Convention on Protection and Use of Transboundary Watercourses and International Lakes

SEMINAR ON ENVIRONMENTAL SERVICES AND FINANCING FOR THE PROTECTION AND SUSTAINABLE USE OF ECOSYSTEMS
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KEYELEMENTS FOR IMPLEMENTATION OF ECONOMIC ANALYSIS IN THE PROTECTION AND SUSTAINABLE USE OF ECOSYSTEMS IN ROMANIA

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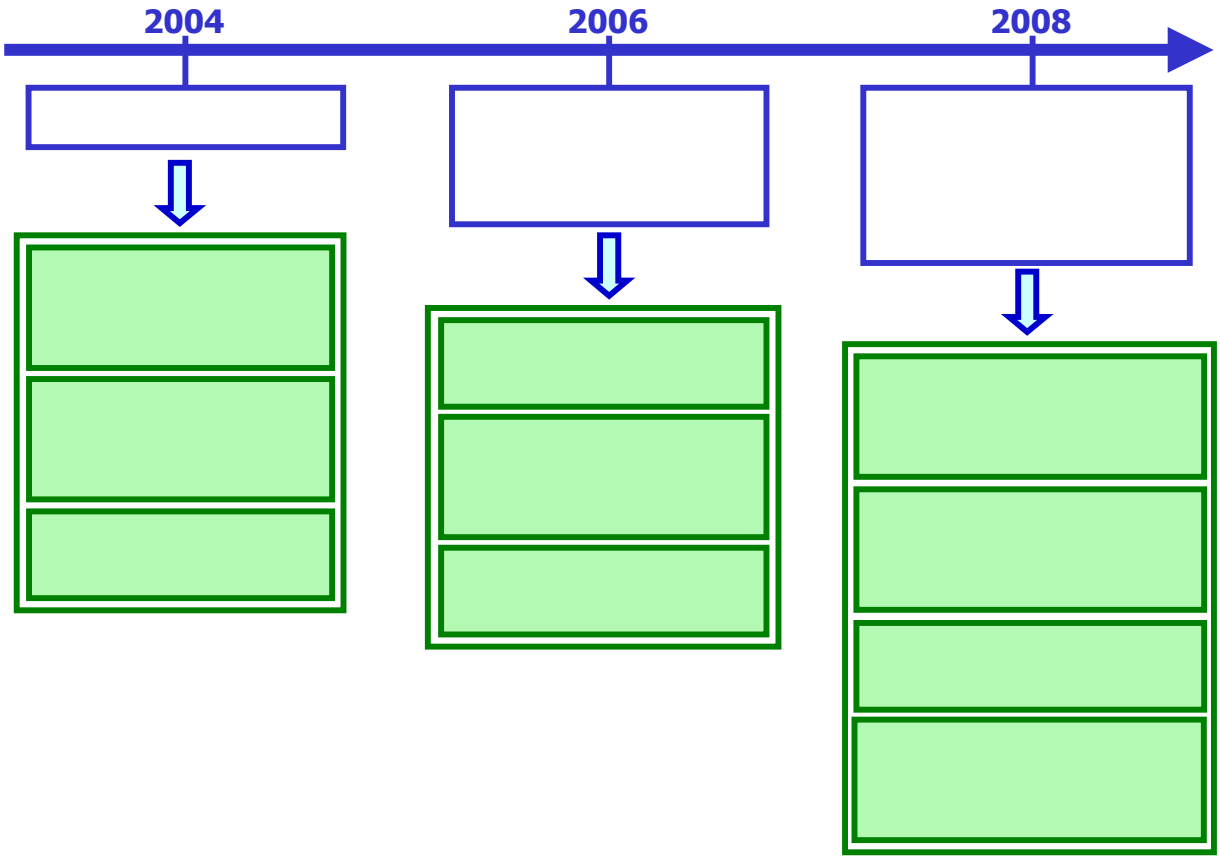
INTRODUCTION - THE USE OF ECONOMICS ACCORDING TO WATER FRAMEWORK DIRECTIVE REQUIRMENTS

One of the main objective of Water Framework Directive 200/60/EC are:

- the use of economic analysis to select appropriate tasks for the programme of measures (PoM) and river basin management plans (RBMP).

Under article 5, the baseline scenario, as an output of the characterisation, will help to identify all of the measures which are needed to reach good status of water bodies and which may include measures linked to other policies within the sector.



Developing economic analysis according to the ICPDR strategy for 2004 Report involves indicators /variables list developed by (ECON ESG) based on WATECO Guidance:
- Assessing the economic importance of water uses
- Providing the economic input into the development of the baseline scenario
- Assessing current levels of recovery of the costs of water services
- Preparing for the cost-effectiveness analysis

Implementation in Romania of economical analysis for the protection and sustainable use of ecosystems means carry out **economic analysis of water uses into 2004 and develop programme of measures until 2009 for water resources sustainable development.**

I. VALUING ECOSYSTEM SERVICES

A. DETERMINING FACTORS FOR USING PAYMENT FOR ECOSYSTEMS SERVICES (PES)

WATER FRAMEWORK DIRECTIVE 2000/60/EC:"water is not a commercial product, but produce economic value"

1. Economic principles for water resources sustainable development:

- **BENEFICIARY PAYS:**
  - *System of payments for specifically water management services for all users*
    - *Tariffs* for achievement the specifically water management services: divided by *source* (surface, groundwater and Danube) and by *user* (agriculture, industry, population)
    - *Tariffs* for quantitative and qualitative monitoring and improvement of pollutants from waste water discharges
- **POLLUTER PAYS:**
  Penalties for exceeding the admitting maximum concentrations of pollutants from waste water discharge
  Monitored indicators:
  - *Chemical*: general, specifically, toxic and very toxic
  - *Bacteriological*
  - *Physical*
- **BENEFICIARY STIMULATION - BOUNTIES**
  For reducing the water quantity consumption
  For improving the water quality

2. CONTRACTS WITH END-USERS

3. IN 1991 WAS ESTABLISHED THE NATIONAL UNITARY SYSTEM OF PRICES, TARIFFS AND PENALTIES IN THE WATER FIELD

B. MEASURING ECOSYSTEM SERVICES

Characteristics of river basins or ecosystems are going to valuing by integrated monitoring system, in order to asses and taking adequate technical and economical measure for "good status" achievement.

The surveillance, investigative and operational monitoring requirements include the sub-systems at the river basin level (rivers, lakes, transitional waters, coastal waters, groundwaters and wastewaters) and protected areas:

- For sub-systems at the river basin level:
  - ⇒ investigation media: water, sediments/suspended solids, biota;
  - ⇒ monitoring elements and parameters: biological, chemical and hydro-morphological
- for protected area:
  - ⇒ drinking water abstraction points:
    - Where: surface water body which provide more than 100 cu.m per day;
    - What: priority substances discharged and all other substances discharged in significant quantities which could affect the status of the water body and which are controlled under the provisions of the Drinking Water Directive;
  - ⇒ Habitats and species protection areas:
    - Where: water bodies forming these areas identified as being at risk of failing to meet their environmental objectives;
    - What: assess the amplitude and impact of all relevant significant pressures on these bodies and, where necessary, to assess changes in the status of such bodies resulting from the programmes of measures;
    - monitoring shall continue until the areas satisfy the water-related requirements of the legislation under which they are designated and meet their objectives.

C. SOCIAL AND ECONOMIC ASPECTS

The *total population* of Romania in 2004 are amount 21.794.793 inhabitants, which are spread more in urban areas, but the *density* is low, especially in the highlands.

Urban	Rural	Total Density
11608735 - 53,26%	10186058 - 46,74%	90,9 inh./km^2

The Structure of Active Population (inhabitants):

Agriculture	Industry	Services
7889715 - 36,2%	6516643 - 29,9%	7388435 - 33,9%

General socio-economic indicators

GDP	Total population	GDP per capita	
(mil. EUR)	million	In EUR per capita	In ppp EU per capita
38,908	21,7336	1,795	5,264

The unemployment rat in Romania the unemployment rate is known to be average value 8.4%.

There are ***gaps*** regarded to the lack of the data related to the new statistical and economic indicators used by EU. These indicators (GDP on County Level, Family Incomes on County level) have not been fully introduced in the Romanian statistics and in economics. The period of economic and social restructuring is still going on and the transition to the market economy could not have done overnight and not even in the period measured from the reference year (1989) until nowadays.

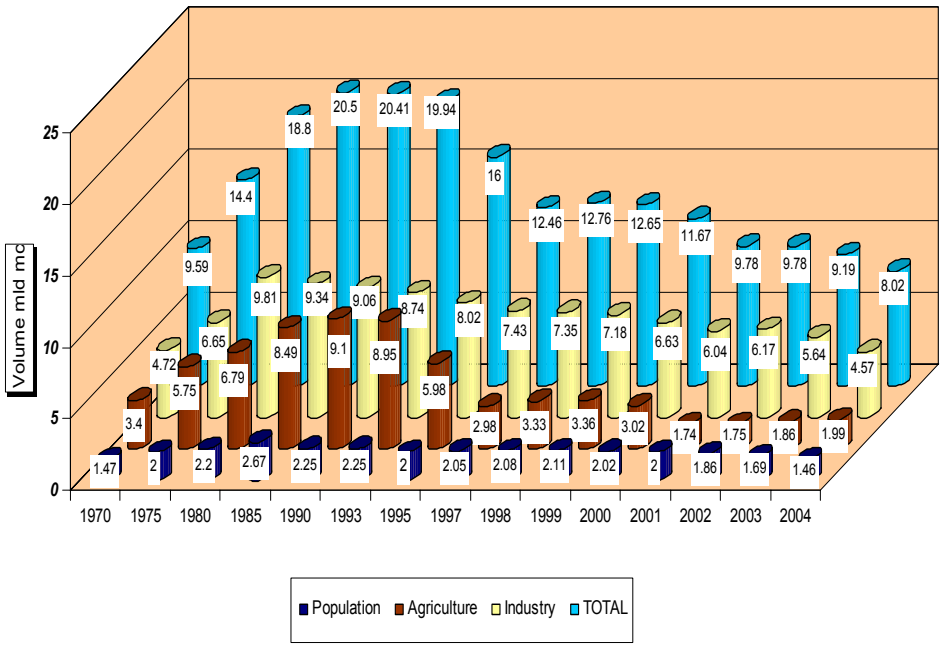
New indicators should be discussed to be reported in the national statistics: expenses in self-supply water systems, especially in the individual systems, values of transported goods, number of pollution accidents.

Some existing indicators in the national statistics should be revised and put into scheme statistics: e.g. “energy and water industry”, or “thermal energy, electrical energy, gases and water”.
New terms like “Willingness to pay”, “Internalization” or “Externalization” are not clearly defined and they are not met in the current set of indicators.
The water services into river basin are:

- *Public services for water resources management:*
  - service regarding quality and quantity knowledge of water resources and forecasting of water resources and hydrologic regime evolution;
  - service for assurance of water raw demand into source;
  - service for protection against floods;
  - service for receiving in surface waters of pollutant substances from discharged waste waters according to regulations;
  - service for water quality protection.
- *Public services for water delivery, sewage and waste water treatment*:
  - abstraction, storage, treatment and delivery of waters;
  - waste waters collecting and treatment .

WATER DRAWINGS EVOLUTION during the period 1990-2004 is presented below:

EVOLUTION OF THE WATER DEMAND IN ROMANIA



The total volume abstracted in 2004 was 8.02 bilions cu.m :
- 4,57 bil cu.m for industry
- 1,99 bil cu.m for agriculture
- 1,9 mil cu.m for population

Population connected to centralized water supply systems

- 98 % from the urban population (11,3 millions inhabitants)
- 33% from the rural population (3,4 millions inhabitants)

Population connected to sewage system
- 90% from the urban population (10,3 millions inhabitants)
- 10 % from the rural population (1,15 millions inhabitants)

Population connected to wastewater treatment plant
- 27% from the total population (5,85 millions inhabitants)

II. LEGAL AND CONTRACTUAL ASPECTS

A. Legal and regulatory frameworks that can help establish payments for ecosystem services

The main national legislation conducive to the creation of payment of ecosystem services is Water Law 310/2004 which modified and completed the Water Law 107/1996.

The actors involved in implementation of payment ecosystem services schemes or policies are:
- ❖ central governmental authorities:
  - Ministry of Environment and Water Management;
  - Ministry of Public Finances;
  - Ministry of Agriculture, Forests and Rural Development
  - Ministry of Industry and Commerce;
  - Ministry of Administration and Internal Affaire;
- ❖ National Administration "Apele Romane" including Water Directorates for 11 river basin
- ❖ local authorities:
  - local and county governmental authorities
  - Environmental Protection Agencies
  - Administrations of Development Regions
  - County Directorates of Agriculture
  - Territorial Inspectorates of Forestry Regime and Hunting
- ❖ Water users from different economic sectors (agriculture, industry, services, etc.)
- ❖ Research institutions:
  - National Institute of Statistics;
  - Research Institute for Pedology and Agrochemistry;
  - National Institute of Hydrology and Water Management
  - National Institute of Research –Development for Environmental Protection
  - National Institute of Research – Development "Danube Delta"
  - National Institute of Marine research – Development "Grigore Antipa"
  - National Institute of Forestry Research and Developments

B. SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF PES

- ❖ ***Contributions:***
  - water resources usage - 1 Euro/1000 m3 for Danube; 10 Euro/1000 m3 for inner rivers;15 Euro/1000 m3 for groundwater
  - receiving waste water in water resources - ex: COD 0,01 Euro/kg; Cd 8 Euro/kg
  - hydropower capacity from National Administration "Apele Romane" dams reservoirs: 70 Euro m head/month
  - gravel extraction from beds and river banks: 1 Euro/m3

❖ ***Penalties:*** according to the pollutants toxicity : ex COD 1Euro/Kg; Cd 20 Euro/kg.

❖ ***Bonifications:*** 10% from the contributions annual amount.

The main **gaps** on information are environmental economics which are non-monetary values not assessments in present. Lack of methodologies for estimating environmental issues in projects is the cause of this gap. The payment for ecosystem services become part of the river basin management plans for 2005.

III. CHALLENGES FOR IMPLEMENTATION

A. CHALLENGES FOR THE ESTABLISHMENT OF PES

1. Assessing the economic importance of water uses

- provided the river basin's economic profile in terms of general indicators, e.g. economic turnover, gross income, employment or number of beneficiaries for significant water uses;
- assessed how important is water for the economy and socio-economic development of the river basin / hydrographical area.

- ***Water users:***

  - **identifying water services**
    - specific services
      a) raw water in source
      b) improvement of surface water quality and protection of water resources
      c) assurance of the mean fall in the reservoirs for energy production
    - common services
      a) raw water catchments and transport to the user
      b) treatment and distribution of drinking water
    - other services
      c) flood protection
      d) monitoring and removal of accidental pollutions
      e) water quality analysis

  - **identification of providers, users and polluters**
    - providers (Water Directorates of National Administration "Apele Romane")
    - users:
      - water companies (households and industry)
      - individual households
      - industrial users
      - hydropower user
      - flood protected objectives : households, lands, etc.
    - polluters:
      - waste water discharges.

  - **characteristics of water services** (water abstracted, water production, waste water discharged, population connected to water supply systems, sewerage and waste water treatment plants).

- ***Water use:***
  - production in the main sectors (agriculture, industry, population)

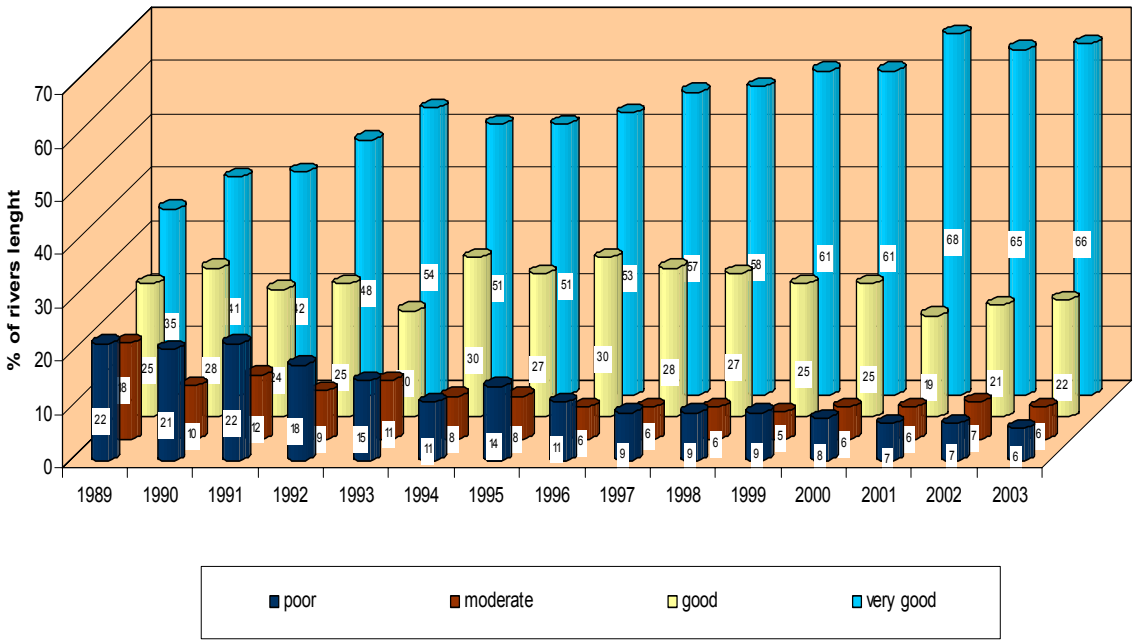
Water national patrimony includes:

- 78,905 km watercourses;
- 122 natural lakes;
- 1420 water storages with 14.2 bil. cm. volume;
- 9365 km dikes for cities, villages, lands protection;
- 6600 km river band stabilisation works;
- 1100 km canals;
- 59 pumps stations.

Water resources:

- ⇨ Romania has a theoretical yearly water potential of about 134 x 10^3 millions cu.m (multi-yearly average stock) of which:
  - 40 x 103 millions cu.m from the inner rivers;
  - 85 x 103 millions cu.m from Danube river (1/2 of the water stocks);
  - 9 x 103 millions cu.m from ground water.
- ⇨ The amount of technical resource that can be used is about 61 x 103 millions cu.m per year, some 1700 cu.m per year and inhabitant.

WATER QUALITY EVOLUTION on the monitorized watercourses (28% of total) during the period 1989-2003



2. Providing the economic input into the development of the baseline scenario

- ❖ The specific role of the economic analysis in the development of a baseline scenario is the assessment of forecasts in key economic drivers likely to influence pressures and thus water status.
- ❖ rends in water supply and water demand will need to be evaluated.
- ❖ Focus is likely to be on changes in general socio-economic variables (e.g. population growth), in economic growth of main sectors, in implementation of planned investments linked to existing regulation

Remarks:
Relevant trend evaluation on river basins level/ hydrographic areas is very questionable especially due to the transition period which affects the economic activities. After 1996 till 2002, under the new socio – economic conditions, a pronounced decrease of 60% of the water demand has occurred as a mainly consequence of industrial activity.
Decrease of population water demand is also registered due to metering systems (sea the diagram above)

Two scenarios will be developed for costs/income evaluation:

Baseline*:*
Based on implementation of European Directives conforming to each risk category

- Organic substances pollution
- Nutrients pollution
- Hazardous substances pollution;
- Hydromorphological alterations

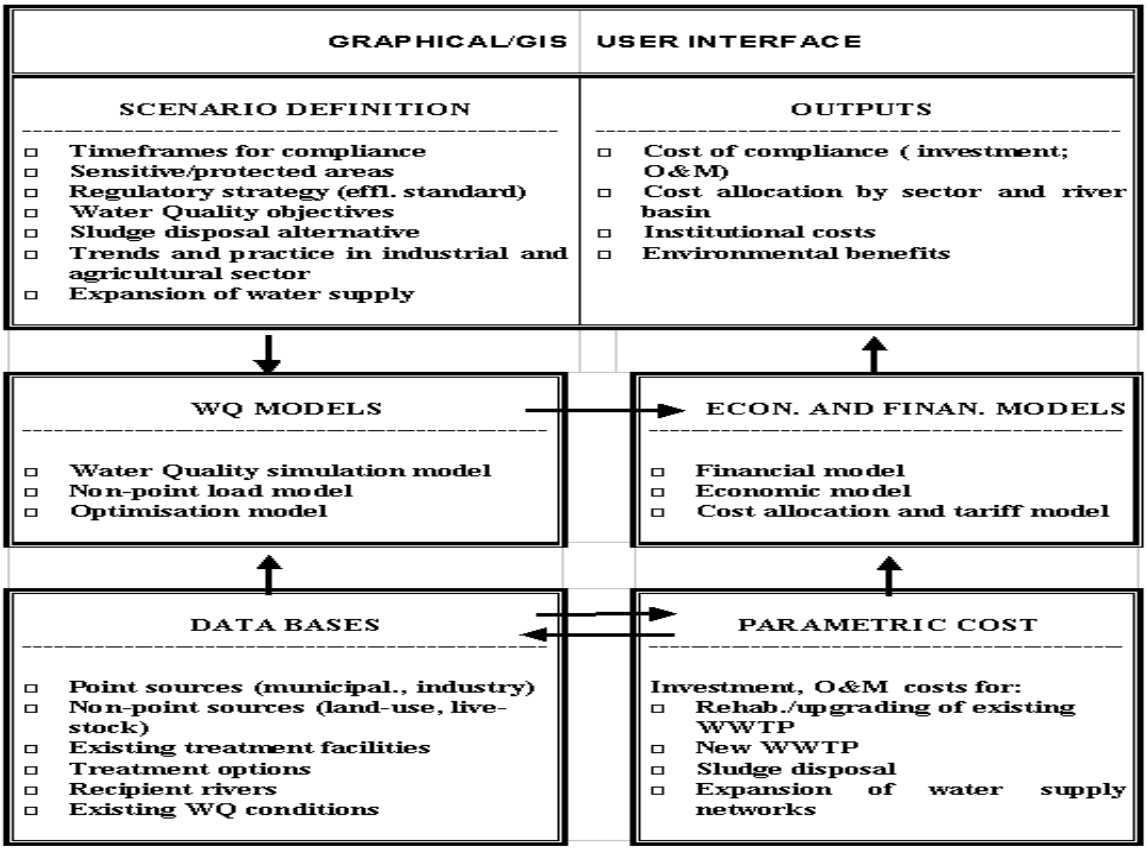
Optimum:

Takes into account also (if it is the case) the costs of measures to reach the good status in 2015. The scenarios take account of Implementation of the Water Framework Directive – models as a tool in integrated river basin management, related to river basin models may play an important role for a successful water management – being tools in the technical solutions for how to achieve "good status" for groundwater and surface waters. To achieve these, river basin management should be established using different models based on:

- an assessment of the characteristics of the river;
- the monitoring of the status of its surface and groundwaters;
- the definition of quality objectives;
- establishing programmes for measures to realise the defined objectives.

- Mathematical models serve as simple tools for integrated water planning management;
- Professional engineering software packages - a powerful modelling tool for integrated river basin planning and management,

  Data bases and models capable of evaluating alternative options for compliance considering the legislative requirements, technical options for improvements, environmental impacts and economic / financial implications, are showed in the following chart:



3. Assessing current levels of recovery of the costs of water services

- The assessment is in accordance with Article 9 of the Water Framework Directive.
- Key elements to be investigated include:
  - the status of water services;
  - the institutional set-up for cost-recovery;
  - the extent of the recovery of the costs (financial, environmental and resource costs) of the water services, and the contribution of key water uses to the costs of these services.

Key elements and variables:

- Institutional set-up:
  - Key actors and structure of the water sector;
  - Legal and administrative framework influencing financial flows in the water sector;
  - Description of the water pricing system/tariff system for water supply and waste water;
  - Current water price (a range of prices are required including minimum and maximum prices – furthermore the prices should be distinguished between water supply and wastewater;
- Price level for agriculture/irrigation, industry, households;
- Price structure for agriculture/irrigation, industry, households;
- Cross-subsidy between the different economic sectors (agriculture, industry and households);
- Collection efficiency, i.e. gap/ratio between projected revenues and actual revenues (including an analysis of outstanding money, i.e. past water bills not being paid)
- Subsidies;
- Costs:
  - Financial costs of water services
  - Investment costs
  - Operation and maintenance and replacement
  - Administrative
  - Environmental and resource costs

There was identified the follow **financial costs** for each hydrografic basin:

- *operating costs:*
  - exploitation and maintenance of hydraulic works, maintenance of watercourses;
  - exploitation and maintenance of the drinking water plant and pipes (hydrology, information system – dispatcher, monitoring, quality analysis, control, guidance, administrative costs)
- *capital costs* – depreciations costs (included in operating costs)
- *environment costs for monitoring and removal of accidental pollutions* includes expensive for qualitative monitoring, laboratories equipments and amount 40% of quantitative monitoring;
- *environment costs for protection against floods* – operating, maintaining of hydro works which are important for protection; resources costs:

For river basin/hydrographic area an analysis of cost recovery of water services has been carried out. The analysis showed that the value of water services is not recovered.

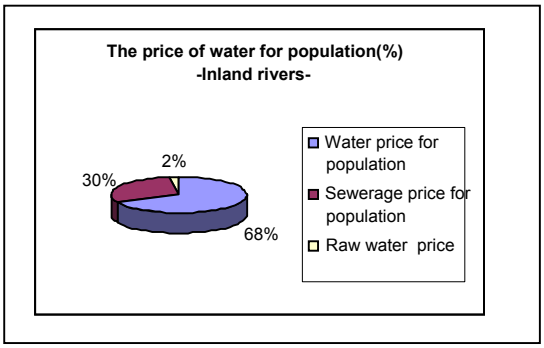
Remarks:

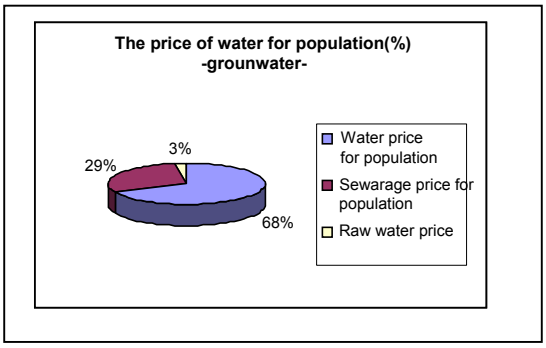
Regarding the economic analysis of water use, the economic importance for water services and for water users and the future trends of water demand and economic indicators on short and long terms have been studied. Relevant trend evaluation on river basins level/ hydrographic areas is very questionable especially due to the transition period which affects the economic activities.

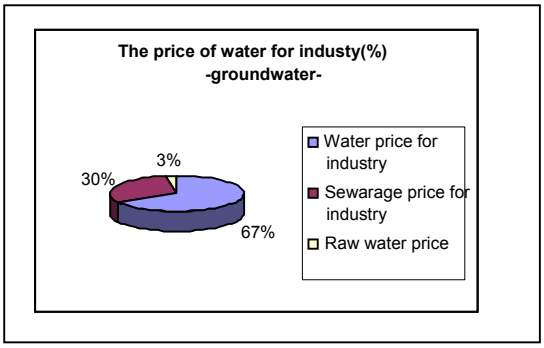
After 1996 till 2002, under the new socio – economic conditions, a pronounced decrease of 60% of the water demand has occurred as a consequence of industrial activity decreasing, closure of the irrigation systems.

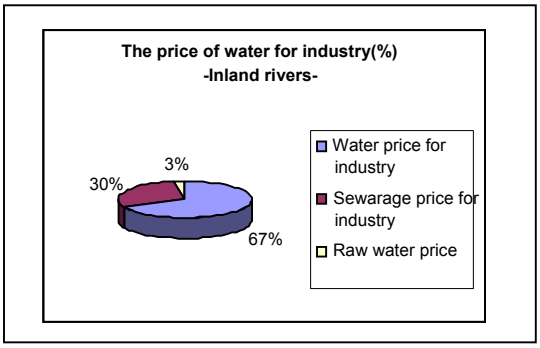
- The average price for the water supply services are:
  - for population: 0,03 Euro/cu.m and 0,64 Euro/cu.m
  - for industry: 0,2 – 0,8 Euro/cu.m
- The tariff for the sanitation varies between 0,01 Euro/cu.m and 0,32 Euro/cu.m.
- The average price for the wastewater treatment services are for both population and industry: 0,2 – 0,4 Euro/cm
- Out of the final price at the consumer an average amount 3 % represents the contributions for the management of water resources
- As a characteristic the protection against floods is a very important activity through the multitude and ampleness of hydro technical works.
  The expenses related to this activity are included into the tariffs for the management of water resources.
  The costs for flood protection represents amount 16-70% out of the total expenses.

The balance of raw water contribution in the final water price









According to Article 9 of WFD "Take account of the principle of recovery of the costs of water services (...) having regard to the economic analysis (...) and in accordance in particular with the polluter pays principle."

Ensure:
- that water-pricing policies provide adequate incentives to use water resources efficiently
- an adequate contribution of different water uses to the recovery of the cost of water services……

… having regard to
- the social, environmental and economic effects of the recovery
- the geographic and climatic conditions of the region

Example of on-going projects

Developing an integrated system for river basin environmental management for **managing the water quality in relation with water resources**, using socio-economical analysis, at the scale of drainage basin.

Action 1 **Assessment** of the available considered measures:
Methods: evaluating scenarios for future strategies of nutrient management. It will be analysed the possible relationships between the relevant production sectors (agriculture, fertilizer industry, chemical industry, waste water disposal) and environment improvement under various options of nutrient management strategies.

The different scenarios concerning the changes in nutrient emissions to surface waters and to groundwater, as well as in the loads transported along the Bistrita river shall be calculated using the French models approaches.

Progress Indicators: Number of definite scenarios.

Awaited results: Database with the mentioned scenarios.

Targets: Selection of most promising scenarios for future management strategies.

Action 2. **Quantifying** the suitable measures from the socio-economic point of view
Methods: The packages of measures shall be shaped, showing their socio-economic impact and the preconditions of their application under the constraints of the environmental European legislation.

The socio-economical analysis shall be conduct by the following factors:
- the rate and pattern of industrial and agricultural development - will be forecasted based on industrial indexes for the next decade;
- the expected growth and distribution of population – shall be supplied by using the demographic indicators;
- the national environmental policies – shall be assessed on waste water purification, taking into account the times of construction / reconstruction of needed infrastructures.

The suitable measures shall be characterising regarding implementation requirements, cost, effectiveness, social benefits, tax level, subsequent impact on income and employment.

Awaited results: Database of objects type "attribute" for the selected measures.

Targets: To combine exploratory scenarios with socio-economic analysis projected for the diminution of pollution risk to the next decade.

Concerning the adequacy of actual economical mechanism:

⇒ As a characteristic the protection against floods is a very important activity through the multitude and ampleness of hydro technical works. The expenses related to this activity are included into the tariffs for the management of water resources. In the case of river basins/hydrographic areas, there are very high costs for flood protection out of the total expenses.

⇒ Lack of statistical data on the level of river basin/hydrographical area, according to the fact that the National Institute for Statistics is dealing with statistics at national and development regions level, and only in some cases on county level. A model has been developed for disaggregating the data from regional level to river basin/hydrographical area level. The errors of the model are acceptable.

⇒ At the level of river basin river basin/hydrographic area, **the cost of damages produced by water uses on environment and ecosystem (environmental costs), as well as the costs due to overexploitation of the resource which affects the other water users (resource costs) have not yet been totally identified – is on going to setting up a methodology for assessing the environment and resources costs.**

⇒ Trends evaluation of water abstraction for population presents a relative high level of uncertainty, due to the fact that the connection rates to the centralized water supply systems are based on projects for water supply networks financed from external funds, and many of these projects are still in the first stage of bringing on financial sources. Referring to the trends for

other economical sectors, a realistic estimation of water abstraction for 2004 – 2015 has not yet been possible, according to the available information.

B. CHALLENGES FOR THE DISSEMINATION OF BEST PRACTICE

The ways to cope the uncertainty in next steps of economic analysis of protection and sustainable use of ecosystems:

- **In the short term**
  - *use available data with all necessary care: extrapolation, experts' saying, aggregation;*
  - *produce lacking data when essential;*
  - *identify clearly the key data gaps and costs to fill them in / the uncertainty to prevent from misunderstanding/ ease future updating.*

- **In the mid-term**
  - *organise/plan the permanent collection / production of data;*
  - *update initial data and results as soon as possible.*

- **In the long-term**
  - *organise capacity-building*
  - *integrate data production in the continuous process of updating the management plan*

Proposed measures to fill the gaps:

- Approximate methods for developing the economic indicators on county/river basin level;
- Adopting / Approximating the EU statistic indicators, especially those related to environmental issues;
- Developing projects and study for assessing on environmental expenses;
- Continuing yearly statistical survey on environmental expenses, including water-sector analysis;
- New statistical indicators should be taken into consideration in national statistics (e.g. value of transported goods, number of hunters permitted to get benefit of river fauna, animal watering, bathing visitors, etc.;
- Establishment of methodologies for evaluating cost-effectiveness of measures;
- Approaching studies for the establishment of methodologies for evaluating cost-effectiveness of measures;
- Self-supply systems, especially individual water supply systems, mainly from groundwater source (rural area, where almost half of Romanian population lives) is a serious gap in information, which must be covered with the future studies;
- More education and training of the people working in environment sector/water sector on economics.

D. CHALLENGES FOR RESEARCH AND CAPACITY BUILDING INITIATIVES

Future policy in water field and protection and sustainable use of ecosystems:

- A ***cost recovery policy*** to stimulate the users for an efficient use of water resources based on "*cost recovery for water services" principle* including environmental and resource cost and *polluter pays principle*

- ***New economical mechanism*** for quantitative and qualitative resource water management involves:

- *system of contributions*;
- payments, penalties and bounties.

- It will assess appropriate ***contributions*** of different kind of users (industry, agriculture and domestic use - population). Contributions will be *based* on:
  - environmental, economical and social effects;
  - specific geographical and climatologically conditions for:
    - using water resources divided by users (industry, agriculture, population) and resource (surface, groundwater and Danube);
    - for waste water discharging;
    - for hidroenergetical potential;
    - for ballast extraction.

Goals:

- recovering the operational and maintaining costs;
- partial financing new investments from National Administration "Apele Romane" incomes;
- Level of contributions and tariffs has to ensure partially financing to:
  - reduce the pollution;
  - implement other water directives;
  - ensure founds for covering an amount of assessing costs;
  - ensure founds for covering potential environmental damages.

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