TOOL BOX

Auxiliary texts to training on IWRM in the context of EU Water Policy

Global Water Partnership
Central and Eastern Europe

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in the context of EU Water Policy.

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Foreword

Since its launch in 2001, the ToolBox on Integrated Water Resources Management (the IWRM ToolBox) has been used in the Central and Eastern European region for education and training activities tailored to address the EU accession process in water resource management. The training activities may also be applicable and beneficial to the Central Asia and Caucasus region. Despite their geographical distance these two regions share a similar past. Both regions consist of young democratic countries established after the collapse of the Soviet Union and the demise of their centrally planned economies. And they share the influence of turbulent economic development complemented with old environmental debts.
In 2003, representatives from GWP Central Asia and Caucasus introduced ToolBox activities to the region, based on the experience in GWP Central and Eastern Europe.

In total, four training courses were organized during 2004 – 2005. The courses were prepared for a broad group of stakeholders in the water sector interested in gaining knowledge on integrated approaches to water resource management. Participants ranged from decision-makers to water researchers, environmental and water experts from the private sector, and water practitioners from NGOs. It was anticipated that the participants would be able to disseminate the IWRM approaches illustrated in the ToolBox throughout the water community in their respective countries. It was also expected that they would bring their ideas and experience together to generate future case studies for the ToolBox website. All courses aimed to promote the application of IWRM practices covered by the ToolBox and to share Central and Eastern European experiences and lessons in implementing the new EU water legislation. The courses provided an exclusive walk through broad aspects of IWRM and topics included water planning and water management; translation of water policy into legislation; integrating economics into water planning and policy; public participation, negotiation of conflicts, awareness raising.

The courses were well received, especially with respect to the efforts devoted to the preparation of the training texts, group exercises and supporting documentation. The main sources of the training texts were taken from the websites of the IWRM ToolBox www.gwpforum.org and the Capacity Building Network (Cap-Net) www.cap-net.org.
This booklet compiles papers and websites which, in the opinion of GWP CEE, are among the most relevant experiences and references on IWRM with the hope that it will be used by water experts and all those interested in promoting a coordinated development and management of water, land and related resources.

1. Background to Integrated Water Resources Management

Chapter Objective:

This chapter aims to provide the participants with knowledge and skills required to support a process of development of IWRM plans. The consequent steps of planning process are described. Meaning of IWRM and its principles are highlighted to better understand the complexity of water resources management.

Introduction

The basis of the IWRM is that the many different uses of water resources are interdependent. *Integrated* management means that all the different uses of water resources are considered together. Integrated water resources management is therefore a systematic process for the sustainable development, allocation and monitoring of water resources use in the context of social, economic and environmental objectives.

Sectoral approaches to water resources management have dominated in the past and are still prevailing. There are few countries in the world that have developed comprehensive national water management plans and strategies. Fragmented approaches in rapidly growing government machineries make implementation of IWRM difficult. This leads to fragmented and uncoordinated development and management of the resource. The demand to manage water resources in integrated manner is mostly rhetorically declared by politicians in all countries. In addition, although most countries give first priority to satisfying basic human needs for water, one fifth of the world's population is without access to safe drinking water and half of the population is without access to adequate sanitation. Also it is noted, that even when policies are in place, they are not implemented because one or more of parties responsible for implementation fails to follow through. Thus, some manifestations of bad management are:

- drought and flood occasions
- ground water overdraft
- water borne diseases
- land degradation
- loss in biodiversity (including aqua diversity)
- lack of water supply and treatment.

Could you think about other implications of a bad management?

True IWRM requires at least 5 levels of integration (1):

- *Vertical integration* ranges from the lowest level of user to the top policymakers in a ministry and all levels of government; from irrigation district to municipality, from regional administration to national water commission.
- *Horizontal integration* implies co-ordination and collaboration among all the institutions responsible for resources management at a watershed (catchment) scale.
- *Interdisciplinary integration* involves all relevant disciplines, including socioeconomic, engineering, hydrologic, economic and ecological.

- *Functional integration* includes planning, regulatory, design, operations, maintenance and monitoring.
- *Stakeholder integration* involves non-governmental interests, user groups or native groups, in all aspects of water management and decision-making.

Discuss the existence or potential establishment of such "integration" body in your country.

Usually the complex, intersecting requirements of IWRM are best managed through a permanent coordinating body such as a River Basin Commission or Catchment Management Agency, whose trained staff are versed in both the technical needs of water management as well as in the requirements for multiple layers of co-ordination.

TABLE 1: **Some comparison of traditional and integrated approaches**

Traditional framing of issues from different disciplines	Linking social to hydrological (integrated)
Hydrological/ hydraulic: • What is expected yield of the catchment?	• How will new investment in water infrastructure be agreed? • How can local management structures balance competing uses? • How will stakeholders negotiate water entitlements in different conditions of water availability, especially scarcity? • How will consumers respond to periodic water shortages, or to increasing environmental concerns?
Engineering: • How much water leaks from the distribution system? • How can leakage be reduced?	
Management: • What is the economic level of leakage?	

The Millennium Development Goals (MDGs) represent a renewed commitment to overcome persistent poverty and to address many of the most enduring failures of human development. The MDGs agreed by the international community in 2000 comprise 8 goals, 18 targets and 48 indicators. Water is interconnected with all eight MDGs and basic sanitation was added to the list at the 2002 World Summit on Sustainable Development (WSSC) in Johannesburg. Halving "by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation" is one of the quantified and time-bound targets defined for the MDGs. The WSSC called for all countries to craft IWRM and water efficiency strategies by the end of 2005[1].

BOX 1: EU Water Initiative

The political commitment made by European leaders at the 2002 World Summit on Sustainable Development (WSSD) to support the water-related Millennium Development Goals (MDGs) amended in the Johannesburg Plan of Implementation (JPoI) has translated into the European Water Initiative (EUWI) and its manifold coordination efforts targeted at mobilizing a wide range of social actors, raise the political profile of the water-related objectives in the context of IWRM and stimulating fresh action. Work since WSSD has been characterized by many small and big events, initiatives and contributions, though a lot more will need to be done to achieve mobilizations effects at the required scale. Information on new projects and activities associated to the EU Water Initiative is now available.

1.1. Dublin principles

A meeting in Dublin in 1992[2] gave rise to four principles that have been the basis for much of the subsequent water sector reform.

[1] *At the end of 2003, the GWF conducted an informal survey to see how countries were progressing towards this initiative. The preliminary results show that of the 108 countries surveyed around 10% have made good progress, 50% have taken some steps in this direction, while 40% are in the initial stages of the process.*

[2] *The International Conference on Water and Environment, Dublin, Ireland, January 1992.*

RECOMMENDATION: A comprehensive discussion on the Dublin principles could be found at the GWP TAC Background Paper No. 3: The Dublin Principles for Water as reflected in a Comparative Assessment of Institutional and Legal Arrangements for IWRM (1999)

- ***Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.***

  Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.

  The notion that freshwater is a finite resource arises as the hydrological cycle on average yields a fixed quantity of water per time period. This overall quantity cannot yet be altered significantly by human actions, though it can be, and frequently is, depleted by man-made pollution. The freshwater resource is a natural asset that needs to be maintained to ensure that the desired services it provides are sustained.

  This principle recognizes that water is required for many different purposes, functions and services; management therefore, has to be holistic (integrated) and involve consideration of the demands placed on the resource and the threats to it. The integrated approach to management of water resources necessitates co-ordination of the range of human activities which create the demands for water, determine land uses and generate waterborne waste products. The principle also recognizes the catchment area or river basin as the logical unit for water resources management.

Why fresh water is determined as a "finite" resource?

- ***Water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels.***

  The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects.

- ***Women play a central part in the provision, management and safeguarding of water.***

  This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation, in ways defined by them.

  It is widely acknowledged that women play a key role in the collection and safeguarding of water for domestic and – in many cases – agricultural use, but that they have a much less influential role than men in management, problem analysis and the decision-making processes related to water resources. The fact that social and cultural circumstances vary between societies suggests that the need exists to explore different mechanisms for increasing women's access to decision-making and widening the spectrum of activities through which women can participate in IWRM.

  IWRM requires gender awareness**.** In developing the full and effective participation of women at all levels of decision-making, consideration has to be given to the way different societies assign particular social, economic and cultural roles to men and women. There is an important synergy between gender equity and sustainable water management. Involving men and women in influential roles at all levels of water management can speed up the achievement of sustainability;

In a water-scarce environment, would it be right that the next water resource developed should be assigned to a steel- manufacturing plant because the manufacturer can afford to pay more for the water than the thousands of poor people who have no access to safe water?

and managing water in an integrated and sustainable way contributes significantly to gender equity by improving the access of women and men to water and water-related services to meet their essential needs.

- ***Water has an economic value in all its competing uses and should be recognized as an economic good.***
  Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource[3]. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

RECOMMENDATION: A comprehensive discussion on this principle could be found at the GWP TAC Background Paper No. 2: Water as a Social and Economic Good: How to Put the Principle into Practice (1998)

1.2. Identification of problems

Identification of problems is prerequisite to identification of solutions. There are several barriers that can limit the effectiveness of the role of political institutions in managing the water resources. These include:

- ***Sectoralism*** within and between the government departments and the fragmented nature of institutional structures, e.g. each with different functions as well as different political goals and each with different stakeholders, with "control" of a water sector often being more important than integration, with poor inter-agency linkages between risk management vs. water resources vs. irrigation vs. land management vs. international obligations;
- Lack of clearly defined overall strategies, including management objectives, mechanisms for delivery to enable objectives to be achieved, and being "***high on rhetoric***" and talk at strategic level and "***low on action***" on the ground;
- ***Lack of research to assess the resource base*** with respect to water resources availability and risk, and the value of water in terms of economic production (e.g. $/m3 water or t/ m3 water), or consideration of the entire hydrological cycle;
- ***Water being a source of conflict***, not only between sectors (e.g. rural vs. urban) but also within a sector (e.g. dryland vs. irrigated agriculture; commercial vs. subsistence agriculture), but in particular with respect to upstream/downstream users and uses;
- ***Deficiencies in information***, which can imply insufficient spatial information, and/or a lack of willingness among organizations to share data and information, and/or data/information not collated, out of date or not disseminated because it resides in obscure reports or theses, and/or networks of information flows being inadequate;
- ***Deficiencies in land management options***, including how to use land impacts on quantity and quality of water under variable climate, how to cope with/adapt to changing hydrological conditions with respect to inter-annual climate variability or more permanent climate change, and trade-offs between land use practices, either within a sector and between sectors;

[3] *Value and charges are two different things. The value of water in alternative uses is important for the rational allocation of water as a scarce resource, whether by regulatory or economic means. Charging (or not charging) for water is applying an economic instrument to support disadvantaged groups, affect behavior towards conservation and efficient water usage, provide incentives for demand management, ensure cost recovery and signal consumers' willingness to pay for additional investments in water services.*

- ***Lack of willingness to integrate***, e.g. with land users and land use agencies each still seeking to assert their primacy in relation to how the land and its associated water resource should be used, and
- ***Lack of audit and post-audit procedures*** which embrace, *inter alia*, who is going to enforce and 'police' progress in coping strategies as well as who will critically evaluate the performance of actions during and after an extreme event.

1.3. IWMR change areas[4]

Adopting a more sustainable and integrated approach to water management and development requires change in many areas and at many levels. Two fundamental questions need to be addressed:
1) how to promote more coordinated decision-making across sectors
2) how to improve communication between levels of decision-making, from the water user to local water management organizations to basin and national decision-making structures.

Many organizations whose primary function is not water management are responsible for sectors where the impact of, and on water resources can be enormous – agriculture, industry, trade, and energy are examples. Similarly, water resources organizations need to consider issues, such as environment or tourism, that lie within domain of other agencies. Therefore, it is essential to have mechanisms for dialogue and coordination to ensure some measure of integration.
In order to reach coordinated decision-making across sectors, integration of (and changes in) functions and roles should be carried out[5]:

What to change in order to improve efficiency in water use?

- among bodies involved directly with water management (e.g. those responsible for water storage and supply, and treatment of waste water)
- between water managers and other sectors, such as land use planning, agriculture, industry, tourism
- linkage of surface and ground water management
- linkage of inland and coastal waters.

BOX 2: Improving water use efficiency – a case

In northern France when cities and industries found their water supply endangered by rapidly dropping water tables due to over abstraction of groundwater, they proposed supply-side solutions – either building a dam on a river 30 miles away and piping water in, or building a desalination plant. The cost? The equivalent of one billion USD for the French taxpayer. But policy – makers chose a demand- side solution instead: they imposed a small tax on each cubic meter of water pumped from the aquifer. Confronted with this tax, industry operators and cities found that they could after all reduce their water consumption, and as a result groundwater use in the area is now sustainable.

Provided by I. Cheret

1.4. Planning processes for IWRM

Because of the existing institutional and legislative frameworks, implementing IWRM is likely to require reform at all stages in the water planning and management cycle. Before planning takes place, it is important to define issues and set priorities. Some examples of questions for defining substantive issues are in BOX 3.

[4] *Adapted from the Catalyzing Change: A handbook for developing IWRM and water efficiency strategies, TEC GWP, 2004*
[5] *Adapted from the Manual: Six Thinking Hats – Looking at a Decision From All Points of View; http://www.mindtools.com/pages/article/newTED07.htm.*

BOX 3: Questions for defining substantive issues

Linked to reducing poverty:
- How to define poor people's water needs?
- What types of water development and service provision are most appropriate given users` needs, their ability to pay, and their capacity to manage and maintain infrastructure?
- What additional elements are needed for people to take maximum advantage of water for farming, livestock, fisheries, and cottage industries?

Linked to addressing water scarcity and competition for water:
- How to allocate water strategically?
- How to improve water efficiency and promote demand-side management?
- What is the potential for development of non-conventional water resources?

Linked to protecting ecosystems:
- How to allocate water for environmental flows?
- When evaluating trade-offs, how to value the goods and services ecosystems provide?
- How to reduce water pollution?

Linked to human health:
- What are the options for improving sanitation in urban and rural areas?
- How can water and sanitation be linked to hygiene education programs?
- What are the options for ensuring sustainable delivery of water and sanitation services for the poorest populations?

Linked to economic development:
- Water are the economic activities that are impacted by water availability and quality?
- How to allocate water between sectors in a way that encourages economic development, while also considering poverty reduction and environmental sustainability goals?

IWRM planning means (2):
- moving from a view that the state alone is the one responsible for water resources management towards one that sees responsibility with society as a whole
- moving from a centralized and controlled decision-making towards sharing result and opportunities, transparent negotiations, cooperation and concerted action
- moving from sectoral planning towards coordinated or fully integrated planning for water resources.

1.5. Planning cycle

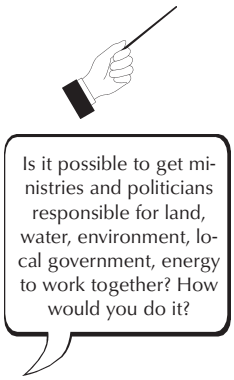
The planning cycle is a logical sequence of phases (3):
1. Initiation, mobilization and stakeholder participation
2. Strategic vision
3. Situation analysis
4. Development and endorsement of IWRM plan
5. Implementation and evaluation of IWRM plan

1.5.1. Planning cycle – Initiation

Whatever reason for government considering to embark on an IWRM planning exercise there are several key activities:
- obtaining government commitment
- raising awareness on water resources management
- establishment of a management team.

RECOMMENDATION: Some ideas addressed by questions are listed in Cap-Net IWRM plans, Training module, 2005. It is recommended to discuss following:

- What might be reasons that IWRM planning process would arise from?
- Who are the most important and influential ministries concerning water (in your country)?
- What strategy would be appropriate to reach key political and senior government figures to explain IWRM?
- What would be a composition of management team (in your country)?
- How to gain political commitment?



1.5.2. Planning cycle – Participation

Water is a subject in which everyone is a stakeholder. Real participation only takes place when stakeholders are part of the decision-making process. The type of participation will depend upon the spatial scale relevant to particular water management and investment decisions. It will be affected by the nature of the political environment in which such decisions take place.

A participatory approach is the best mean for achieving long-lasting consensus and common agreement. Participation is about taking responsibility, recognizing the effect of sectoral actions on other water users and aquatic ecosystems and accepting the need for change to improve the efficiency of water use and allow the sustainable development of the resource. Participation does not always achieve consensus; arbitration processes or other conflict resolution mechanisms also need to be put in place.

Governments have to help create the opportunity and capacity to participate, particularly among women and other marginalized social groups. It has to be recognized that simply creating participatory opportunities will do nothing for currently disadvantaged groups unless their capacity to participate is enhanced. In table 2 there are some types of participation.

TABLE 2: **Types of participation (adopted from (3))**

Level of participation	**Characteristics**
Manipulative participation	Participation is simply a pretence
Passive participation	People participate by being told what has been decided or has already happened. Information shared belongs only to external professionals
Participation by consultation	People participate by being consulted or by answering questions. No share in decision-making is conceded and professionals are under no obligation to take on board people's views
Participation of material incentives	People participate in return of food, cash or other material incentives. Local people have no stake in prolonging practices when the incentives end
Functional participation	Participation is seen by external agencies as a mean to achieve project goals, especially reduced cost. People may participate by forming groups to meet predetermined project objectives
Interactive participation	People participate in joint analysis, which leads to action plans and the formation or strengthening of local groups or institutions that determine how available resources are used. Learning methods are used to seek multiple view points
Self-mobilization	People participate by taking initiatives independently of external institutions. They develop contacts with external institutions for resources and technical advice but retain control over how resources are used

It is highly unlikely that any River basin management plan can be implemented if it does not meet with broad public acceptance and if it is not supported by key stakeholder groups. In BOX 4, benefits of public and stakeholder participation are listed.

BOX 4: Benefits of public and stakeholder participation

- key water management issues at the river basin level are correctly identified and agreed upon
- knowledge, experience, aspirations and concerns of local communities are built into management plans and programs of measures
- programs of measures are likely to be politically realistic and acceptable
- conflicts can be minimized or avoided
- future implementers of measures will be aware of costs
- regulatory and voluntary approaches will be enforceable

Source: (4)

Badly organized public participation might lead to following situations:
- limited and un-representative response from stakeholders involved
- misleading of public opinion by specific interest groups
- mistrust in future decisions and unwillingness to implement measures adopted
- unaccomplished promises and expectations of requirements of legal framework
- passive position for new development plans in the area or, opposite, turbulence and unconstructive positions of stakeholders.

The importance of stakeholder participation should be recognized in a number of aspects of project preparation and implementation. These aspects include:
- the identification of stakeholders` interests in, importance to, and influence over the proposed project
- the identification of local institutions or processes upon which to build support for the project
- the provision of a foundation and strategy for involving the stakeholders in the various stages of preparing and implementing the IWRM plan.

In order to assess the importance and influence of the stakeholder, following aspects should be assessed:
- the power and status (political, social and economic) of the stakeholder
- the degree of organization of the stakeholder
- the control the stakeholder has over strategic resources
- the informal influence of the stakeholder (personal connections)
- the importance of these stakeholders to the success of the project.

Once the key stakeholders have been identified, the possible interest that these groups or individuals may have in the project can be considered. Important to realize when assessing the interests of the different stakeholders is that some stakeholders may have hidden, multiple or contradictory aims and interests.

Stakeholders should be engaged at all critical steps in the process of developing the plan. Methods of participation may include:
- workshops in which selected stakeholders are invited to discuss water issues
- representation in the management structure for the planning process
- local consultations
- surveys.

BOX 5: Illustration from running spatial planning in Sweden

Consultation with the public on overall plans and detailed plans is compulsory in Sweden. Consultation and information are important procedures to realize the plans and to prevent appeal against the plans. Example from one of the municipalities in Sweden shows that up to 25% of the costs and time to produce such a plan, mentioned above, fall on consultation and information just to prevent appeal against the plan and to "get everybody on the train". This may seem expensive, but appeal against the plans may delay the realization of the plans to high costs of those involved both authorities and the publics. In Sweden, no formal costs of the participation process fall on the users – except the time they use for the process.
Source: Public Participation in Relation to WFD, Guidance Document No. 8, EC 2003

Useful resources at web:

Building trust tools: http://www.resolv.org/pubs/buildingtrust/index.html
DFID: Stakeholder methodologies in natural resource management: http://www.dfid.gov.uk/pubs/files/BPG02.pdf

1.5.3. Planning cycle – Capacity building

Institutional capacity building is a means of enhancing performance. In the context of IWRM it represents the sum of efforts to utilize and enhance skills and capabilities of people and institutions at all levels. Capacity is needed at two levels:

- capacity to plan and develop IWRM programs
- operational capacity.

The term "capacity building" is used in many contexts, often with little reflection regarding its meaning. Capacity building can occur at local, national, or global levels and amongst any individual or group of stakeholders. Capacity building does not always involve the creation of new capacity, but often the redeployment or release of latent capacities. In general, the capacities are assessed at systemic, institutional and individual levels. Box 6 illustrates guiding questions to assess capacity constraints at all levels (5).

BOX 6: Guiding questions to assess capacity constraints

Systemic level:

- Policy framework: is the overall policy environment conducive?
- Legal and regulatory framework: is the appropriate legislation in place and are these laws effectively enforced?
- Management accountability framework: are institutional responsibilities clearly defined and are responsible institutions held publicly accountable?
- Economic framework: do markets function effectively and efficiently?
- Processes and relationships: do the different institutions and processes interact and work together effectively?

Institutional level:

- Mission/strategic management: do the institutions have clearly defined and understood missions and mandates?
- Culture/structure/competencies: are the institutions effectively structured and managed?
- Processes: do institutional processes such as planning, quality management, monitoring and evaluation, work effectively?
- Human resources: are the human resources adequate, sufficiently skilled, and appropriately deployed?
- Financial resources: are financial resources managed effectively and allocated appropriately to enable effective operation?
- Information resources: is required information available and effectively distributed and managed?

- Infrastructure: are material requirements such as buildings, offices, vehicles, computers, allocated appropriately and managed effectively?

Individual level:

- Job requirements: are jobs correctly defined and are the required skills available?
- Training: is the appropriate learning taking place?
- Career progression: are individuals able to advance and develop professionally?
- Accountability/ ethics: is responsibility effectively delegated and are individuals held accountable?
- Access to information: is there adequate access to needed information?
- Networking: are individuals in contact and exchanging knowledge with appropriate peers?
- Communication skills: are these effective?

1.5.4. Planning Cycle – Strategic vision

The achievement of sustainability requires a strategic vision, which is both long-term in its perspective and linking various development processes so that they are as sophisticated as the challenges are complex. A strategic vision for the sustainable development and management of water resources at the national level implies:

- Linking long-term vision to medium-term targets and short-term action;
- "Horizontal" linkages across sectors, so that there is a coordinated approach to development;
- "Vertical spatial linkages, so that local, national and global policy, development efforts and governance are all mutually supportive; and
- Genuine partnership between government, business, and community and voluntary organizations since the problems are too complex to be resolved by any group acting alone.

A vision of how the water resources are expected to be in about 20 years time is a useful start to a planning process. It allows for a common appreciation to be built of the future avoiding concerns over present conflicts and systems. This common view of the future assists stakeholders to pull together and address difficult issues. While a policy and a vision are very different, either may act as a basis of agreement and form the foundation to move on to the development of an IWRM plan. In the context of the development of an IWRM plan there may be a need to convince government and other stakeholders that an IWRM approach is the correct one to achieve the long term goal of sustainable management and development of water resources. The vision starts with the development of common view of the future and may include defined common goals and objectives, and translates these into policies, legislation and practice. The vision can be applied at a regional (inter-country) level, a shared watercourse level (internal river basin), a national level or a local level (sub-catchment).

BOX 7: Belgium Government recognizes water as a human right by the Constitution

On 19 April 2005, the Belgian federal government has adopted a "water resolution" in which it recognises access to safe water as a human right that should be included in the Belgian constitution. The resolution also calls for a significant increase in development aid for drinking water and sanitation, taking into account that access and distribution of water remains in public hands and that developing countries should not be pressurised by international financial or trade institutions to liberalise or privatise their water markets. Read http://www.irc.nl/page/17853.

Useful resource at web:

ECDPM, Facilitation tools, (from: Institutional Development, Learning by Doing and Sharing), http://www.cap-net.org/FileSave/34_facilitation_tools.doc

How to run a brainstorming session: http://www.uiweb.com/issue34.htm

1.5.5. Planning cycle – Situation analysis

The situation analysis examines the key factors of influence in a given situation. It is especially important to view the situation first from the perspective of those directly affected. Awareness of the problems and the motivation to seek solutions are a function of the condition experienced by the stakeholders.

For the purposes of an IWRM plan, the situation analysis is assessed against the principles of sustainable management and those embodied in the IWRM approach. Analysis and interpretation made against these goals and the national water vision or policy can be focused and targeted to address the main constraints and causes rather than the symptoms. A summary of the main areas to be covered in situation analysis is given in Box 8.

BOX 8: Scope of water resource situation analysis

- Institutional and legal analysis. Assess the mandates of institutions, laws and policies for conflict, conformity, overlap and consistency with sustainable management of water resources.
- Hydrological and hydrogeological assessment examines the extent of the surface and groundwater resources available, taking account of seasonality and long-term trends in supply.
- Demand assessment examines the competing uses of water with the physical resource base and assesses demand for water (at various prices), thus helping also to determine the financial resources available from tariff revenues for water resource management in different development scenarios.
- Environmental impact assessments (EIA) collect data on the social and environmental implications of development programmes and projects. EIA is an important tool for cross-sectional integration involving project developers, water managers, decision-makers and the public. It can be seen as a special form of water resources assessment.
- Social assessment examines how social and institutional structures affect water use and management, degree of equitable access to water such as by gender and how specific projects might affect the social structure.
- Risk or vulnerability assessment analyses the likelihood of extreme events, such as flood assessment; the environmental implications of development programmes and projects; management, or how a specific project might affect social structures; and droughts, and the vulnerability of society to them.
- Demand management assessment assesses the potential for water savings through water conservation and demand management.
- Unconventional sources assessment examines the potential for water reclamation, re-use, recycling and desalination.

Source: Adapted from the GWP IWRM Toolbox, Version 2, 2003

The situation analysis should examine the quantity and quality of both surface and groundwater as well as the potential for utilizing unconventional sources (reclamation, re-use, recycling, desalinization). The analysis should pinpoint the major water resources issues and [potential conflicts, their severity and social implications, as well as risks and hazards such as flood and drought. Many times, necessary data are not available and this in itself is an indicator of the weakness of the water resource management system.

An integral part of situation analysis is to prioritize those problems and issues that require most urgent attention. The criteria for this should be developed. Some of them might be as follows:

- is a barrier to solving other problems
- has an impact on a large number of people
- is a major equity issue
- will improve development and reduce poverty
- will significantly improve efficiency
- will positively impact on environment
- will improve water resource availability.

What are good indicators for sustainable management of water resources?

1.5.6. Planning cycle – development and endorsement of IWMR plan

The final action plans need political agreements on the highest political level, acceptance from the main stakeholders and raising the necessary financial means from domestic and international resources. There are a range of issues that an IWRM plan could address. These issues will differ from country to country depending on what the state of water and water management is in a particular country and should be driven by strategy and long terms objectives. At the minimum an IWRM plan should address the following:

What steps would you take to ensure political involvement and commitment when writing the final plan? How would you ensure the plan is realistic?

- The description of the water management ***approach*** which is intended to be replaced by the IWRM Plan. Where it came from, how long has it been in place, what legal instruments (policies, laws and institutions) supports it, and what are the constraints of the current approach to water management.
- A description of the current ***water resources situation*** in the country (a water resource assessment)
- A description of the ***scope of the plan*** (what is the objectives we wish to attain with the IWRM Plan; the vision for water management and also the level at which the plan is addressed (national, provincial or local level)).
- A description of how we plan to achieve the vision and objectives. This means an ***Implementation strategy***. (Achievement could be indicated either with direct reference to the water resources strategy or incorporating the relevant issues into the plan itself).
- The plan must include a section that ***links*** the IWRM plan to other national processes and/or plans. How relevant is the IWRM Plan for a Poverty Reduction Plan or an Integrated Development Plan, for example.

BOX 9: The SDAGE projects, France

For each of the 10 French large river basins, a management plan has been produced according to the 1992 French Water Act, called SDAGE. In a modified form they will become the river basin management plan according to the Water Framework Directive. The so-called Basin Committee is responsible for their initial elaboration. This Committee is composed of the representatives of all stakeholders and users in the River Basin District (about 100 members):

• 1/3 local elected officials (i.e. mayors, local communities);
• 1/3 users, consumers, NGOs;
• 1/3 representatives of the State.

The Basin Committee defines the management plan (SDAGE) and co-ordinates the coherence between SAGE Projects (management plans at the sub-basin/local scale). It arbitrates water conflicts, decides on the taxes to be paid by the users and defines action programmes. The SDAGE document was made available to the general public only after its approval, but this will have to change.

Each Basin Committee created a Planning Commission and several Geographic Commissions (implanted at a more local level) in which a number of debates and meetings took place. Hundreds of interested parties were able to voice their opinions in the meetings of these geographic commissions.

For example in the Rhone-Mediterranean-Corsica (RMC) Basin, the stakeholders were consulted through 10 geographic commissions, 6 technical committees and 7 socio-professional committees.

Besides, the SDAGE Project was submitted to the associations by way of a specific dialogue. 1500 written comments from stakeholders and the general public were received.

After completion of the plan, it needs to be accepted by the all stakeholders including government. It makes no sense to spend all the resources on a developing plan that is rejected at the end or consigned to the shelf never to be implemented. That is why political and stakeholder participation from the onset of the process of developing an IWRM plan is so important. A communication strategy for the plan should have been part of the communication strategy established by the management team during the whole planning process. The final IWRM plan should be made widely known and

easily accessible. This is important because, whatever the consultation process, it will have been impossible to reach all interested parties. Most consultation processes can only be samples and therefore once a national plan has been adopted it is important that everyone has access to it and is able to debate and prepare for the implications of implementation.

BOX 10: Good water legislation might be jeopardized by weak collaboration of water users

In Mediterranean Europe, irrigated agriculture is the heaviest user of abstracted water and accounts for 80% of total demand in Greece, 50% in Italy and 65% in Spain (EEA, 1996). Much of this water derives from groundwater, since surface runoff is insufficient to meet irrigation demand. For example, of the 5500 Mm3 abstracted annually from aquifers in Spain, 4000 million m3 is used for irrigation. An imbalance between supply and demand occurs occasionally owing to reduced recharge as a result of droughts and other climatic variability, which may be accentuated by future climate change. For example, it is predicted that by 2050 only a slight decrease (5%) in annual rainfall will occur over central Spain with no change in its seasonal pattern, whereas early wet season rainfall is expected to decrease significantly in Greece, with annual totals 25% less than at present.

A water law was passed in 1995 to limit abstraction in 15 hydrogeological units which had been declared overexploited in 1994. This water law could, in theory, solve the situation of water exploitation if the regulations were to be applied in aquifers declared as 'overexploited'. For these aquifers, the relevant water authority should prepare a water plan indicating the maximum amount of water available to each ground--water-licensed user. In practice, the situation has become much more complicated. Since the aquifer was legally declared 'over-exploited', and the authority attempted to impose abstraction restrictions, farmers have drilled an estimated 8000 to 9000 new, but illegal, water wells. Before this declaration, about 16 000 wells had been drilled (Acreman, 2000). This case study shows a region where water supply and demand are finely balanced and where the authorities are trying to implement sound management measures, but where collaboration with water users is proving the obstacle to sustainable water use.

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2. Water legislation of the EU

Chapter Objective:

This chapter aims to provide the participants with the overview of the EU water related legislation, description of the individual directives in order to understand the approach of the EU in a broader economic and political content. This chapter also outlines that implementation measures directed by the EC which must be transposed into national legislations are difficult and complex tasks.

Introduction

Early European water legislation began, in a "***the first wave***", with standards for those of rivers and lakes used for drinking water abstraction in 1975, and culminated in 1980 in setting binding quality targets for drinking water. It also included quality objective legislation on fish waters, shellfish waters, bathing waters. Its main emission control element was the Dangerous Substances Directive.

In 1988, the Frankfurt ministerial seminar on water reviewed the existing legislation and identified a number of improvements that could be made and gaps that could be filled. This resulted in "***the second wave***" of water legislation, oriented on emission control. The first results of this were focused on the pollution from urban waste water and from agriculture and the adoption in 1991, of the Urban Waste Water Treatment Directive, providing for secondary (biological) waste water treatment, and even more stringent treatment where necessary and the Nitrates Directive, addressing water pollution by nitrates from agriculture.

Other legislative results of these developments were Commission proposals for action on a new Drinking Water Directive, reviewing the quality standards and, where necessary, tightening them (adopted in November 1998) and the Directive for Integrated Pollution and Prevention Control (IPPC), adopted in 1996, addressing pollution from large industrial installations.

From 1995, the Community began to adopt a more global approach to water management. This has led to the framework directive for a policy on water which seeks to promote sustainable use of water resources and to ensure the coherence of policy in this area (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000, establishing a framework for Community action in the field of water policy).

BOX 1: The international conventions in field of water joint by the EU

The Community is a party to various international conventions aimed at protecting the marine environment: the OSPAR Convention, the Barcelona Convention for the Protection of the Mediterranean Sea and the Paris Convention for the Protection of the Marine Environment of the North East Atlantic. Other conventions seek to protect water courses: the Helsinki Convention on Transboundary Water Courses and International Lakes, the Convention on Cooperation for the Protection and Sustainable Use of the River Danube, the Convention on the Protection of the Rhine.

2.1. EU water legislation oriented on water quality

Council Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States[1].

The objective of the Directive[2] concerns surface water used or intended for the abstraction of drinking water after appropriate treatment and supplied by public distribution networks. The Directive sets the minimum quality requirements to be met by surface fresh water:

- parameters defining the physical, chemical and microbiological characteristics;
- limit values and guide values for these parameters;
- the minimum frequency of sampling and analysis;
- common non-mandatory reference methods for measuring the parameters.

Surface water is classified on the basis of its characteristics into three categories with different limit values. The categories A1, A2 and A3 correspond to the appropriate standard methods of treatment given in Annex I. These groups correspond to three different qualities of surface water, the respective physical, chemical and microbiological characteristics of which are set out in Annex II. A standard method of treatment is defined for each category. Subject to certain conditions, surface water is assumed to conform to the parameters, even if a certain percentage of samples fail to meet the limit values.

The Member States set the values for the parameters and the frequency of analysis of surface water in accordance with the guidelines set out in the Directive. If no values are set for the parameter in the Directive, Member States are under no obligation to set one. Member States may set more stringent requirements than laid down in the Directive.

The Member States are obligate to implement national programmes to improve surface water. Various exemptions are allowed from the provisions in the Directive. There is a procedure for adapting to technical progress the reference methods of measurement, the limit of detection, and the precision and accuracy of these methods. The Member States report every three years on implementation of the Directive on the basis of a questionnaire or outline drafted by the Commission[3]. This Directive will be integrated into the Water Framework Directive.

BOX 2: Sampling and monitoring – key tasks

- The competent authority should identify existing and future surface water abstraction points and agree a sampling point in each case
- In conjunction with the laboratory appointed, carry out a sampling program to ascertain the quality of the water (existing data may be used if the sampling procedures are in compliance with the Directive procedures)
- Using the data, the competent authority must assign the waters to a quality class (A1, A2, or A3)
- The competent authority mist establish an ongoing sampling program
- The competent authority should issue guidance on sampling and analytical methods to ensure that these conform to the requirements of the Directive.

[1] *The directive was amended by Directive 79/869/EEC, concerning the methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water and Directive 91/692/EEC, standardizing and rationalizing reports on the implementation of certain Directives relating to the environment.*

[2] *The directive is usually named as Surface Water Directive.*

[3] *The procedures are laid down in Directive 91/692/EEC.*

Council Directive 76/160/EEC concerning the quality of bathing water

The Directive concerns the quality of bathing water (both for fresh and coastal water bathing areas), with the exception of water intended for therapeutic purposes and water used in swimming pools. Directive lays down the minimum quality criteria to be met by bathing water:

- the physical, chemical and microbiological parameters;
- the mandatory limit values and indicative values for such parameters;
- the minimum sampling frequency and method of analysis or inspection of such water.

The Member States fix the values that they apply to bathing water in accordance with the guidelines of Directive. The Member States may fix more stringent values than those laid down in the Directive. Under certain conditions, bathing water is deemed to conform to the relevant parameters, even if a certain percentage of samples taken during the bathing season do not conform to the limit values.

The Directive on the quality of bathing waters requires that Member States submit to the Commission a comprehensive report on their bathing water and the most significant characteristics thereof. The Commission then publishes this information by means of a report just before the beginning of the next bathing season. The public gets as such an idea of what quality he might expect on his next visit to his favourite bathing place. It is, for the moment, not yet possible to provide the public with the information on the current bathing season. In the mean time, the Commission still publishes yearly a "paper" report (and Internet site).

The Member States are obliged to determine the cause of the problem where bathing waters fail the standards, and identify what action is required to bring the waters into compliance. As a result of the investigations, the competent authorities should draw up plans for water quality improvements.

BOX 3: Definitions

- "bathing water" means all running or still fresh waters or parts thereof and sea water, in which bathing is explicitly authorized by the competent authorities of each member State, or bathing is not prohibited and is traditionally practised by a large number of bathers;
- "bathing area" means any place where bathing water is found;
- "bathing season" means the period during which a large number of bathers can be expected, in the light of local custom, and any local rules which may exist concerning bathing and weather conditions.

Council Directive 78/659/EEC on the quality of fresh waters needing protection or improvement in order to support fish life

This Directive concerns the protection and/or improvement of the quality of running or standing fresh waters which support or which, if pollution were reduced or eliminated, would become capable of supporting certain fish species. Waters in natural or artificial fish ponds used for intensive fish-farming are excluded from the scope of the Directive.

The Member States are required to designate the fresh waters which are to be considered suitable for fish-breeding. These are subdivided into

- salmonid waters (waters which support or become capable of supporting fish belonging to species such as salmon, trout, grayling or whitefish) and,
- cyprinid waters (waters which support or become capable of supporting fish belonging to the cyprinids or other species such as pike, perch and eel).

The Directive lays down the minimum quality criteria to be met by such waters:

- physical, chemical and microbiological parameters;

- binding limit values and indicative values for these parameters;
- minimum frequency of sampling and reference methods of analysis for such waters.

There are two types of standards within each water category:
- Imperative (I) values – these are standards that must be met if the stretch is to pass the Directive (for the stretch to be 'compliant'). Values have been set for dissolved oxygen, pH, non-ionised ammonia, total ammonium, total residual chlorine, zinc and (for thermal discharges) temperature.
- Guideline (G) values – these are quality standards that should be achieved where possible. Values have been set here for other chemical parameters, such as copper, biochemical oxygen demand and suspended solids.

The Member States are required to set the values which they will apply to such waters in accordance with the guidelines contained in the Directive. They may set more stringent requirements than those laid down in the Directive. The Directive lays down the procedure for adapting the methods of analysis and the binding limit values to technical and scientific progress.
At intervals of three years, the Commission presents a report on the implementation of the Directive. This report is drawn up on the basis of a questionnaire or outline drafted by the Commission. This Directive will be integrated into the Water Framework Directive.

Council Directive 98/83/EC on the quality of water intended for human consumption

The Directive is intended to protect human health from adverse effects of contamination of water intended for human consumption by laying down healthiness and purity requirements which must be met by drinking water within the Community. It applies to all water intended for human consumption apart from natural mineral waters and waters which are medicinal products.
The Directive requires Member States (and designated competent authorities) to regularly monitor the quality of water intended for human consumption by using the methods of analysis specified in the Directive, or equivalent methods. For this purpose they shall determine the sampling points and draw up monitoring programmes. Where the parametric values are not attained, the Member States concerned shall ensure that the corrective action needed is taken as quickly as possible in order to restore water quality. Regardless of compliance, or otherwise, with the parametric values, Member States shall prohibit the distribution of drinking water or shall restrict its use and shall take any action needed where that water constitutes a potential human health hazard. Consumers shall be informed of any such action.

The Member States shall ensure that such drinking water:
- does not contain any concentration of micro-organisms, parasites or any other substance which constitutes a potential human health risk;
- meets the minimum requirements (microbiological and chemical parameters and those relating to radioactivity) laid down by the Directive.

BOX 4: Exemptions

The Directive shall provide the Member States with scope to provide for exemptions from the parametric values up to a maximum value, provided that:
- the exemption does not constitute a human health hazard;
- there is no other reasonable means of maintaining the distribution of drinking water in the area concerned;
- the exemption must be as restricted in time as possible and not exceed three years (it being possible to renew the exemption for two further three-year periods).

Any exemption granted must be accompanied by a detailed justification except if the Member State concerned feels that failure to meet the limit value is not serious and may be quickly remedied. Water sold in bottles or containers may not be exempted. Any Member State granting an exemption must inform the following thereof:
- the population affected;
- the Commission within a two-month period if the exemption covers the distribution of more than 1000 m^3 per day on average, or supplies for more than 5000 persons.

REMARK:
- The member states must inform the population concerned of any exemptions granted and provide advice to them on measures to be taken to protect human health from the adverse effects of contamination of drinking water.

The materials used in new installations for preparing and distributing drinking water may not continue to be present in drinking water beyond a strictly necessary level.
At least every five years the Commission shall re-examine the parameters laid down by the Directive in the light of scientific and technical progress. It will be assisted in that process by the Committee comprising representatives of the Member States. Every three years Member States shall publish a report on the quality of drinking water for its consumers. On the basis of those reports the Commission will, every three years, draw up a summary report on the quality of the water intended for human consumption within the Community.
Within five years at the latest Member States shall take any action needed in order to guarantee that water quality complies with the Directive. In exceptional cases that period may be extended provided that it does not exceed three years.

Council Directive 79/923/EEC on the quality required of *shellfish waters*[4]

The Directive aims to improve and to protect the quality of coastal and brackish water bodies which shellfish live[5], in order to contribute to the quality of edible shellfish products.

The Directives set the minimum quality criteria which must be met by shellfish waters:
- the physico-chemical and microbiological parameters;
- the mandatory limit values and the guide values of these parameters;
- the minimum sampling frequency and the reference methods of analysis of these waters.

The Member States shall set the values to be applied to shellfish waters in accordance with the guidelines in the Directives. They may set more stringent values than those laid down in the Directives. A procedure is laid down for adapting the methods of analysis and the parametric values to technical progress.
Every three years the Commission shall publish a sectoral report on the implementation of the Directive. This report shall be drawn up on the basis of a questionnaire or outline drafted by the Commission.

[4] *Amended by Council Directive 91/692/EEC*
[5] *Shellfish waters are waters which can support shellfish life (bivalve and gasteropod molluscs)*

2.2. EU water legislation oriented on emission control

Council Directive 76/464/EEC on pollution caused by certain *dangerous substances* discharged into the aquatic environment of the Community

The Directive applies to inland surface water, territorial waters, internal coastal waters and groundwater. The aim is to eliminate pollution of these waters, two lists of dangerous substances to be monitored are established:

- pollution caused by discharges of substances on list I must be eliminated,
- pollution caused by products on list II must be reduced.

List I contains certain individual substances which belong to the following families and groups of substances, selected mainly on the basis of their toxicity, persistence and bioaccumulation, with the exception of those which are biologically harmless or which are rapidly converted into substances which are biologically harmless must be ended.

List II contains substances belonging to the families and groups of substances in List I for which the limit values referred to in Article 6 of the Directive have not been determined, certain individual substances and categories of substances belonging to the families and groups of substances listed below, and which have a deleterious effect on the aquatic environment, which can, however, be confined to a given area and which depend on the characteristics and location of the water into which they are discharged.

BOX 5: Daughters directives that improve origin directive

- 82/176/EEC on limit values and quality objectives for mercury discharges by the chlor-alkali electrolysis industry. This Directive was amended by Council Directive 91/692/EEC.
- 83/513/EEC on limit values and quality objectives for cadmium discharges. This Directive was amended by Council Directive 91/692/EEC.
- 84/156/EEC on limit values and quality objectives for mercury discharges by sectors other than the chlor--alkali electrolysis industry. This Directive was amended by Council Directives 91/692/EEC.
- 84/491/EEC on limit values and quality objectives for discharges of hexachlorocyclohexane. This Directive was amended by Council Directive 91/692/EEC.
- 86/280/EEC on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464/EEC. This Directive was amended by Council Directives 88/347/EEC, 90/415/EEC and 91/692/EEC.

Quality objectives and emission standards are laid down for the substances on list I, based on the best available technology (BAT). These are compulsory unless the Member States prove that the quality objectives are being met and continuously maintained. Authorisation for new plants can only be issued if they intend to operate in accordance with BAT. All discharges require prior authorisation by the competent authority in the Member State concerned. The authorisation is granted for a limited period and lays down the emission standards. It is up to the Member State to ensure compliance with the emission standards.

Could you think why these substances are dangerous for aquatic environment?

For the substances on list II, the Member States adopt and implement programmes to preserve and improve water quality. All discharges are subject to prior authorisation by the competent authority in the Member State concerned, once again laying down the emission standards.

Every listed dangerous substance has a concentration limit called an Environmental Quality Standard (EQS). EQSs must not be exceeded in any controlled watercourse. The dangerous substance is not believed to be detrimental to aquatic life at any concentration below its EQS limit. The EQS is set

for the receiving watercourse and not the discharge itself. EQSs vary for each substance and can be different for fresh, estuarine or coastal waters.

The Member States systematically monitor water quality and may take more stringent measures than provided for by Directive. A procedure is laid down for revising and adding to the lists or transferring specific substances from list II to list I. Every three years Member States report on implementation of Directive, based on a questionnaire or outline drafted by the Commission.

BOX 6: Examples of institutional arrangements in Member States

In UK, the national Environment Agency has been appointed the competent authority for this directive. The Agency also has responsibility for IPPC and river basin management, so there is close cooperation between the individual inspectors who deal with industrial pollution and water management.
In Portugal, the competent body is the Water Institute, which reports to the EC and funds the Regional Directorates of the Environment. The Regional Directorates are also funded from licence fees and dredging rivers, and are not obliged by law to report to the national Water Institute or inform or coordinate with other Regional Directorates. In this country, the Dangerous Substances Directive has been transposed in three different national laws. However, the transposition was not adequate because it allowed an adoptive period for the industries to comply with the directive without specifying a time limit.

Thirteen years after the entry into force of the Water Framework Directive, the Directive on dangerous substances will be repealed.

Council Directive 80/68/EEC on the protection of *groundwater* against pollution caused by certain dangerous substances[6]

The purpose of the Directive is to
- prevent the discharge of certain toxic, persistent and bioaccumable substances into groundwater
- combat pollution by harmonizing the laws of the Member States on the discharge of certain dangerous substances into groundwater and by establishing systematic monitoring of the quality of such water.

Could you think what the differences between List I and List II substances are?

There are two lists of dangerous substances drawn up for the protection of groundwater:
- direct discharge of substances in list I is prohibited;
- discharge of substances in list II must be limited.

The following are excluded:
- discharges of domestic effluents from isolated dwellings;
- discharges containing substances listed in Directive 80/68/EEC in very small quantities and concentrations
- discharges of matter containing radioactive substances.

All indirect discharges of substances in list I and all direct or indirect discharges of substances in list II are subject to prior authorization. Such authorization:
- is granted after an investigation into the receiving environment;
- is granted for a limited period and subject to regular review;
- lays down the conditions that have to be met for discharges. If they have not been or cannot be met, the authorization is withdrawn or refused.

[6] *Amended by Council Directive 91/692/EEC*

BOX 7: Ground Water Directive – key terms

- "groundwater" means all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil;
- "direct discharge" means the introduction into groundwater of substances in lists I or II without percolation through the ground or subsoil;
- "indirect discharge" means the introduction into groundwater of substances in lists I or II after percolation through the ground or subsoil;
- "pollution" means the discharge by man, directly or indirectly, of substances or energy into groundwater, the results of which are such as to endanger human health or water supplies, harm living resources and the aquatic ecosystem or interfere with other legitimate uses of water.

The obligation is to prohibit the discharge into groundwater of List I substances, unless the groundwater is permanently unsuitable for other uses (in this case, the discharge may be allowed subject to specified conditions).
Monitoring of compliance with these conditions and of the effects of discharges on groundwater is the responsibility of the competent authorities of the Member States.

BOX 8: From news ... POPs not added to a new Groundwater directive

Brussels, (27 June 2005) Last Friday, Environment Ministers agreed on a new Groundwater Protection Directive. According to the EEB, Europe's largest federation of environmental citizen's organisations, the agreed Directive does no more than backtrack on existing groundwater protection levels, giving cause for increased concern about EU's responsibility towards its citizens.
"Clearly, citizens are worried about chemical contamination of their drinking water. But the response from EU governments is to allow even further contamination of groundwater – our main drinking water resource", says Stefan Scheuer, EEB Policy Director. "Almost every government that asked for it got its specific exemption, leaving the law with more loopholes than actual obligations. This is the EU a la carte."

Council Directive 91/271/EEC concerning *urban waste water treatment*

This Directive concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. Its aim is to protect the environment from any adverse effects due to discharge of such waters. Industrial waste water entering collecting systems, and the disposal of waste water and sludge from urban waste water treatment plants, are both subject to regulations and/or specific authorisations on the part of the competent authorities. The Directive lays down specific requirements for discharges from certain industrial sectors of biodegradable industrial waste water not entering urban waste water treatment plants before discharge to receiving waters.

BOX 9: Key terms used in the act

- **urban waste water** means waste water from residential settlements and services which originates predominantly from the human metabolism and from household activities (domestic waste water) or a mixture of domestic waste water with waste water which is discharged from premises used for trade or industry (industrial waste water) and/or run-off rain water;
- **eutrophication** means the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned;
- **population equivalent** (p.e.) is a measure of pollution representing the average organic biodegradable load per person per day identified as the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60g of oxygen per day.

- **agglomeration** means an area where the population and/or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point;
- **primary treatment** means treatment of urban waste water by a physical and/or chemical process involving settlement of suspended solids, or other processes in which the BOD5 of the incoming waste water is reduced by at least 20 % before discharge and the total suspended solids of the incoming waste water are reduced by at least 50 %;
- **secondary treatment** means treatment of urban waste water by a process generally involving biological treatment with a secondary settlement or other process in which the requirements established in Table 1 of Annex I are respected;
- **appropriate treatment** means treatment of urban waste water by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives.

The Member States shall ensure that urban waste water entering collecting systems before discharge is subject to secondary treatment or an equivalent treatment. As for the treatment objective:

- secondary (i.e. biological) treatment is the general rule,
- additional nutrient removal or further measures are mandatory in so-called sensitive areas with a population equivalent more that 10 000,
- in certain marine areas primary treatment (less sensitive areas) might be sufficient; less stringent objectives might so apply for agglomerations in high mountain areas
- for agglomerations with a population equivalent of less than 2000, but equipped with a collecting system, appropriate treatment has to be provided, i.e. a treatment that ensures good quality of the receiving water.

Could you think what does mean "sensitive areas" and what kind of measures should be adopted for waste water treatment in these areas?

The Member States, which have decided not to introduce an advanced standard of treatment throughout their territory, must ensure that their list of sensitive areas is revised at least every four years. The disposal of sludge at sea has been banned. The sludge arising from wastewater treatment and treated wastewater must be re-used whenever appropriate. Disposal routes should minimise adverse effects on the environment.

Member States are responsible for monitoring both discharges from treatment plants and the receiving waters. They will ensure that the competent national authorities publish a situation report every two years.

The Member States will set up national programmes for the implementation of this Directive and will present these to the Commission. These programs should include technical and financial measures for the implementation of the Directive.

BOX 10: UWWTD the most difficult to comply...

Due to the serious time-lag of the implementation of the Directive there are currently a significant number of ongoing infringement cases. All the horizontal infringement cases are based on detailed technical assessments of the situation, while single cases against Member States are based on the individual complaints from citizens, NGOs or have been initiated by the Commission.

The following infringements for the Directeve currently ongoing (as 2005):

- Court cases: In total 10 cases are in front of the European Court of Justice.
- Horizontal infringements in relation to designation of sensitive areas: there are 11 cases (9 of them at the stage of reasoned opinion).
- Horizontal infringements in relation to normal areas: 7 cases (2 of them at the stage of reasoned opinion) in relation of lack of infrastructure for agglomerations >15,000 p.e., discharging into normal areas (deadline of 31/12/2000).

- Single cases: 13 cases (6 of them at the stage of reasoned opinion and 7 at the stage of letter of formal notice). Six previous cases were merged with the horizontal cases, which highlights the concern of pollution by waste water by the EU citizens. The main issues related to single cases are collecting systems (especially storm water overflows), lack of infrastructure and industrial pollution (food-processing industries). More and more cases are having a mixed character i.e. in breach of several Directives (i.e. Dangerous substances directive, Birds and Habitats Directive, Sewage sludge directive etc.).

Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources (*nitrate directive*)

Objective of the Directive is to reduce or prevent water pollution caused or induced by nitrates from agricultural sources.
Water pollution by nitrates has been worsened by the introduction of intensive farming methods, with increased use of chemical fertilisers and higher concentrations of animals in smaller areas. Water pollution by nitrates is causing problems in all the Member States. The sources of nitrate pollution are diffuse (multiple discharges, difficult to locate), and the main polluters – farms – are sensitive to anything which affects the economic viability of their activity. The 1980s saw a progressive worsening of the situation (nitrate concentrations in water rose by an average of 1 mg/l per year) owing to the growth of intensive livestock farming (chickens, pigs) in areas already saturated, and of intensive crop-growing involving chemical weed killers and over fertilisation.

The Member States must identify, on their territory:
- surface waters and groundwater affected or which could be affected by pollution, in accordance with the procedure and criteria set out in the Directive;
- vulnerable zones which contribute to pollution.

Could you think what is the difference between "sensitive area" and "vulnerable zone"?

The Member States must establish codes of good agricultural practice to be implemented by farmers on a voluntary basis, as defined in Annex II to the Directive. The Member States must establish and implement action programmes in respect of vulnerable zones. These must include the measures prescribed in the codes of good agricultural practice and measures:
- to limit the spreading on land of any fertiliser containing nitrogen;
- to set limits for the spreading of livestock effluent.

The Directive authorises Member States to take additional measures or to reinforce the action programmes in order to attain the objectives of the Directive. The Member States must monitor water quality, applying standardised reference methods to measure the nitrogen compound content. Member States must report regularly to the Commission on implementation of the Directive.

BOX 11:
EC report of 17 July 2002 on implementation of the Directive 91/676/EEC

All the Member States have transposed the Directive, set up a monitoring network, drawn up a code of good practice and designated vulnerable zones (apart from Ireland). The monitoring networks indicate that over 20% of groundwater in the EU and between 30 and 40% of lakes and rivers are showing excessive nitrate concentrations. Nitrogen from agricultural sources accounts for between 50 and 80% of the nitrates entering Europe's water. The impact of the Directive's implementation will only be felt in a few years' time, though positive results are already starting to be seen in some regions.
Though the report considers the Directive to be fully up-to-date and in no need of revision, action to improve its implementation is desirable:
- cost-effectiveness studies on preventive measures;
- reinforced controls at field level and penalties for those who fail to comply with the Directive.

Synergy needs to be developed for common implementation of the water directives, on items such as:
- harmonisation of water sampling points, networks, parameters and frequencies for quality monitoring;
- assessment of losses of nutrients to waters and of the breakdown of their origin;
- development of models correlating environmental impacts and causative factors.

2.3. Integrated EU approach in the field of water management

Directive 2000/60/EC of the European Parliament and of the Council, establishing a framework for Community action in the field of water policy (*Water Framework Directive*)

Much progress has been made in water protection in Europe, in individual Member States, but also in tackling significant problems at European level. But Europe's waters are still in need of increased efforts to get them clean or to keep them clean. After 25 years of European water legislation, this demand is expressed, not only by the scientific community and other experts, but to an ever increasing extent by citizens and environmental organisations. The initiative generated by the present political process on the Water Framework Directive for the benefit of all Europe's citizens and waters included:
- Getting Europe's waters cleaner
- Getting the citizens involved.

The central feature of the WFD is the use of river basins as the basic unit for all water planning and management actions. Thus, it obliges the Member States to establish integrated river basin management. The principal environmental objectives are:
- to prevent deterioration in status of all Community waters
- to ensure achievement and maintenance of good status for all Community waters by 2015.

One advantage of the framework directive approach, in its own way a significant one, is that it will rationalise the Community's water legislation by replacing seven of the "first wave" directives: those on surface water and is two related directives on measurement methods and sampling frequencies and exchanges of information on fresh water quality; the fish water, shellfish water, and groundwater directives; and the directive on dangerous substances discharges. The operative provisions of these directives will be taken over in the framework directive, allowing them to be repealed.

Key actions
- 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 (*Article 3, Article 24*);
- to characterise 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 (*Article 5, Article 6, Annex II, Annex III*);
- to carry out, jointly and together with the European Commission, the intercalibration of the ecological status classification systems by 2006 (Article 2 (22), *Annex V*);
- To make operational the monitoring networks by 2006 (*Article 8*);
- Based on sound monitoring and the analysis of the characteristics of the river basin, to identify by 2009 a programme of measures for achieving the environmental objectives of the Directive cost-effectively (*Article 11, Annex III*);
- to produce and publish River Basin Management Plans (RBMPs) for each RBD including the designation of heavily modified water bodies, by 2009 (*Article 13, Article 4.3*);

- to implement water pricing policies that enhance the sustainability of water resources by 2010 (*Article 9*);
- to make the measures of the program operational by 2012 (*Article 11*); and
- to implement the programmes of measures and achieve the environmental objectives by 2015 (*Article 4*).

River Basin Management

The best model for a single system of water management is management by river basin – the natural geographical and hydrological unit – instead of according to administrative or political boundaries. While several Member States already take a river basin approach, this is at present not the case everywhere. For each river basin district – some of which will traverse national frontiers – a "river basin management plan" will need to be established and updated every six years, and this will provide the context for the co-ordination requirements identified above.

Surface water – ecological protection

A general requirement for ecological protection, and a general minimum chemical standard, was introduced to cover all surface waters. These are the two elements "good ecological status" and "good chemical status". Good ecological status is defined in Annex V of the Water Framework Directive, in terms of the quality of the biological community, the hydrological characteristics and the chemical characteristics. As no absolute standards for biological quality can be set which apply across the Community, because of ecological variability, the controls are specified as allowing only a slight departure from the biological community which would be expected in conditions of minimal anthropogenic impact. A set of procedures for identifying that point for a given body of water, and establishing particular chemical or hydromorphological standards to achieve it, is provided, together with a system for ensuring that each Member State interprets the procedure in a consistent way (to ensure comparability). The system is somewhat complicated, but this is inevitable given the extent of ecological variability, and the large number of parameters, which must be dealt with.

Surface water – chemical protection

Good chemical status is defined in terms of compliance with all the quality standards established for chemical substances at European level. The Directive also provides a mechanism for renewing these standards and establishing new ones by means of a prioritisation mechanism for hazardous chemicals. This will ensure at least a minimum chemical quality, particularly in relation to very toxic substances, everywhere in the Community.

BOX 12: Preparation of priority hazardous substances list

The Commission proposed a procedure for the identification of priority hazardous substances outlined in the Working Document (ENV/191000/01, 2001). The proposed procedure in the Working Document groups the proposed 32 priority substances according to their "level of concern" taking particular account of their "level of hazard". The procedure is based on the best available knowledge. The main emphasis was put on available "hazard assessments", in particular work carried out under the OSPAR Strategy with regard to Hazardous Substances, the classification and labelling of dangerous substances under Directive 67/548/EEC and the Protocol on POPs under the UN-ECE Convention on Long-Range Transboundary Air Pollution. Furthermore, the procedure considered the finalised risk assessments made under Council Regulation No. 793/93/EEC and Directive 91/414/EEC and the information under the regulations of pollution by certain dangerous substances discharged into the aquatic environment under Directive 76/464/EEC and its five 'daughter' directives. The above-mentioned information was used to group the priority substances into clusters with increasing "levels of concern".

For the final assignment of a priority substance, „additional considerations" were considered to confirm or reject the status of the substance. The „additional considerations" included other relevant Community

legislation or relevant international agreements, the production and use of the substance, the socio-economic impacts of a cessation or phase-out and the suspected endocrine disrupting potential of the substance. The final qualitative assessment of the socio-economic costs related to the identification of substances for inclusion as priority hazardous substances was carried out in the study ***"Socio-Economic Impacts of the Identification of Priority Hazardous Substances under the Water Framework Directive"***, conducted by RPA December 2000 (Report).

Other uses of surface water

The other uses or objectives for which water is protected apply in specific areas, not everywhere. Therefore, the obvious way to incorporate them is to designate specific protection zones within the river basin which must meet these different objectives. The overall plan of objectives for the river basin will then require ecological and chemical protection everywhere as a minimum, but where more stringent requirements are needed for particular uses, zones will be established and higher objectives set within them.

There is one other category of uses which does not fit into this picture. It is the set of uses which adversely affect the status of water but which are considered essential on their own terms – they are overriding policy objectives. The key examples are flood protection and essential drinking water supply, and the problem is dealt with by providing derogations from the requirement to achieve good status for these cases, so long as all appropriate mitigation measures are taken. Less clear-cut cases are navigation and power generation, where the activity is open to alternative approaches (transport can be switched to land, other means of power generation can be used). Derogations are provided for those cases also, but subject to three tests: that the alternatives are technically impossible, that they are prohibitively expensive, or that they produce a worse overall environmental result.

Ground water – Chemical status

The case of groundwater is somewhat different. The presumption in relation to groundwater should broadly be that it should not be polluted at all. For this reason, setting chemical quality standards may not be the best approach, as it gives the impression of an allowed level of pollution to which Member States can fill up. A very few such standards have been established at European level for particular issues (nitrates, pesticides and biocides), and these must always be adhered to. But for general protection the approach of precautionary was taken. It comprises a prohibition on direct discharges to groundwater, and (to cover indirect discharges) a requirement to monitor groundwater bodies so as to detect changes in chemical composition, and to reverse any antropogenically induced upward pollution trend. Taken together, these should ensure the protection of groundwater from all contamination, according to the principle of minimum anthropogenic impact.

Quantitative status of ground water

Quantity is also a major issue for groundwater. Briefly, the issue can be put as follows. There is only a certain amount of recharge into a groundwater each year, and of this recharge, some is needed to support connected ecosystems (whether they be surface water bodies, or terrestrial systems such as wetlands). For good management, only that portion of the overall recharge not needed by the ecology can be abstracted – this is the sustainable resource, and the Directive limits abstraction to that quantity.

The combined approach

Historically, there has been a dichotomy in approach to pollution control at European level, with some controls concentrating on what is achievable at source, through the application of technology; and some dealing with the needs of the receiving environment in the form of quality objectives. Each

approach has potential flaws. Source controls alone can allow a cumulative pollution load which is severely detrimental to the environment, where there is a concentration of pollution sources. And quality standards can underestimate the effect of a particular substance on the ecosystem, due to the limitations in scientific knowledge regarding dose-response relationships and the mechanics of transport within the environment.
For this reason, a consensus has developed that both are needed in practice – ***a combined approach***. The Water Framework Directive formalises this. On the source side, it requires that as part of the basic measures to be taken in the river basin, all existing technology-driven source-based controls must be implemented as a first step. But over and above this, it also sets out a framework for developing further such controls. The framework comprises the development of a list of priority substances for action at EU level, prioritised on the basis of risk; and then the design of the most cost-effective set of measures to achieve load reduction of those substances, taking into account both product and process sources.
On the effects side, it co-ordinates all the environmental objectives in existing legislation, and provides a new overall objective of good status for all waters, and requires that where the measures taken on the source side are not sufficient to achieve these objectives, additional ones are required.

The river basin management plan
The plan is a detailed account of how the objectives set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within the timescale required.

The plan will include all the results of the analysis:
- the river basin's characteristics,
- a review of the impact of human activity on the status of waters in the basin,
- estimation of the effect of existing legislation and the remaining "gap" to meeting these objectives; and
- a set of measures designed to fill the gap.

One additional component is that an economic analysis of water use within the river basin must be carried out. This is to enable there to be a rational discussion on the cost-effectiveness of the various possible measures. It is essential that all interested parties are fully involved in this discussion, and indeed in the preparation of the river basin management plan as a whole.

Participation
The WFD requires encouraging the active involvement of all interested parties in the implementation of this Directive. There are two main reasons for an extension of public participation. The first is that the decisions on the most appropriate measures to achieve the objectives in the river basin management plan will involve balancing the interests of various groups. The economic analysis requirement is intended to provide a rational basis for this, but it is essential that the process is open to the scrutiny of those who will be affected.
The second reason concerns enforceability. The greater the transparency in the establishment of objectives, the imposition of measures, and the reporting of standards, the greater the care Member States will take to implement the legislation in good faith, and the greater the power of the citizens to influence the direction of environmental protection, whether through consultation or, if disagreement persists, through the complaints procedures and the courts. Caring for Europe's waters will require more involvement of citizens, interested parties, non-governmental organisations (NGOs). To that end the Water Framework Directive will require information and consultation when river basin management plans are established: the river basin management plan must be issued in draft, and the background documentation on which the decisions are based must be made accessible.

Furthermore a biannual conference in order to provide for a regular exchange of views and experiences in implementation will be organised. Too often in the past implementation has been left unexamined until it is too late – until Member States are already woefully behind schedule and out of compliance. The Framework Directive, by establishing very early on a network for the exchange of information and experience between water professionals throughout the Community will ensure this does not happen.

Getting the prices right

The need to conserve adequate supplies of a resource for which demand is continuously increasing is also one of the drivers behind what is arguably one of the Directives's most important innovations – the introduction of pricing. Adequate water pricing acts as an incentive for the sustainable use of water resources and thus helps to achieve the environmental objectives under the Directive Member States will be required to ensure that the price charged to water consumers – such as for the abstraction and distribution of fresh water and the collection and treatment of waste water – reflects the true costs. Whereas this principle has a long tradition in some countries, this is currently not the case in others. However, derogations will be possible, e.g. in less-favoured areas or to provide basic services at an affordable price.

Implementation

Under this Directive, Member States have to identify all the river basins lying within their national territory and assign them to individual river basin districts. River basins covering the territory of more than one Member State will be assigned to an international river basin district.

Member States must at the latest:

- four years after the date of entry into force of this directive, complete an analysis of the characteristics of each river basin district, a review of the impact of human activities on the water, an economic analysis of water use and a register of areas requiring special protection. All bodies of water used for the abstraction of water intended for human consumption providing more than 10 m^3 a day as an average or serving more than 50 persons must be identified,
- nine years after the date of entry into force of the Directive, a management plan and programme of measures must be produced for each river basin district, taking account of the results of the analyses and studies,

The measures provided for in the river basin management plan seek to:

- prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of hazardous substances;
- protect, enhance and restore all bodies of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between abstraction and recharge of groundwater;
- preserve protected areas.

Could you think that the objectives of the WFD to achieve "good status" of water bodies are realistic?

Less stringent environmental objectives may be set for specific bodies of water that are "so affected by human activity... or their natural condition is such" that achievement of good status would not be feasible or would be disproportionately expensive.

The abovementioned objectives have to be achieved at the latest fifteen years after the date of entry into force of the Directive, but this deadline may be extended or relaxed, albeit under the conditions laid down by the Directive.

There are some ***deadline extensions*** possible. These are in cases where

- the scale of improvements needed is so great that the time limit of 15 years would be exceeded, or
- completing the necessary improvements within 15 years would be disproportionately expensive, or
- natural conditions preclude timely improvement.

By 2010, Member States must ensure that water pricing policies provide adequate incentives for users to use water resources efficiently and that the various economic sectors contribute to the recovery of the costs of water services including those relating to the environment and resources.

BOX 13:
The EC obligations

The Commission submitted a list of priority substances selected amongst those which present a significant risk to or via the aquatic environment. Measures to control such substances, as well as quality standards applicable to concentrations thereof, will also be proposed. The aim of such measures is to reduce, stop or eliminate discharges, emissions and losses of priority substances. This list forms Annex X to the present Directive.
Two years after the entry into force of the Directive, the Commission will publish a proposal with specific measures to prevent and control the pollution of groundwater.
At the latest twelve years after the date of entry into force of the Directive and every six years thereafter, the Commission will publish a report on the implementation of the Directive. The Commission will convene when appropriate a conference of interested parties on Community water policy which will involve Member States, representatives from the competent authorities, the European Parliament, NGOs, the social and economic partners, consumer bodies, academics and other experts.

Implementation strategy

The EC endorsed the Common Implementation Strategy (CIS), that aims to help of the development of a common understanding of important technical issues, pools effort and expertise and helps deliver effective implementation across Europe in a timely way.
The CIS[7] has two main aims:

- to provide opportunities to build a shared understanding of the Directive, which is vital if we are to reach good water quality status throughout the EU by 2015; and
- to share the wealth of experience and expertise that Member States have at their disposal and the burden of preparing for implementation over the coming years.

Under the Strategy, a number of projects have developed guidance documents on how to implement the technical parts of the Directive. The guidance is non-legally binding and is not intended to interpret the terms of the Directive. Guidance documents have now been adopted on:

- Analysis of pressures and impacts.
- Economic analysis.
- Identification and designation of heavily modified water bodies and artificial water bodies.
- Reference conditions and ecological status boundaries for inland surface waters.
- Typology, reference conditions and classification of transitional and coastal waters.
- Intercalibration.
- Monitoring.
- Geographical Information Systems.
- Tools for the assessment and classification of groundwater.
- Best practices in river basin planning:

[7] *[http://www.europa.eu.int/comm/environment/water/water-framework/implementation.html]*

  - Identification of river basin districts.
  - Public participation.
  - River basin planning process.
- Identification of water bodies.

These guidance documents can be downloaded from the public section of the Commission's website [http://forum.europa.eu.int/Public/irc/env/wfd/library].

RECOMMENDATION: It is strongly recommended to visit more information. There are sources:
- Strategic document (May 2001): "Common Strategy on the Implementation of the Water Framework Directive"
- Strategic document (June 2003): "Carrying forward the Common Implementation Strategy for the Water Framework Directive – Progress and Work Programme 2003/2004"
- Strategic Document (December 2004): "Moving to the next stage in the Common Implementation Strategy for the Water Framework Directive – Progress and Work Programme 2005/2006"

2.4. Something in addition

...of the short history of EU environmental policy

Protection of the environment is one of the major challenges facing Europe. The European Community has been strongly criticised for putting trade and economic development before environmental considerations. It is now recognised that the European model of development cannot be based on the depletion of natural resources and the deterioration of the environment.

Environmental action by the Community began in 1972 with four successive action programmes, based on a vertical and sectoral approach to ecological problems. During this period, the Community adopted some 200 pieces of legislation, chiefly concerned with limiting pollution by introducing minimum standards, notably for waste management, water pollution and air pollution. The introduction of this legislative framework, however, could not of itself prevent deterioration of the environment, and with the growth in public awareness of the risks posed by global environmental problems it has become clear that concerted action at European and international levels is absolutely essential.

Community action developed over the years until the Treaty on European Union conferred on it the status of a policy. A further step was taken with:
- the Treaty of the Amsterdam, which enshrines the principle of sustainable development as one of the European Community's aims and makes a high degree of environmental protection one of its absolute priorities,
- the Fifth Community Action Programme on the Environment „Towards Sustainability" established the principles of a European strategy of voluntary action for the period 1992-2000 and marked the beginning of a „horizontal" Community approach which would take account of all the causes of pollution (industry, energy, tourism, transport, agriculture, etc.),
- the Commission Communication on integrating the environment into European Union policies,
- the European Strategy for Sustainable Development was approved in May 2001. It sets out the long-term objectives for sustainable development and essentially concerns climate change, transport, health and natural resources.
- the Sixth Action Programme for the environment, sets out the priorities for the European Community up to 2010 in the field of:

- climate change,
- nature and biodiversity
- environment and health
- management of natural resources and waste.

Instruments and application

The range of environmental instruments available has expanded as environmental policy has developed. Not only has the Community adopted framework legislation providing for a high level of environmental protection while guaranteeing the operation of the internal market, but it has introduced a financial instrument and technical instruments: (the LIFE programme) eco-labelling , the system of environmental management and auditing , system for assessment of the effects of public and private projects on the environment , and the criteria applicable to environmental inspections in the Member States .

The European Environment Agency has come to play an increasingly important role in recent years. It was set up to gather and disseminate comparable environmental data. Its role is purely advisory but its work has become more and more crucial for the adoption of new measures and for assessing the impact of decisions already adopted.

Monitoring the application of the Community law

Monitoring the application of the law may take the institutional infringement proceedings following complaints or where cases are discovered in the ordinary course of events:

- court action against the other institutions;
- checking whether aid given by Member States is lawful; checking that the principles prohibiting certain types of agreements,
- decisions and concerted practices and the abuse of a dominant position are observed.

The Commission's annual reports on the application of Community law are an expression of the desire for transparency in dealings not only with complainants but also with citizens and members of parliament. The Commission has the power to ask the Court of Justice to impose a fine on the offending Member State. This new power seriously boosts its ability to monitor the proper application of Community law.

BOX 14: Legal Process

Article 226 of the Treaty gives the Commission powers to take legal action against a Member State that is not respecting its obligations. If the Commission considers that there may be an infringement of EU law that warrants the opening of an infringement procedure, it addresses a „Letter of Formal Notice" (first written warning) to the Member State concerned, requesting it to submit its observations by a specified date, usually two months. In the light of the reply or absence of a reply from the Member State concerned, the Commission may decide to address a „Reasoned Opinion" (final written warning) to the Member State. This clearly and definitively sets out the reasons why it considers there to have been an infringement of EU law and calls upon the Member State to comply within a specified period, normally two months. If the Member State fails to comply with the Reasoned Opinion, the Commission may decide to bring the case before the European Court of Justice. The Court can make a judgement confirming that the Member State is in breach of its obligations. The Member State must take steps to comply with the judgement as soon as possible. Article 228 of the Treaty gives the Commission power to act against a Member State that does not comply with a previous judgement of the European Court of Justice. Such action also involves the stages of a "Letter of Formal Notice" and "Reasoned Opinion". The article also allows the Commission to ask the Court to impose a financial penalty on the Member State concerned.

3. Basic Concepts of Environmental Economics

Chapter Objective:

This chapter is designed to investigate the way in which economic theory can be applied to environmental issues – and specifically to those in the water sector. It will also look at the ways in which economists, environmental scientists/technologists and environmental practitioners can apply economic principles to help them to develop water-related policies and to manage their execution.

Introduction

There are many ways in which relatively straightforward principles of environmental economics can be used to ascribe 'values' and 'costs' to water stocks and water flows, and how such factors can be exercised and manipulated in the marketplace.
Environmental and resource economics is a branch of applied economics within which spatial and temporal issues play an important role. The economic concept of 'value' is grounded in neoclassical welfare economics. Welfare economics is *normative* or *prescriptive* in character – it seeks the resource allocation that maximally contributes to the satisfying of needs and wants of individuals in society. This contrasts with *positive* or *descriptive* economics which is concerned with understanding how economic systems function(1). Positive economics deals in *facts* whilst normative economics deals with *values*.

Non-renewable resources that are available today (perhaps oil is the most striking example) will not be available in the future and their allocation over time and between generations becomes an important issue. The impact of the pollution of the aquatic environment is not only a function of *how much* pollutant there is, but *where* it occurs and how easily, quickly and cheaply the pollution can be removed to restore the water to an acceptable quality for the next user.

BOX 1. The Origins of Environmental Economics

The idea of applying environmental economics and using economic instruments in the environmental arena is not a recent one. Back in 1920, the welfare economist Arthur Cecil Pigou suggested the use of pollution taxes as a means of reducing the gross atmospheric pollution that occurred in parts of London at the time. He felt that it was unacceptable to simply regard the atmosphere as a 'sink' into which all gaseous pollutants could be discharged without penalty, and one in which we also choose to ignore the consequences of the reduction in sunlight and the higher incidence of disease that this indiscriminate pollution causes.
He advocated the use of an economic instrument to put a 'value' on the troposphere and argued that this would enable a levy or a tax to be raised on those emitting the polluting discharges. The more the pollution then the more that should be paid (to compensate for the loss of amenity, the increase in illness and so on). Putting it another way, Pigou's argument was that when pollution remained an unpriced 'externality' to market transactions then it would result in a less advantageous allocation of resources than if pollution were to be correctly priced.

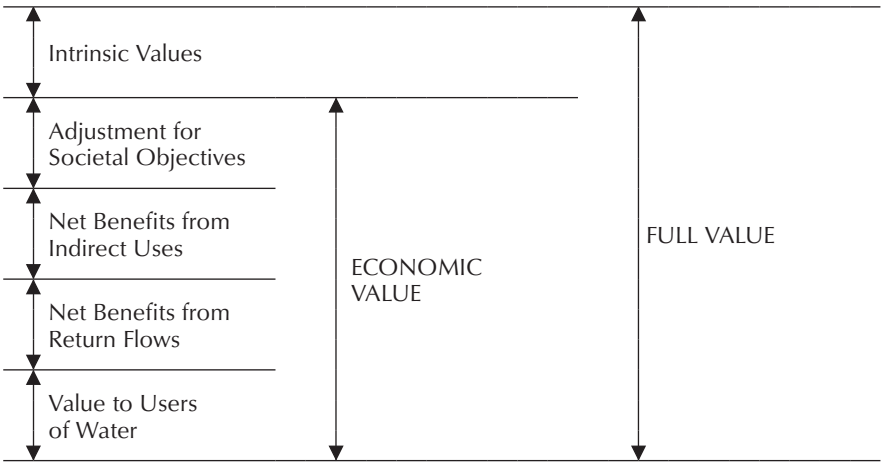
In many parts of the world, despite the inescapable fact that water is vital for all human activity, it is becoming an increasingly scarce commodity. Many of the sources that we use for drinking, agriculture and irrigation are finite and unless we are able to manage our water in a sustainable way then there will be increasing hardship and social dislocation. The ways in which we chose to access and distribute our water and the methods that we employ to manage its availability will have far-reaching consequences on the levels and patterns of growth in many areas of the world. This, in turn, will influence the generation and the distribution of wealth – it will affect people's wellbeing and determine the range of opportunities that are available to them for generations.
So, it is important to understand the economic implications of the policies that water experts develop to manage the water; not simply in conventional financial terms but in a wider context where environmental and societal factors and values come into play during the economic evaluation process. The role of economic tools and their contribution to the decision-making processes in devising and developing water-related policies can easily be overlooked.

3.1. Basic terms: Cost, Price and Value

We need water to sustain our basic needs – drinking, irrigation, cleaning and so on. There is a **cost** associated with this provision and this is perhaps the simplest way in which might consider water's environmental economic impact. Things are more complex than this though and there are many facets relating to the basic concept of 'cost'. There is the 'cost' of river and catchment management to ensure that we have sufficient water of a satisfactory quality to use for the needs that we identify. There will be a cost associated with abstracting the water and conveying or pumping it to where we want to use it, and there is also the cost of the appropriate treatment of the wastewater that we produce so that we can return it to the environment without causing significant harm (certainly to ourselves and maybe also to others). There are also recreational benefits associated with water, and these too have an associated cost linked to their maintenance.

Can you think of any other specific types of 'value' that water has? Consider, for example, a habitat or a wildlife refuge – does this have an environmental or a social value that translates into an economic cost or value? If so, how might we set that value?

We may also choose to consider water in terms of its **value**. There are many ways in which we might ascribe a 'value' to water, but ultimately its value depends upon the user and the use to which the water is put. For example, rivers convey wastewaters and polluted runoff – this can mean that the local population are less susceptible to disease than they might otherwise have been had the polluted material remained in place. This, in turn, can mean that there is less expense incurred treating illnesses, less work days lost resulting in a more vibrant economy, a generally improved social recreational environment all of these aspects are of value to us, although it may be difficult for us to ascribe a monetary equivalent value to some of these. Nevertheless, their absence would



lead to a cost, which may be financial, environmental or social. Managing water in the context of these summative values is critical in ensuring its efficient use and encouraging its conservation and protection.

Another way of thinking about the value of water is to consider the components that go into making up the full value to an individual; typically, these can be summarised as shown in the diagram (2). Cost and value have their place, but we must also think about **price** – the amount that an individual or organisation pays for its supply of water or for the facility to discharge its wastewater. We shall discuss the interrelationship between cost, value and price in greater detail, but in the meantime we can summarise by saying that environmental economics is able to help us to approach the interrelationship between these factors in a systematic way.

In looking at water through the prism of environmental economics, we need to consider cost, value and price (or 'tariff'). But in trying to define our overall 'value' of water, there are some basic terms and concepts that we need to better understand and that will help us to define it.

BOX 2. Glossary of Terms

User value is the value that can be derived from the actual direct or indirect use of the environment – or in this case of water. You might best consider it as the value ascribed to one single, specific use of water.

Non-use value is an ascribed value that is independent of any individual's or organisation's actual present use of the resource – for example, we 'feel' that the wetland or the lake is of value to us.

Option value is the value to a consumer in retaining an option to consume a good or service sometime in the future.

Total Economic Value (TEV) is the sum of the use values, the non-use values and option values.

System value is the aggregate value that, say, a unit of water can *generate* as it moves through a river system before it is consumed or lost. An integrated approach to water resource management shifts the focus from *user* to *system* values, accounting for opportunity costs (see below) and internalizing externalities (see below).

Contingent valuation (CV) is a method of finding, often through surveys, how environmental impacts are valued by individuals (both use and non-use values). Respondents are offered a hypothetical market and asked to express their willingness to pay for existing or potential environmental conditions that have no 'real' market associated with them (3).

Willingness to pay (WTP) is the *maximum* amount (identified during the CV) that an individual is prepared to pay for a good, to secure a benefit or to avoid a cost.

Willingness to accept (WTA) is the *minimum* amount/compensation (identified during the CV) that an individual would be prepared to accept to give a good up, or as compensation for forgoing a benefit or tolerating a cost.

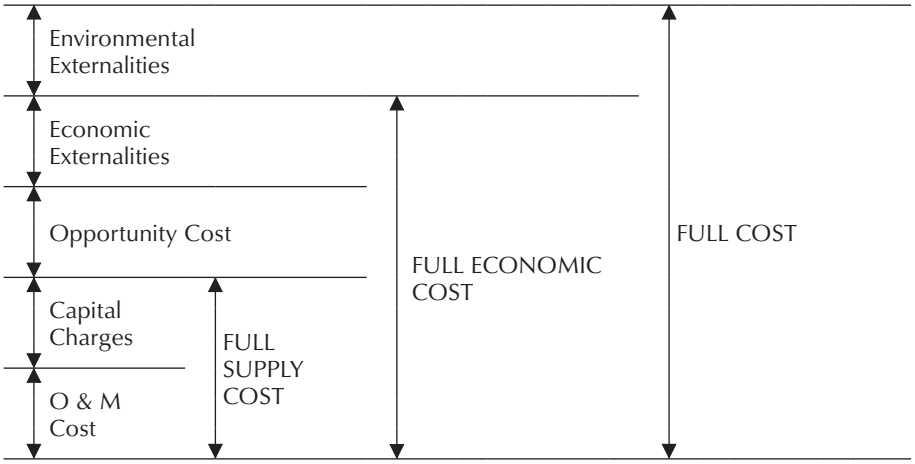
Cost benefit analysis (CBA) or **benefit cost analysis (BCA)** is a methodology that is used to evaluate the benefits that accrue through the application of specific costed solutions.

Externalities occur when the actions of one water user affect the interests or the well-being of another user with no compensation being applied. They are the consequences of the actions of specific water users on "external" parties and consist of changes that are not reflected in actual market prices – they remain unpriced (and hence external to the market). Economic externalities are those that cause an upstream or downstream impact that affect consumption costs whereas the *environmental externalities* are those associated with public health and ecosystem maintenance. So, for example, if pollution is causing increased production/consumption costs then this would be an economic externality; if it was causing public health or ecosystem impacts then it would be an environmental externality. We can have both *positive externalities* (for example when surface irritation is both watering crops and also recharging an aquifer) and *negative externalities* (for example if return flows from irrigation are saline or contain high concentrations of nitrogen or phosphorus).

Full supply cost includes all of the costs associated with the supply of the water – the *operational* and *maintenance costs* (labour, power, maintenance and services) and the *capital costs* (principal, interest and depreciation).

Opportunity costs relate to the value of foregone opportunities for alternative water uses. If there are competing uses for the water then how much is 'gained' or 'lost' by one end use being picked in preference to others.
Full economic cost is the sum of the full supply cost plus the opportunity cost (see above) plus the *economic* externalities (see above).
Full cost is the full environmental cost plus the *environmental* externalities.

The relationships between the different costing elements associated with water can be seen in the diagram on the right.



3.2. Externalities and Public Good

The production and consumption of goods often carries associated external environmental costs. These 'externalities' arise because of the so called non-excludable nature of environmental goods. There are no property rights assigned to these resources and so the environment is, in this respect, a public good. Water, for example, is an asset that is usually held in the common good with open access available for its depletion. In a free market, if we do not ascribe a cost to this degradation process and merely assume that the next user will pay to clean up our legacy before they themselves use it, pollute it and then discharge it, there will always tend to be 'excessive' environmental degradation. Unlimited access destroys any incentive to conserve.
To an extent, this problem may be addressed by assignment of property rights, but that can lead on to its own set of problems about availability of water to those without the capital to 'buy' and/or 'use' water. Indeed, as we shall see in the next chapter, a fundamental tenet of the 1992 Dublin Principles[1] (that have been used as the basis for much subsequent water policy reformation) are that it is vital to recognize the basic right of all human beings to have access to clean water and sanitation at an affordable price.

But at what price? It is in addressing and trying to answer that question that we need to introduce a series of valued judgements. In fact the debate might be better served by asking where, within the spectrum of a series of questions, we wish to start from. Questions such as:

[1] *The International Conference on Water and Environment, Dublin, Ireland, January 1992. More information here: http://www.wmo.ch/web/homs/documents/english/icwedece.html*

- Must I have access to a regular supply of water – over 30% of the world's population do not have access to safe drinking water and 10% suffer from chronic water shortage?
- Does my water need to be cheap – how cheap relative to, say, petrol?
- Does my water need to be of a quality that doesn't require me to boil it before using it?
- Would I prefer to have a choice of suppliers [maybe at different prices and of differing qualities] from whom I acquire my water?

As we move through the list from water being a vital necessity to the exercising of personal choice in sourcing it, the relative value that each of us ascribe to each of the factors will differ. Even if there is a general level of agreement, there will be differences between the views of one individual and another one. This makes it very difficult to determine the absolute value of water even in a relatively localised area. This paradox is not helped by the seemingly prevalent view (including many developed countries) about the long term availability of cheap high quality water. The overriding view seems to be that we have an endless supply – and of course, we don't.

Why do you think that WTP is usually considerably less than WTA? Write down three reasons why you think that this might be the case?

WTP and WTA are fundamental economic measures of value and although usually measured in terms of money, either term can be defined on the basis of any commodity/goods that an individual is willing to replace with the one that is being valued. WTP takes the absence of goods or services as its reference point whilst WTA takes their presence as the starting position. WTP and WTA need not be equal; in practice, WTP is usually many times lower than WTA.

The point about the 'external' nature of externalities is that they do not accurately reflect market prices:

"Externalities in the water economy arise primarily because access rights to water resources and infrastructure do not convey the full costs and benefits of water use to the holder of those rights. As water users, buyers and sellers are generally concerned with their private returns, they do not take into consideration the costs borne of their actions by downstream users and society at large. If markets do not accurately reflect the value of natural resources, private decisions based on those values will not allocate resources in a way that efficiently meets the demands of the community. For example, a free water market will not reflect environmental demands for water and the market price of water will be less than the true value of the resource". (6)

Externalities may be 'negative', where an individual or an organisation imposes a cost or a loss onto another party and, for which, they are not compensated or they may be 'positive' when an external agency benefits from the activity of a party who made some improvement but who did not themselves receive due compensation for that accrued benefit. An example of the latter might be an investment to make significant improvements in river water quality (perhaps to enable abstraction) that also results in adding significant value to properties bordering the much more aesthetically pleasing river bank. Where water is not put at its highest value use, opportunity costs will tend to outweigh the use value generated by that water.

3.3. Market Failure and Policy Failure

Markets and policies fail when they send out incorrect signals and cause environmental damage. In conventional economics, market failure is not one of the central tenets whereas in environmental economics it can often play a central role. Market failure is normal for pollution problems and common when it comes to allocating natural resources such as water. Although water has characteristics associated with being a *marketable private good* or *commodity* (such as the availability of bottle water or when water is used for irrigation or drinking), it also has the characteristics of a *public collective good* (navigation, recreation etc.), it is capable of being taken out of the public

domain and being put into the private one (a reservoir is created and then angling and recreational access rights are sold off for example, or where there is indiscriminate and unregulated abstraction of ground or surface water) and also, as we have seen, it has externalities.

All three of these latter characteristics are cases of 'market failure'. This term can be interpreted either as the failure of a market to develop and function because of the impossibility of establishing legally defensible and tradable property rights for the water in question or as the consequent failure of unregulated markets to deliver the optimal allocation of resources from society's point of view. So, as we shall see in later chapters, these factors are recognised as providing justification for state or other intervention in the management of water on the grounds of resource use efficiency alone.

Markets fail when certain values are not included in prices (or are ignored) and consequently prices do not send correct messages about the true value of a resource, or the true extent of the damage caused by a particular action. Policies fail when they are implemented and they create unintended and usually negative environmental side effects. Often, these policies will be well meaning, but they have unintentional consequences. Institutional failures can be considered to be another form of policy failure, and given that policy failures also result in inappropriate signals, they are often felt to be market failures as well[2].

3.4. Environmental Damage Functions

There are rigorous mathematical treatments that are used to quantify this non-empirical term but a general description of the rationale will suffice for our purposes. When harm is caused, in this case let us say to a water body, then the magnitude of the damage that is caused (and the cost that we ascribe to it) will be proportional to the amount of harm exerted If some harm was already being caused, before we introduced 'our harm', then the increase in harm ascribable to us and the activities that we are undertaking that results in the impact on the water body can be considered to be the *marginal damage function* – this will generally be positive and the magnitude will be indicative of the rate at which any increase in our impact relates to any underlying natural harm. We can use the tools that we have developed to help us to determine the cost of this harm and, through this, a means to value it and to draw comparisons with the overall value of the resource and the cost/benefit of attenuating the damage.

3.5. Environmental Abatement Costs

Environmental abatement costs are the sum of the discounted capital and operating costs that are needed to attain and maintain a given level of environmental performance. In the case of an industry that has a production process that requires water for example, this often relates to the cost of purchase and operation of the pollution abatement equipment that needs to be installed in order for the effluent discharge (either to foul sewer or to surface water) to be of appropriate quality. The quality requirements may be set by law and then monitored by a regulator who is charged with the responsibility of ensuring that the quality parameters are not breached and/or the collection of fees and levies (often on a sliding scale that is directly proportional to the amount of pollution that is being discharged).

For most pollutants, marginal abatement costs increase as more of the emissions are abated. The optimal point is usually taken where the increasing cost of additional abatement outweighs the gains from increasing reduction (see the charted representation on pg.11 of the 1991 OECD report). The

[2] *For more information about market and policy failures please read short World Bank document http://info.worldbank.org/etools/docs/library/36495/MarketFailuresPolicyFailures.pdf.*

interesting point here is the methodology that is used to arrive at the measure of the 'gain' associated with reducing pollution emissions. As we have learned, the use of environmental economics and our ability to take an holistic view when arriving at the value of such abatement makes the construction and the evaluation of the overall cost/benefit analysis a more rigorous exercise.

Conclusion

It is clear that *laissez faire* marketplace economics will not serve us well when we come to develop policies relating to water. Economic instruments and market mechanisms will need significant regulation and management by Government or the local community. There are many ways in which applied economic theory can be developed to include the environmental dimension that is necessary to cope with water as a public good. The Global Water Partnership vision statement "Towards Water Security: A Framework for Action" (2000) (5) makes it clear that economic analysis must be applied in the context of an integrated approach to water resource management (IWRM) – taking an holistic view to the management of water within a catchment rather than considering it in a fragmented fashion with isolated uses that are independent from each other. Each use of water in a catchment has interdependency with other uses and the efficient and effective management of the water has to be viewed in this context.

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4. Water as an Economic and Social Good

Chapter Objective:

This chapter is designed to examine the concept of water as an economic and social good. In doing this, we shall consider the implications of the cost, the price and the value of water, discussing the differences between these terms and exploring how they might be quantified. We will investigate various pricing mechanisms and also look at the role of subsidies and issues of affordability.

Introduction

The 1992 Dublin Principles[1], further elaborated in Agenda 21 of the 1992 United Nations Conference on the Environment and Development (UNCED) - the so-called Rio Earth Summit – set about reinforcing the principal that water is an 'economic good' whilst encouraging an integrated approach to the management of water resources. The Second World Water Forum held in The Hague in 2000 saw agreement that the full resource value (economic, environment, cultural and social) should be recognised when making water management decisions and that changes in perceptions and attitudes are required at all levels to reflect the true value of water as a resource.

Water (especially unpolluted water) is not only a finite and a valuable resource – this is universally the case – but it will also find itself having different values under different circumstances, depending upon its availability and desired use. Furthermore, under free market conditions, differentials in value are different to those that prevail where there is intervention. Such intervention may be governmental, as in the case of subsidies, grants, levies, tax relief, taxes/charges, legislative/regulatory pressures etc., or it may be through protectionism or cartels that are operating and helping to manage trading arrangements in the sector.

Government interventions can be used as a way of implementing and pursuing policies – adjusting the 'climate' so that certain outcomes relating to water supply or demand become more likely than others. For example, this may involve 'adjustments' to the ways in which water is allocated within regions or to different constituencies, it may be something that is used to help protect the quality of the water that is available, or it may be a device for protecting or rationing the quantity of water that is available for a particular purpose or constituency.

4.1. Components of Costs

Putting a 'value' on water can be a complicated exercise, and that many factors need to be taken into account. One of the factors is the 'cost' of the water – but what do we mean by cost? The cost to whom, and over what period?

The **supply cost** of water relates to the production cost – the capital cost of the plant and equipment that is needed to collect or abstract and treat the water and the operation and maintenance costs

[1] *The Dublin Principles for Water as Reflected in a Comparative Assessment of Institutional and Legal Arrangements for Integrated Water Resources Management. http://www.gwpforum.org/servlet/PSP?iNodeID=1345*

(O&M) related to keeping the plant and equipment going (consumables, labour, energy etc.). In a centralised treatment plant with a dendritic supply network then the distribution costs associated with delivering the water to the point of use needs to be added to this.
The capital costs of the plant will have to be written off over a period of time – anywhere between 2 and 30 years depending upon whether it is a computer or a large pump perhaps – and there will also often be financing and debt servicing charges because the money used to purchase the plant has been borrowed and there will be interest payments on this capital.
The **economic cost** of water may be less immediately obvious but ultimately of significantly greater magnitude than the supply cost. If, for example, high quality groundwater is being abstracted for crop irrigation at a rate in excess of the aquifer's recharge rate, there will come a time, as the supply costs rise due to ever deeper pumping and supply rationing, when it ceases to be economic to grow those particular crops in that particular location. Crop production might then move, but families whose livelihoods depended upon the agricultural economy in that locale and its associated infrastructure are no longer able to sustain themselves. There will be a large economic cost associated with relocating the agricultural industry, providing for the families directly affected and who are left behind, returning or reverting the land to some sustainable use and so on.
If we were to then go on and factor in the full environmental externalities, adding these to the economic cost (which already includes the supply cost) then we end up with the full cost. This will include the **opportunity cost** – the cost of those opportunities that have been forgone as a consequence of the existing consumption pattern. The opportunity cost can be thought of as the sum of the supply cost, the user cost and the environmental cost.
Cost benefit analysis (CBA) dates back to the 1930s and is used to evaluate the benefits that accrue through the application of a particular set of specific costed solutions. For example, it can be used to monetize the net benefits associated with reducing levels of a particular pollutant from one value to a lower one. The cost of achieving successive reductions in concentration are compared with the benefit associated as a consequence of that reduction. By matching costs and benefits, it is possible to arrive at a solution that may not have the lowest cost (in an extreme case this could be doing nothing) but nevertheless offers the maximum benefit (without necessarily being the most costly option). CBA can be used to help choose between different pollution control strategies and to help set priorities within broader environmental improvement programmes.

The value of cost benefit analysis has been summarised by Schultz and Schultz (1) as helping to:
- make the economic dimension of environmental degradation clearer
- make the environmental debate more objective
- direct scarce financial resources to those areas of the environment where they are most urgently needed
- make polluters aware of the costs arising from their actions
- further develop statistical measures of welfare

We should also bear in mind that **cost effectiveness analysis** (CEA) is frequently used in the optimisation procedure – CEA being a subset of CBA. Once a policy has been created, we need methods of evaluating the specific methods that are available to deliver the policy targets and achieve the objectives. Some of these methods will be relatively inexpensive whilst some will be costly – cost effectiveness offers a systematic methodology for finding the *lowest cost* solution that achieves the desired objective(s). This procedure may well not produce an efficient allocation of resources as the objective that is sought may well also not be 'efficient'. It is the old management adage about the difference between efficiency and effectiveness; in this case, not all cost effective policies are efficient whilst all efficient policies are cost effective.
Cost effectiveness analysis is used to find the least-cost means of meeting a specific standard and identifying the corresponding cost of doing so. Using this as a benchmark, we are then able to es-

timate how much costs would increase if policies that are less cost effective are implemented. This type of approach can also be used to examine existing compliance costs and estimate how much these might change if a regulator were to opt for a more stringent or a less stringent standard.

4.2. Components of Values

Another important consideration is the value that we chose to place on a *stock* or a *flow*. An example would be the stock of water in a particular location [lake, reservoir etc.] and the flow would be the rate at which water were being released out of that stock [outlet river, compensation water etc.]. The relationship between these values is a complex one – downstream water consumption requirements may vary; irrigation, for example may be seasonal; the amount of impounded water will vary depending upon recharge and rainfall; nevertheless, we can examine the various components that go in to creating the value in each case.

Resources have an economic value whenever users are willing to pay for them rather than do without. **Use value** involves some interaction with the resource, it is the value that can be gained from one single, specific use of water, and is that value which is derived as a consequence of the use. For example, when water is an input in soft drinks manufacture (an example of **consumptive use**), or used as a source of hydroelectric power or as amenity value for hunting or fishing (a **non-consumptive use**). The value therefore differs depending upon the use – the same 1000 gallons of water might be used to produce a computer or to irrigate 1 ton of wheat. The former product has a value (in America) several times greater then the former, but in central African state perhaps the reverse would be true.

Use value of water may be subdivided into:

- the commercial value (where water is combined with other factors and sold such, such as the soft drinks and electricity examples cited above)
- the in situ use value (such as the fishing example above where the water has an amenity value but is not subsequently sold)

There are also **non-use values** associated with water, where the value ascribed is independent of any individual's or organisation's actual present use of the resource. Non-use value is associated with the benefits derived from the knowledge that the water is there and likely to stay there.

We may just feel that water has value to us – without it we cannot live and living close to a water source can improve our quality of life – and so we might ascribe it an **intrinsic value**. Knowing that a particular aquatic asset simply 'exists' might offer it an **existence value**. This might apply to a natural wetland that has a wide biodiversity and perhaps also contains some endangered species; an environment where we just feel that preservation would be the 'right' thing to do. Linked to this notion might be a **bequest value**, whereby we would wish to pass on this wetland feature to heirs or future generations as a natural habitat for them to enjoy in the future. Finally, there is also the **altruistic value**, derived from knowing that contemporaries can enjoy the benefits that the water source or the aquatic ecosystem provides.

There is also another value category that is occasionally considered under use value but frequently is viewed as distinct from either use or non-use values – the **option value**. This occurs where, although an individual or organisation is not currently using the water, they might be prepared to pay for the right to use it at a later date. For example, a company might be prepared to pay for abstraction rights from a river if their current groundwater supply were to become compromised. This payment might be one that is current (so, in this case, it would be being used to safeguard the future allocation to the company) or it could be noted as a possible/likely future payment when circumstances require it. Sometimes, option value is regarded separately from use value.

4.3. Cost and Price

Do you know how much you pay for your drinking water? How much more would you be prepared to pay to ensure that your supply remained uninterrupted? How much more still would you be prepared to pay to guarantee that the water supply remained available for future generations?

In conventional economics, data is usually freely available for empirical analysis. In the field of environmental economics, information about prices and quantities is often much harder to obtain because the commodities (clean water, for example) do not normally form part of any open market. This is why we have to be more imaginative when it comes to ascribing values and costs in this context.

How do we arrive at a price for water? For a typical commodity, the price is a function of the cost of production, manufacture, distribution (including raw materials, energy, labour etc.) and the price that any given consumer is willing to pay. Incidentally, the difference between these values might be regarded as surplus or profit.

Conventional economic theory tells us how pricing policy can influence things. The higher the price, the lower the demand relative to the willingness to pay. Substitutes for water, if there are any materials that are appropriate for the particular application in question, become relatively cheaper. Higher prices also tend to increase the supply of water as hitherto uneconomic supplies become more readily available as the overall price for the good increases. A price increase also shifts water use to higher value activities and curtails its use in low value activities – more might be used for drinking and less for cooling for example. There are also arguments that run along the lines that increasing revenue for the water suppliers leads to more efficient management and better trained staff, and that this ultimately can lead to a reduction in price whilst maintaining surplus. Finally, it can be argued that the increased revenue to the supplier enables them to extend and improve their supply mechanisms so that poorer and less accessible can avail themselves of the service (assuming that they can meet the cost when this happens) and that this eventually leads to a reduction in price through economies of scale.

In supplying water, there are absolute production costs relating to factors such as the relative abundance (how much will be available from the proposed source), the water quality (how much purification will be required before supplying it) and the ease of abstraction (is it easily abstracted or must it be pumped from a great depth for long distances) – these are the supply costs described earlier).

But how much will any given consumer be prepared to actually pay for all of this? Of course the amount depends upon many things, and the amount or the value of goods that an individual is prepared to part company with will, to an extent, dictate the efficiency with which s/he goes on to use it. If it is deemed expensive then the water may well get drunk but it may well not be used for cleaning purposes. In most cases though, the environmental degradation associated with the abstraction of the water will not feature anywhere as a price as an acknowledged cost; it will be a potential environmental cost but not a supply cost.

Think of an instance, or a scenario, when a sharp value difference might lead to conflict? Which parties would conflict? How might this be resolved?

In summary, where the perceived value of a commodity is higher than the cost or the subsequent charged price then circumstances are sustainable; when the perceived value is lower than either the price or the cost then things are unsustainable.

So...why is pricing important?

- **Revenue sufficiency;** revenues adequate to operate & maintain the system and extend service new customers
- **Resource allocation;** signal socially appropriate water resource allocation, ensuring that values to society outweigh their costs
- **Resource conservation;** signal the value of water, encourage efficient use and conservation
- **Getting prices "right":** recognizing the incentives resulting from price structures, and ensuring that they align with the desired social objectives

4.4. Valuation Techniques

In previous chapters, we discussed the differences in value that can be ascribed to water depending upon whether, at one extreme it is a vital necessity to live and, at the other, to what extent an individual values a choice when deciding from whom they will obtain their water. We also touched on the subject of **contingent valuation** (CV) and the concept of people's **willingness to pay** (WTP) and their **willingness to accept** (WTA)- go back and review these terms if you need to.
When carrying out a contingent valuation survey, there are a number of approaches that can be used to elicit information about willingness to pay – for example open-ended methods such as bidding-games or asking 'What is the most that you would pay?" for the good in question and asking the respondent to circle the amount from a payment card that lists a number of monetary values.. There are also closed-ended methods, for example asking a respondent whether they would pay at least a stated amount (or not).[2]
To an extent, people's values will always differ and where these differences are large it is termed a **value divide**. If such a divide is not dealt with then it can lead to a **value conflict**. Such value conflicts can be avoided by good use of formal political processes – good governance and transparency, consensus-building [time consuming but, when used in combination with other processes it offers significant added value] and formal market mechanisms.
When approaching integrated water resource management (IWRM), we should consider the concept of **systems value**. As we explained in the previous chapter, this relates to the aggregate value that, say, a unit of water can generate as it moves through a river system before it is consumed or lost. An integrated approach to water resource management shifts the focus from *user* to *system* values, taking onto account the opportunity costs and internalizing externalities. Using this approach can help us to chose between competing needs/options and guide us to the most valuable use of our resource. A comprehensive discussion on system value is provided in (2).
In moving towards an integrated water resource management (IWRM) strategy it is clear that there must be increasing emphasis on the overall value of water throughout the river basin and the system approach helps to clarify the most appropriate end effective use of the resource.

4.5. Water Pricing (Household; Industrial; Agriculture)

Charging and pricing water is a difficult problem, for a number of reasons. What price best reflects the value of the water? The marginal cost of water may be low – the supply of the first unit may be very high but thereafter the supply of subsequent units could be much lower.

We can think of a number of ways of charging for water supplied:
- a flat rate payable by everyone
- a tax based on a person's ability to pay
- a cost per unit volume received (metered supply) irrespective of use
- a cost per unit volume that is banded depending upon the use to which the water is put
- a cost per unit volume on a sliding scale that changes depending upon the amount consumed.

[2] *For much more information and explanation about contingent valuation and using WTP and WTA, you can look at the World Bank publications http://info.worldbank.org/etools/docs/library/36513/TheoryMethodContingentValuation.pdf and http://info.worldbank.org/etools/docs/library/37409/ContingentValuation1.pdf. If you want to see a worked example of a willingness to pay exercise then you can look http://info.worldbank.org/etools/docs/library/37412/ContingentValuationExercise.pdf.*

Similarly, for wastewater treatment:

- a flat rate payable by everyone
- a rate payable depending upon the amount supplied
- a rate payable based on metering the discharge.

Let us consider some of the more plausible examples in more detail. A water **tariff** is a set of rules and regulations covering charges/taxes/prices that water utilities use to collect revenues. There is inevitably an element of (political) intervention when setting tariffs, given the nature of the market, and so tariffs need to be seen in the context of a wider social reform framework (covering, for example, governance, management and investment). Different prices will have a different impact on various stakeholders since tariffs have different functions. They determine the level of revenue that a water utility receives but they also create incentives relating to the production and the use of water, and they allocate the associated costs between the different customers.

Consumers can be charged **a flat rate** each month or each year irrespective of actual water consumption. Such a tariff is often used in systems where house connections are not equipped with water meters. The fixed rate is normally related to an indicator such as the number of persons living in the household or the size of the apartment. The underlying philosophy of this approach tends to be more related to the issue of equity and fairness than to cost recovery.

In the case of metered connections, consumers may be charged a uniform (linear) rate per unit volume of water supplied irrespective of consumption, or an **increasing block tariff** (IBT), charging higher rates as consumption increases.

Usually an IBT has an initial rate in the low consumption area that is maintained at below average cost, and this is then used to compensate for an above-cost tariff rate at higher consumption rates. Under these circumstances it often seems to be the case that industrial and commercial customers pay significantly more than residential customers in all consumption rate blocks. The result is a subsidy from industrial and commercial users and from high-volume residential users to low volume residential user. IBTs are commonly used in many less developed countries as they are perceived by many to be "fair".

However, things are not always as they might at first seem[3] and although no one is arguing that people should be deprived of water simply on the basis of economic status, it clearly is arguable whether tariffs are the right mechanism to set about redistributing personal income in this way. In addition, the underlying assumption that low volume users are poor and high volume users rich may well not be the case. There is evidence to suggest that water consumption is not linked to income, although it is fairly closely linked to size of household. Larger, low income families will therefore be penalised by IBT. The size of the initial [low cost] tariff consumption band may be so great that there is little incentive to reduce consumption – if one is already paying at the basic tariff and this is set below cost then the incentive to significantly reduce consumption is minimal. On the other hand, commercial and industrial consumers may be driven off the supply altogether by the high cost and forced to seek alternative sources. Some consumers may find the calculation of charge difficult if they need to multiply several unit costs by their consumption in each tariff band and add these all together. Finally, there needs to be adequate administrative and operational support to maintain an efficient meter reading and billing system. Reading has to be regular, timely and verifiable and the calculation and transmission of the billed total needs to be a transparent and easily understood process.

[3] *Dale Whittington, "Possible adverse effects of increasing block water tariffs in developing countries", in Economic Development and Cultural Change, October 1992. pp. 75-87 and Yepes, Guillermo "Do Cross-Subsidies Help the Poor Benefit from Water and Wastewater Services?" TWU Infrastructure Note, The World Bank, Washington, DC. 1999 and Urban Think Tank, Twelfth Meeting, Tariffs and Subsidies, April 3-4, 2001, Mumbai, Maharashtra. Boland, John and Whittington, Dale "The Political Economy of Increasing Block Tariffs in Developing Countries" ed. Dinar, Ariel. The Political Economy of Water Pricing, Oxford, Oxford University Press, 2000.*

Where a significant number of households live in poverty, it may be deemed necessary to provide a level of subsidy to guarantee basic needs and public health. Generally, it is better for these subsidies to apply to the specific households or individuals rather then to the general cost of supplying the water (input costs) or on the output side (to the water tariff). Such subsidies must be seen in the context of a general overall social policy rather than being looked at in isolation. This means that a water utility would not be best placed to set up a subsidy system such as this on their own, or to administer it (other than by issuing the bills).

A number of basic principles apply:

- The subsidy should be related to the amount of water that is actually consumed (metered), up to certain limit
- In order to make sure that only the poor are targeted, some form of means testing is required. A (preferably nationally applied) scoring system such as this then allows for various levels of eligibility
- The subsidy should be granted only to cover part of the total supply cost, depending on the outcome of the means test. The consumer should be required to pay a proportion of the bill themselves irrespective of subsidy – perhaps 25% (to encourage conservation)
- Means testing should be specifically focused on, and address, water consumption and concessions and subsidies should only be granted only for a limited period of time before reassessment

Bills can be issued that include the subsidy, and the water utility can then claim back its subsidy from the subsidy-granting agency. Alternatively, the full bill can issued (and paid) and the consumer is then reimbursed when they apply to the agency.
Another mechanism for applying a block tariff would be to set baseline consumption charges on a national *per capita* consumption rate (litrese/person/day) and then multiply this by the number of individuals in the household. Consumption above this level [for activities other then drinking/cooking/washing perhaps] would be billed at a higher rate.
As we can see, pricing, as a tool, can be factually and socially complex and costly to administer, but it allows us to target our impacts and helps to encourage changes in behaviour. It also allows us to bring in significant amounts of revenue.

Types of water pricing include:

- Bulk water pricing
- Retail tariff structures, which can include:
  - volumetric pricing [tends to be a good vehicle for encouraging conservation; not always economic and can be costly to administer; income can be variable]
  - 2-part tariffs [offer greater revenue stability; can be used to signal need for conservation]
  - drought schedules
  - set at a ceiling of, say, 2-5% of income (even though willingness to pay may be higher)

As a pricing alternative, **licensing** and **permits** are simple and relatively cheap to administer. They can be rather expensive to monitor and enforce though, and whilst doing little to modify behaviour, they also tend to bring in less revenue.
Fees and **fines** are also simple and straightforward, although they are more expensive than licences to administer and tend to be more difficult to enforce. Although they can easily be targeted to induce specific behavioural changes, they tend not to bring in significant amounts of revenue.

GWP summarises their experience of pricing by considering it to be applicable under almost all circumstances, but having several preconditions if it is to result in a successful cost recovery policy. These are:

- Public acceptance of the need for cost recovery; people may need a public information campaign to persuade them if they are used to regarding water as a 'gift of nature'
- Higher charges are easier to implement when there is an associated service improvement
- Strong political backing and the avoidance of extravagant and unaffordable promises before elections.
- Thorough demand surveys and consultation with consumers are essential. In poorer communities with underdeveloped services, willingness to pay surveys can be a useful pointer to setting appropriate tariffs provided that the people who actually pay (often women) are actually consulted
- Careful provision for poor or disadvantaged consumers. Direct support may be more effective as subsidies often benefit the rich to a greater extent
- Financial transparency including independent auditing and regular and automatic price adjustments (based on inflation for example)
- Firm and clear public regulation of tariffs set by the private sector. Because of lack of competition and the high social sensitivity of water, governments usually tend to regulate prices whether charged by public utilities, municipalities or private concessionaires
- Consumers tend to respond to price increases by greater care in their use of water
- The structure of tariffs is just as important as the level of charges in achieving equity and cost recovery aims
- Private companies find it easier to levy and raise charges than their public counterparts

RECOMMENDATION: It is recommended to **GWP Tool C 6.3**. Regulations for Water Services.

4.6. The Role of Subsidies

As we have seen in the pervious section, a common way of addressing market failure and providing for poor households has been through Government intervention in the form of **subsidies**. Subsidies can be used to protect the vulnerable and the poor groups in society but they are notoriously difficult to target and may well end up disproportionately helping the better off. They may also encourage excessive consumption. Indeed, the OECD has concluded that agricultural subsidies in Europe are causing massive environmental damage by promoting land use that is devoted to agriculture (when there is an overall food surplus) and by encouraging agricultural policies that end up degrading the environment. Subsidies can cause similar problems arise elsewhere in the world, manifesting themselves in overgrazing and deforestation.

RECOMMENDATION:
It is recommended to see **GWP Tool C 7.4**. Examples of inappropriate subsidies are discussed and include:

- Industrial plants that are heavy water users and that operate in a protected, subsidised regime lack any incentive to conserve water or use it efficiently
- Low prices in the power/energy sector encourage excessive use of water
- Subsidised prices for farm crops that require significant amounts of irrigation, lead to heavy use for this activity to the detriment of other uses or of conservation.

GWP summarises their experience of the application of subsidies in this way:

- The introduction of new subsidies should be very carefully considered since they tend to be difficult to remove and can become a fiscal burden. However, they can be useful to encourage

the uptake of unfamiliar technology (e.g. recycling and water-efficient irrigation methods) or stimulate pilot schemes that might lead to wider acceptance of desirable practices
- Subsidies (such as low-interest loans) might also be a way of tackling stubborn market failures (e.g. the habit of needing excessively short pay-back periods for recycling or water-efficient appliances)
- Subsidies can also be used in combination with a tax/charge regime to make the regime more acceptable, since people and firms paying the tax can see that the revenues are being applied for the same purpose and can even benefit from them
- Subsidies may help those who already have access to water services, but not benefit those who have no access to water
- Policy reforms aiming at the removal of economic distortions can have the double benefit ("win--win" policies) of economic and environmental gains.

GWP also note that there is a risk that general economic reforms which do not address distortions that are specific to the water sector may aggravate the latter's problems. For instance, trade liberalisation may increase pressure on a natural resource like water, unless accompanied by a concurrent water reform programme.

4.7. Affordability Issues

It can often be the case, particularly in less developed countries, that water user's current tariffs fail to cover even the O&M costs associated with their supply, let alone any of the other components. Rapid increases in tariffs for individual users that take them towards full cost levels would be neither practical nor politically acceptable, especially in low income economies. Any such adjustment would result in significant additional social costs during the period of change. When starting from low tariff levels, such rises may need to be progressive (often over a long time period), and accompanied by awareness creation, education and user participation (see also Dublin Principle No.2 relating to participation). Water consumers need to see transparency and accountability, and also that improvements in quality of service, network coverage and the general environment that result from paying these higher charges.

One approach is to moderate market forces through the use of a national regulatory body. In the UK, for example, the water industry price regulator (OFWAT) is there to *'regulate in a way that provides incentives and encourages the companies to achieve a world-class service in terms of quality and value for customers in England and Wales'*. OFWAT sets limits on what water companies can charge their customers and encourages competition in the sector, helping to address affordability issues through direct intervention in the sector that is backed up by legislation.

When it comes to the use of water in agriculture and for irrigation (where most water is consumed), affordability issues can become more complex. Similarly, it can be argued that industry should also pay the full cost for water supplied and for wastewater that needs treatment – if this causes the organisation significant hardship then measures that support the company's income are likely to be the best way of addressing the problem rather than those that might compromise the sustainability of the water services.

The basic proposition that the best estimates for the full cost and full value of water are both publicly available and used within an integrated water resource management strategy is a sound one. They can be used to inform the debate when it comes to setting water prices or effluent charges and for other policy instruments such as incentives for pollution control, or investment of capital in extending the coverage of supply networks to inaccessible, poor (and often high cost) urban and rural areas. IWRM shifts the focus from user value to systems value, accounting for opportunity costs and internalizing the externalities.

4.8. Economic Analysis Relating to the EU Water Framework Directive

The EU Water Framework Directive 2000/60/EC, provides a legislative framework that is designed to protect and improve the quality of water resources (rivers, lakes, groundwater, transitional and coastal water) within the European Union. As each EU Member State is implementing the content of the Directive into their own national legislation the intention of the Directive is to encourage a greater degree of public participation and transparency in the business of water management. It specifically requires the introduction of river basin management on a Europe-wide scale, necessitating the requirement for cross-border cooperation in water management between countries and pollution prevention and control on the basis of a „combined approach". This approach is wholly in line with IWRM.

When Member States have identified their river basin districts (RBDs), the WFD requires an analysis of the characteristics for each one, a review of the human activities on the status of the water bodies contained within it and *an economic analysis of water use*. A characterisation report emerges from this process, but a more substantial River Basin Management Plan (RBMP) is required for each RBD by 2009. The plan is designed to give a detailed account of how the objectives set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within a required timescale. In Box 1, the information requested for the RBMP is outlined.

BOX 1: The RBMP information detailed in Annex VII of the WFD includes (3):

- To carry out an economic analysis of water uses in each RBD
- To assess trends in water supply, water demand and investments
- To identify areas designated for the protection of economically significant aquatic species
- To designate heavily modified water bodies based on assessment of impact (including economic impact) on existing uses and costs of alternatives for providing the same beneficial objective
- To assess current levels of cost-recovery
- To support selection of programme of measures on the basis of cost-effectiveness criteria
- To assess the potential role of pricing in programmes of measures – implications on cost-recovery
- To estimate the need for potential (time and objective) derogation from the Directive's environmental objectives based on assessment of costs and benefits and of costs of alternatives for providing the same beneficial objective
- To assess possible derogation resulting from new activities/modifications, based on assessment of costs and benefits and costs of alternatives for providing the same beneficial objective
- To evaluate costs of measures to identify cost-effective way to control priority substances

So, in implementing the WFD, there will be a need to characterise each river basin and prepare ***an economic analysis of water use***. When identifying the significant water management issues, the RBMP will need to highlight gaps in water status between baseline results and the WFD objectives to enable the construction of an appropriate programme of measures. In addition to carrying out a complete economic analysis of water use in the basement, it will be important to evaluate the economic input needed when putting together the programme of measures and that which will be required in its ultimate delivery. The WFD clearly integrates economics into water management and policy making; the polluter pays principle, cost benefit analysis and the consideration of economic instruments such as water pricing will all have a part in achieving the Directive's objectives of a good water status for all in a cost effective manner.

RECOMMENDATION: For a tabulated summary of the economic elements within the WFD then look at pg. 19 of the WATECO working group main document [an informal water/economics orientated grouping from Member States dedicated to enunciating the economic issues associated with the WFD]. It is also available as a linked item from page http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents/economic_wateco&vm=detailed&sb=Title. This document is also a source of much more information about the role of economics in the formulation of water policy in the context of the WFD [pg.17 onwards].

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5. Economic Instruments in the Water Sector

Chapter Objective:

This chapter is designed to provide an insight into the various economic instruments that are used in the water sector; examining how they are applied, how their use can be optimised and how they can occasionally lead to consequences that were not desired or foreseen.

Introduction

Throughout much of the world 'command-and-control' regulation is still the predominant form of environmental regulation – it can be effective but it may not always be cost-effective[1]. Over recent years, one of the principal tenets of good environmental stewardship has been that of 'shared responsibility'. This means that all participants in a supply chain, from production through to consumption, accept responsibility for the environmental impacts that occur in their specific part of the chain. For example, if an electroplating/fabricating company manufactures zinc plated metal pieces and converts these into a product then that company would be responsible for the pollution that is generated during the plating and manufacture of the product. This producer would not be held directly and solely responsible for the environmental impact of the product once it has left the company's control. Users of the product, and those involved post-use, would all share a responsibility for the environmental impact of that product. So the overall pollution is assigned not solely to the producer or manufacturer, but to all parties that participate in generating the pollution connected with the production, manufacture, use and disposal of the product. The 'polluter pays' (PP) principle – or the 'polluter pays principle' (PPP) – translates this shared responsibility into **costs**. Every actor is responsible for the real costs that are associated with the environmental impacts caused by his/her activities. These environmental costs may remain as **externalities** or they may be **internalised** and reflected in the price of products and services. Thus the cost is ultimately paid by the final consumer/user in his or her choice of a specific product or service. One function of an economic instrument is to internalise these external costs.

5.1. Polluter Pays Principle

PPP has underpinned thinking in Europe for over 30 years now; the Community originally endorsed the term in 1975 (1) and the OECD in 1972 (2).

Principle 16 of the 1992 UNCED Rio Earth Summit states explicitly that: "National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment."

[1] *Linking Economics and Environment and Market and Policy Failures. (2002) World Bank. Available here: http://snipurl.com/gm6u*

PPP is predicated upon charges that are levied on processes which generate pollution – either as direct taxes on pollution or as license fees entitling the holder to generate specific quantities of pollution. Without PPP, polluters continue to pollute and the costs shift towards the victims of the pollution. The OECD specifically state that PPP excludes financial assistance but there are occasions when the situation is confused by payments (often centrally-funded grants or tax breaks) can be made toward the cost of purchase and installation of pollution abatement installation/equipment and/or incentives to install cleaner processes.

The OECD went on to argue (3) that PPP could be extended to the so-called "resource pricing principle", which argues that all natural resources, including the environment's natural absorption capacity, should be properly priced to reflect the social costs of using them. This is also referred to as the "user pays principle", although neither of these two principles have the international standing of the PPP. The full application of the PPP and its related principles suggests that polluters should pay the full cost of their own activities and of public activities to reduce pollution to the environment, while government expenditures should be restricted to public goods such as protecting natural areas and biodiversity, as well as environmental monitoring, research and education.

BOX 1: PPP

Advantages of PPP include:

- Avoiding externalities
- Transferring the cost of the pollution to the polluter and apportioning the cost of the pollution appropriately
- Generally reducing the overall level pollution by acting as an incentive to save money and thereby reduce polluting activities

Disadvantages of PPP include:

- Tends to create argument about 'What is pollution and what isn't?'
- Similar arguments are caused when deciding how much should be charged for a particular pollution impact – there are equitability and transparency issues
- Identifying who specifically is causing the pollution
- Sorting out the best way for polluters to pay – taxes, fines etc.
- Can be seen as inhibiting economic growth – particularly in less developed countries

5.2. Economic Instruments

The main feature of an **economic instrument** is to make clear to polluters the wider cost of their polluting activities[2]. Their aim is to demonstrate the *price* of the environmental damage that is being caused and to make the polluters pay accordingly [according to the PPP]. Polluters then have a choice between either paying that price or taking action to reduce their pollution. An economic instrument should also provide an ongoing incentive for the development of new, more cost-effective pollution control techniques.

RECOMMENDATION: For a detailed but very readable summary of the rationale for economic instruments in the water sector, please read the document 'Economic Instruments for Water; Theory of Economic Instruments'. written by the Department of Environment, Food and Rural Affairs (DEFRA) in the UK.

[2] *'Economic Instruments for Water Pollution'. 2 reports issued by DEFRA UK. Available here: http://www.defra.gov.uk/environment/water/quality/econinst1/eiwp01.htm#3 and here: http://www.defra.gov.uk/environment/water/quality/econinst1/eiwp02.htm#f1*

BOX 2: Potential benefits from the use of economic isntruments

- Greater efficiency in achieving quality objectives. Without appropriate instruments, the costs of action to reduce pollution may not be fully taken into account in setting discharge consents. Different polluters may face very different costs for reducing pollution. If those differences in cost can be better reflected, the pattern of discharge control can be changed so that overall costs are reduced
- More cost effective improvements in quality. It should be possible for further improvements in water quality to be achieved more cheaply than might otherwise have been the case; for example the polluter might be required to pay charges based on an estimate of the costs to others
- Improved implementation of the Polluter Pays Principle. If the costs faced by polluters poorly reflect the wider costs of the pollution that they cause, an economic instrument may better reflect these costs
- Provide a continuing incentive to cost-reducing innovation (since the 'price' is paid for all pollution not just that beyond a given level of pollution)
- A stream of revenue (if charges are used) or a one-off revenue gain (if tradeable permits are auctioned

One tradition form of controlling aquatic pollution is through a regulator who issues simple **permits** or **agreements** to allow a discharge to occur. However, this approach may not be lacking because:

- it may not meet the receiving water's environmental objectives at lowest cost
- it may not make those responsible for pollution pay fully for the effects of their activities
- it may not necessarily encourage dischargers to go beyond the minimum requirements in meeting any consent conditions that might be imposed.

One common way of employing the polluter pays principle to recoup the treatment costs of industrial wastewater discharges (either to foul sewer or to surfacewater) is to use **emission** or **pollution charges –** usually a sliding scale of charge based on the total volume discharged and the amount of organic pollution that it contains.
At the beginning of the 1990s, many countries were applying a variety of charges as economic instruments (4) as shown in the following Box. 3.

BOX 3: Countries Applying Charges as Economic Instruments (4)

	Type of charge							
	Effluent charges				User charges	Product charges	Administrative charges	Tax differentiation
	Air	Water	Waste	Noise				
Australia		x	x		x		x	
Belgium			x		x		x	
Canada					x			
Denmark					x	x	x	x
Finland					x	x	x	x
France	x	x		x	x	x		
Germany		x		x	x	x	x	
Italy		x			x	x		
Japan	x			x				
Netherlands		x	x	x	x	x	x	x
Norway					x	x	x	x
Sweden					x	x	x	x
Switzerland				x	x		x	
United Kingdom				x	x		x	x
United States			x	x	x		x	

GWP offer the following as 'lessons learned' from the application of pollution charges:

- Few pollution charges are set at levels high enough to encourage to firms to spend sufficient on pollution abatement to meet pollution standards, but the existence of a charge, even at a low level, provides some incentive and may be helpful in raising awareness of the costs of pollution
- Pollution charges need to be administered as part of an overall system of regulation
- A precondition for successful pollution charges is the presence of a well-developed monitoring and measuring system.
- Pollution charges have a stronger incentive effect on the polluting party if it has to bear the cost of the charge itself and cannot pass the costs on to consumers
- Planned progressive increases in charges are useful in allowing dischargers to adjust their processes over a given time period.

5.3. Tradable permits

A more recent economic instrument is the **tradable** or **marketable permit**. In this case, dischargers are able to buy and sell rights to discharge within **overall limits** or **caps**. The total permitted level of emissions of particular substances for a particular stretch of water are divided amongst the relevant dischargers (this assumes that there are sufficient numbers of dischargers to create an effective market). Some dischargers may be able to reduce their discharges below permit levels at low cost. If they do so, they can then sell their rights to discharge to others – polluters for whom reduction is more expensive and who therefore wish to buy permits. This is the so-called **cap and trade** approach.

Emissions trading schemes have emerged as popular policy tools – for the present the focus has been on the control of air pollution. Most of the significant air quality improvement initiatives in the United States now include emissions trading as a component of their emissions control program although the trading of SO_2 emissions has been taking place there for over 40 years. The main perceived benefit associated with emissions trading is that a properly designed program provides a framework within which, it is argued, emissions reduction is achieved at the lowest possible cost by giving emitting sourc es the flexibility to find and to apply the lowest-cost methods for reducing pollution. Emission sources with low-cost compliance options have an incentive to reduce emissions more than they would under simple 'command-and-control' regulation.

BOX 4: The UK Emissions Trading Scheme

A New Way to Combat Climate Change – Quotation from an April 2004 UK National Audit Office report:

'Emissions reductions are made by those companies that can deliver them most efficiently. Each company can decide its best strategy by comparing the market price of emissions allowances with the cost if it were to reduce its own emissions. In general, companies that can find lower-cost ways of making emissions reductions will tend to sell allowances to organisations that face higher costs. The overall effect will be to reduce the total cost of achieving any given level of emissions reductions. The wider the participation [in the Scheme], the greater the cost reductions are likely to be.'

By trading emission credits and allowances to high-cost compliance sources, who then need to reduce emissions by less than they would otherwise, cost-effective emission reductions are achieved by both parties.

Applying a similar trading philosophy to water markets, **transferable** water **rights** are tools that allow sales of water allocations from one group to another. The markets can apply to either surfacewater or groundwater, and the transfer of rights may be seasonal or permanent.

GWP argue[3] that such markets can:

- Enable water to be transferred from lower value to higher value uses
- Overcome the resistance of the entrenched property rights of existing holders
- Be a cheaper way for communities or farmers to obtain their water than the alternatives, which may include creating a new source of supply
- Be used by environmental champions, to buy out existing users and preserve the water for habitat or natural amenity

In the case of **water auctions**, public authorities make water available to the highest bidders at public auctions. The water lots could be offered on a daily, weekly, seasonal or even annual basis. Auctions are a useful source of revenue to public authorities, but they can create conflicts of interest if the revenue raising function becomes more important than the issue of efficient water allocation.
With **tradeable pollution permits**, individual polluters are allowed the right to buy and sell quotas of emissions subject to an overall upper quota on total emissions. Nutrient trading, for example, could be a potentially useful instrument to help improve water quality.

GWP's view is that certain preconditions are necessary for water markets and auctions to be successful:

- A clear and permissive legal framework, within which individual holders of water rights can transfer their rights, either temporarily or permanently, to other parties
- A procedure for considering the impact of these trades on third parties (e.g. downstream users) and, where appropriate, arranging compensation
- Recognition of the potential environmental impact of trades, and the need to invoke relevant safeguards
- The physical means of transferring water between potential users
- Strong provision by Government of the legal, social and economic environment for effective market operation
- Regulation to avoid monopoly build up is essential.

BOX 5: GWP 'lessons learned' from the application of pollution charges (GWP Tool C7.3)

- As with charging systems, it is important to ensure that vulnerable groups are protected
- There is a need for a mechanism for initial allocation of rights (whether for water or pollution discharges) which should be seen to be fair, and be equitable and effective.
- Experience suggests that water auctions can be efficient and effective in some situations
- Trading schemes can be intensive in terms of information and enforcement, hence costly to administer; the high transaction costs of certain markets may outweigh their benefits
- Markets can help identify the highest value use and assist in conflict resolution
- Water auctions may be useful to adjudicate water allocation under competitive conditions, but must be regulated to prevent monopoly build up
- Markets work best where there are a large number of traders and transactions, so that the risk of build up of monopolistic "market power" is minimised

5.4. Product charges

In instances where pollution is from diffuse (non-point) sources rather than point sources, such as might be the case with nitrate/phosphate or pesticide pollution in a watercourse caused by agricultural run off for example), tradeable permits can have some effect but **product charges** can

[3] *GWP Tool C 7.3 – Water Markets and Tradeable Permits. Available here: http://snipurl.com/gm7h*

also be applied. A product charge occurs where a levy is applied when a unit of product is bought [point of sale], used [point of use] or disposed of [point of disposal] and the amount of the charge/levy per unit of product is proportional to the extent of the pollution problem associated with that particular product. Other examples where one might consider a product charge could include lubricants, non-returnable containers, plastic carrier bags and nickel/cadmium batteries. A plastic bag tax in the Republic of Ireland for example is reported to have resulted in the number of bags changing hands being cut by about 90%.

It is clear that economic instruments are increasingly being used in a number of countries as a market mechanism to enable them to help implement the polluter pays principle. Such instruments range from landfill and aggregates taxes, emissions trading for atmospheric pollutants, product charges (for plastic bags or tyres for example) through to emission charges for aquatic pollutants. Whilst there are well documented examples associated with the implementation of many of these, there still needs to be a degree of caution when it comes to evaluating whether these instruments are performing as effectively as they should (or could) do and there is still much work to be done in refining the nature and the focus of such mechanisms.

5.5. Examples of Effective and Ineffective Use of Economic Instruments

RECOMMENDED CASE STUDY READINGS:

- Economic instruments are also used to influence water abstraction activities; a review of this in the context of the UK can be found in this DEFRA (2000) report for example. The 2001 EU report 'Study on the Economic and Environmental Implications of the Use of Environmental Taxes and Charges in the European Union and its Member States' evaluates the economic and environmental implications of the use of environmental taxes and charges by the EU Member States.
- It is recommended to read the specific sections relating to water **abstraction/charges** (using examples of a groundwater tax the Netherlands and a water supply tax in Denmark) and **wastewater taxes** (drawing on examples of a wastewater levy in the Netherlands, an German and Danish wastewater taxes) as case studies that examine the impact on a variety of stakeholders linked to the introduction of economic instruments.
- A paper considering the application of economic instruments to industrial water use (to improve water conservation and enhance water resources management) in Canada by Renzetti S. 'Economic Instruments and Canadian Industrial Water Use'. (2004) Canadian Water Resources Journal.
- One current area where there is much debate about how best to apply economic instruments is in the case of the Danube. The Danube River Basin is the second largest in Europe and the 13 countries and 18 states that are affected by the 2,780 km river's flow have come together to sign the Danube River Protection Convention. They are committed to use the EU Water Framework Directive (WFD) as a basis for coordinating efforts to manage the Basin's water resources. A 2004 report, the Danube Basin Analysis – Roof Report Part A, has been published and this characterises the Danube River Basin District, its water resources, the human pressures, environmental impacts and various water uses as outlined under the WFD. In looking at how both point sources and diffuse pollution into the Danube can best be dealt with in an integrated manner, a range of economic instruments will need to be considered. In cases such as this it is important to bear in mind the differing socio-economic positions of, in this case, the 18 component States involved in the Danube project. Their relative prosperity will have a significant bearing on which instruments are likely to be the most effective (overall and in specific locations) and which, potentially, the most divisive. Section 7 of the Report discusses this in more detail and shows how instruments can (and must) be tailored and modified to adapt to prevailing circumstances.

How might you begin to evaluate the most appropriate environmental instruments (given the variations in GDP per capita) with which to begin the process of harmonisation of pollution charges within the countries in the Danube Basin?

- For a more general view on the use of economic instruments in Central and Eastern Europe up until 1999, there is the Sourcebook on Economic Instruments for Environmental Policy in Central and Eastern Europe; A Regional Analysis, edited By Klarer J et al and published by the Regional Environmental Center for Central and Eastern Europe (REC).
- It is also recommended to read the 2001 30-page OECD report 'Economic Instruments and Clean Water' (Andersen) as a case study review of the use of economic instruments to control water pollution in Denmark, Germany, the Netherlands and France during the period 1970-1990.
- For a review and reflection of general failures of policy and markets, please read the short World Bank paper 'Market Failures and Policy Failures'(2002).

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The Global Water Partnership (GWP), established in 1996, is an international network open to all organizations involved in water resources management: developed and developing country government institutions, agencies of the United Nations, bi- and multilateral development banks, professional associations, research institutions, nongovernmental organizations, and the private sector.

GWP was created to foster Integrated Water Resources Management (IWRM), which aims to ensure the coordinated development and management of water, land and related recources by maximizing economic and social welfare without compromising the sustainability of vital environmental systems. GWP promotes IWRM by creating fora at global, regional, and national levels designed to support stakeholders with their practical implementation of IWRM.

Currently, the GWP network consists of twelve regions: Central America, Central and Eastern Europe, Central Asia and Caucasus, China, Eastern Africa, Mediterranean, Pacific, South America, South Asia, Southeast Asia, Southern Africa and West Africa. The GWP Secretariat is located in Stockholm in Sweden and supported by the following resource centers: DHI Water & Environment in Denmark, HR Wallingford in the UK, and the International Water Management Institute (IWMI) in Sri Lanka. The mission of GWP is to "support countries in the sustainable management of their water resources."

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