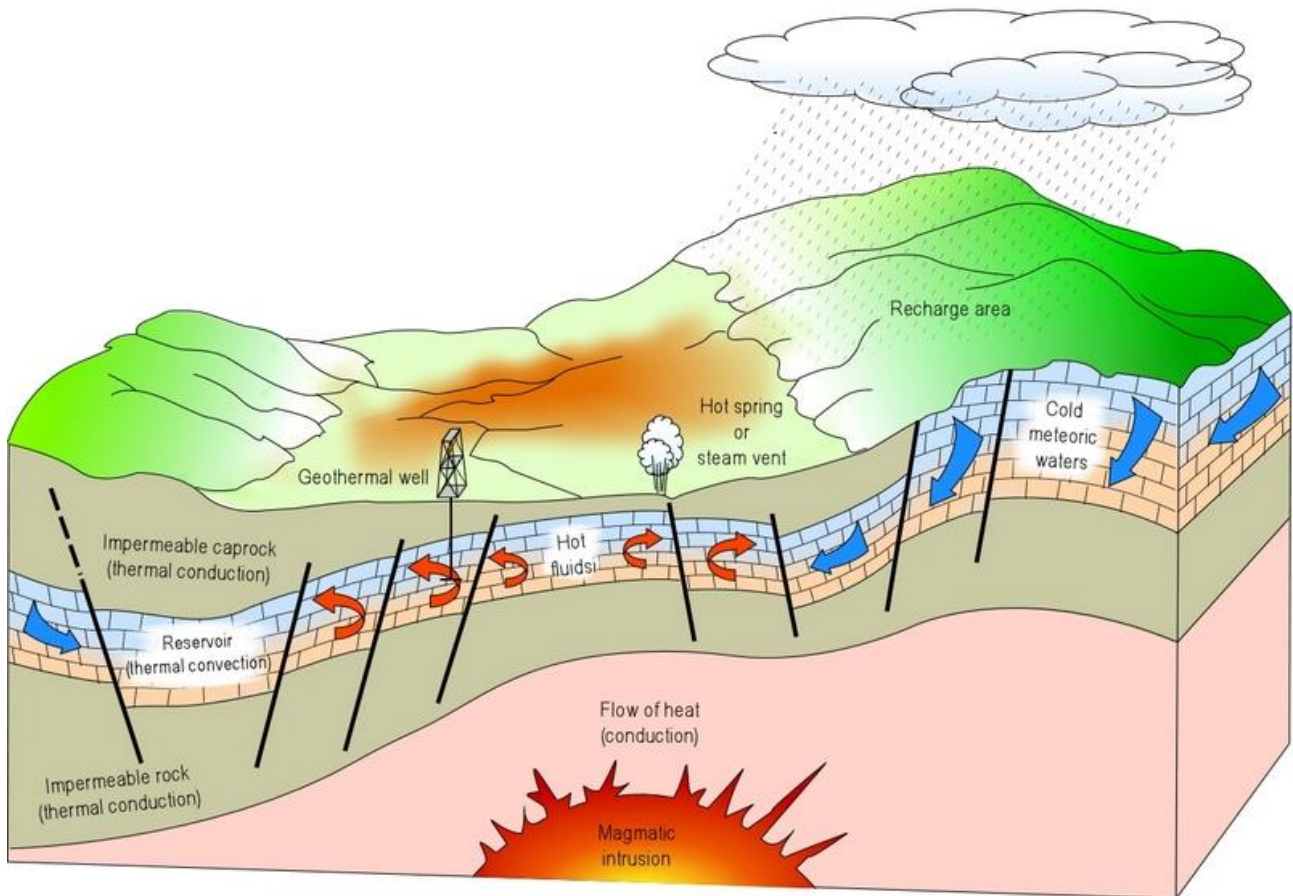
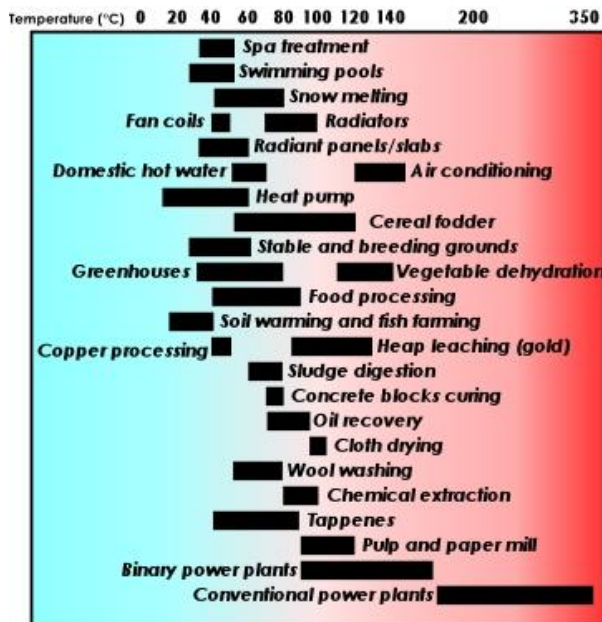


Figure-Schematic representation of an ideal geothermal system.

### Utilization of geothermal resources



Electricity generation is the most important form of utilization of high-temperature geothermal resources (> 150 °C).

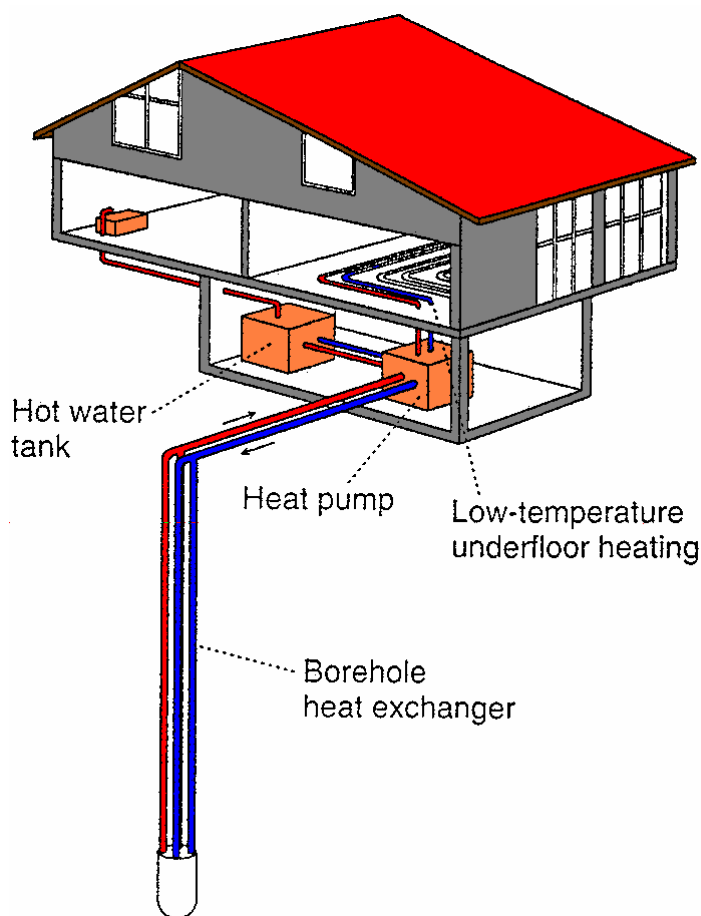
The medium-to-low temperature resources (< 150 °C) are suited to many different types of application.

This figure represents the classical Lindal diagram (Lindal, 1973), which shows the possible uses of geothermal fluids at different Temperatures.

Direct heat use is one of the oldest, most versatile and also the most common form of utilization of geothermal energy. Bathing, space and district heating, agricultural applications, aquaculture and some industrial uses are the best known forms of utilization, but heat pumps are the most widespread (12.5% of the total energy use in 2000). There are many other types of utilization, on a much smaller scale, some of which are unusual.

Space cooling is a feasible option where absorption machines can be adapted to geothermal use. The technology of these machines is well known, and they are readily available on the market. The absorption cycle is a process that utilises heat instead of electricity as the energy source. The refrigeration effect is obtained by utilising two fluids: a refrigerant, which circulates, evaporates and condenses, and a secondary fluid or absorbent. For applications above 0 °C (primarily in space and process conditioning), the cycle uses lithium bromide as the absorbent and water as the refrigerant. For applications below 0 °C an ammonia/water cycle is adopted, with ammonia as the refrigerant and water as the absorbent. Geothermal fluids provide the thermal energy to drive these machines, although their efficiency decreases with temperatures lower than 105 °C.

Figure- Typical application of ground-coupled heat pump system (from Sanner et al., 2003).



Geothermal space conditioning (heating and cooling) has expanded considerably since the 1980s, following on the introduction and widespread use of heat pumps. The various systems of heat pumps available permit us to economically extract and utilise the heat content of low-temperature bodies, such as the ground and shallow aquifers, ponds, etc. (Sanner, 2001).

Heat pumps are machines that move heat in a direction opposite to that in which it would tend to go naturally, i.e. from a cold space or body to a warmer one. A heat pump is effectively nothing more than a refrigeration unit. Any refrigeration device (window air conditioner, refrigerator, freezer, etc.) moves heat from a space (to keep it cool)

conditioner, refrigerator, freezer, etc.) moves heat from a space (to keep it cool)

and discharges that heat at higher temperatures. The only difference between a heat pump and a refrigeration unit is the desired effect, cooling for the refrigeration unit and heating for the heat pump. A second distinguishing factor of many heat pumps is that they are reversible and can provide either heating or cooling in the space. The heat pumps, of course, need energy to operate, but in suitable climatic conditions and with a good design, the energy balance will be a positive one.