

SMART

**Project Deliverable: D02.2
Guidelines for the socio-economic analysis:
issues and indicators**



Programme name:	Sustainable Management of Scarce Resources in the Coastal Zone
Program Areas:	A3, (d)
Project acronym:	SMART
Contract number:	ICA3-CT-2002-10006
Project Deliverable:	D02.2: Guidelines for the socio-economic analysis: issues and indicators
Related Work Package:	WP 02: Socio-economic framework and guidelines
Type of Deliverable:	RE Technical Report
Dissemination level:	Public
Document Author:	Luis Rodrigues, UATLA
Document Version:	R 1.0
First Availability:	2003 08 30
Final Due Date:	2003 08 31
Last Modification:	2003 10 09
Hardcopy delivered to:	Mrs. Cornelia Nauen European Commission, Research Directorate General SDME 1/02 B-1049 Brussels, Belgium



Table of Content

<i>Table of Content</i>	2
<i>Executive summary</i>	3
<i>Introduction</i>	4
<i>1. General objective of the socio-economic analysis</i>	5
<i>2. Driving forces and pressures</i>	6
<i>3. Data compilation and methodology proposal</i>	8
3.1 Population, demographic and migration policy analysis - Task 1	8
3.1.3 Projections, the scenarios until 2025	11
3.2 Political and economic options adopted for the study areas - Task 2	11
3.2.1 Policy tools and institutional drivers	12
3.3 Competing water uses - Task 3	15
3.3 Competing water uses - Task 3	15
3.3.2. Water use variables	15
<i>Appendix A - SMART WP 2</i>	20

Executive summary

The deliverable **socio-economic analysis** on WP2 has been established to provide methodological advice on the process of data collection. It has provided its advice to support the socio-economic analysis in each case study. These Guidelines have been prepared including the feedback received through consultation of the case study partners.

The data compilation and methodological proposal is divided in four different tasks, as it was defined in the SMART technical annex.

In the **population, demographic and migration policy analysis** is analysed demographic aspects, including migration issues and projections. It is presented the lists of population data, which should be mainly collected at the national, regional and municipal population census.

The main source of statistical data to collect for the case study areas is the national statistic office. The data should be as similar as possible in all the case study countries, however each country has different constrains. A first collection of the census data availability shows significant differences and information gaps in the countries considered. In order to achieve the integration proposes of the SMART project, the socio-economic analysis reference year is 2000/01. Three different scenarios for the population forecast to 2025 are also proposed.

Regarding the **political and economic options adopted for the study areas** it is analysed the pattern of economic growth as a result of the existing policies. Other objective is to consider how the policies and the options for economic growth can be at the source of competing uses of water. The main objectives are to analyse the strategic and regulatory instruments at national, regional and municipal levels; and the identification and characterisation of the different levels of decision related to the water management.

The aim of **competing water uses** task is the identification of water demands and the characterisation of the various actors and interests related with this demand. It will be also launched the principles to analyse the competition between different economic activities for the water use.

A framework to develop water demand scenarios is defined. In the meaning of those scenarios are considered the more important factors that are influencing the water use. Based on the characterisation of the socio-economic, policy and biophysical dynamics will be possible to determine the following scenarios: business as usual; water crisis; and sustainable water use.

The purpose of the **economic analysis of water resources** is to bring into the WP2 the prices of water (by each economic sector), the costs among the different water users and other negative externalities, which can influence this economic analysis.

Introduction

The objective of this document is the presentation of *Guidelines for the socio-economic analysis: issues and indicators*. Following the first presentation and discussion of the socio-economic analysis made in Cairo's Meeting (January, 2003), a more detailed document is now presented to the consortium in order to describe the work, methodologies and list data needs to achieve the objectives of *Workpackage 2*. This deliverable of the WP2 results also from the adaptation of the model systems according to the user requirements of WP 01.

Considering the importance of the continuous communication between partners to fulfil these objectives, the UATLA team will be available for give the support needed to achieve the workpackage goals.

1. General objective of the socio-economic analysis

The analysis of the local water policies and regulations will be the basis of the comparative analysis between EU and Mediterranean countries, as an approach to the study of sustainable coastal development.

The main reference for sustainable water management in the EU is the Water Framework Directive (2000/60/EC). Therefore, to achieve the general objective we have to analyse the socio-economic dimensions considered in the Water Framework Directive (WFD).

The water demand projections are based on an integrate analysis including social, economic, and institutional perspectives (Fig. 1).

Population, demographic and migration policy analysis - Task 1

Analysis of the population's dynamic, which origins a pressure on existing supplies and generates demand that induces the development of additional water delivery facilities.

The demographic and migration issues and projections (evolution of the variables birth, death, migrations and the trends observed in the past) will be analysed. Demographic and migration policies will also be analysed, as a limiting migration policy has effects on the population growth different from those deriving from a free migration policy.

Political and economic options adopted for the study areas - Task 2

In order to understand the institutional structure for managing water quantity and protecting water quality, the task aims to analyse the planning and management instruments in the regions studied and the levels in which decisions are taken.

The level and the pattern of economic growth is considered also a result of existing policies, therefore the aim of the task will be the analysis of the policies and options for economic growth that are at the origin of competing uses of water. The level and the pattern of economic growth and its consequences in terms of labour demand will also be important issues to understand to regional dynamics of change and future developments. Are the economic activities localized in this urban-rural interface more labour demanding? Which are the

pressures caused by increasing demand? In what way is the political structure able to intervene?

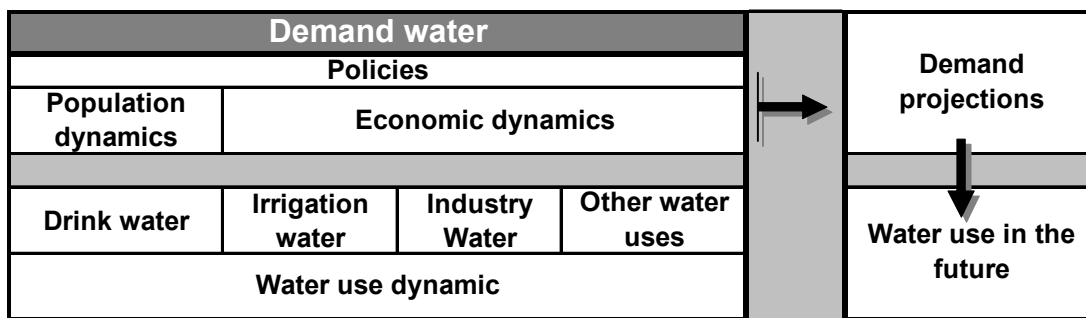
Competing water uses - Task 3

A characterisation of the various actors and interests and the identification of water demands will be performed. The economic and demographic structure of the rural/urban interface is analysed in terms of the consequences for multi-sectoral current and projected water demand, and the implied conflicts.

Economic analysis of water resources - Task 4

The costs of water supply will be included in the analyses, considering the possible differences between drink water, irrigation water, industrial needs, other needs (e.g. aquaculture).

Fig. 1



2. Driving forces and pressures

The demands of water differ drastically according to life-style, region and level of development. A comprehensive study of population's impact on water quantity and quality would require improved data for the socio-economic analysis. The measures of water demand alone are poor indicators about water quantity and quality. Population and socio-economic dynamics, and the institutional framework have a substantial impact on the scarcity, cleanliness and security of water supplies.

The fundamental objective of the WP2 is the development of an integrated methodology for analysing the water demand system and the population, social and economic changes. The integrated study of changes and prospective thus appears to be an essential contributing factor to the understanding of Global

Change. In fact, while the problems caused by changes are diverse, they have one aspect in common: they can put the sustainable development of a region at risk.

Using a tool of fundamental importance, the Geographic Information System, the integrated study of water and socio-economic data will be carried out at various levels of spatial analysis. In that sense is very important to collect the geographical information to georeference the changes. The GIS will be also important to analyse the data at the different level (national, regional and local). At the national and regional level, with the interdisciplinary analysis, the GIS will permit the identification of the main driving forces related to the quantity and quality of water and warranted the case studies.

However, the observed biophysical and socio-economic changes can only be understood in depth through the consideration of the decision-making processes of the various agents of change present in a given territory. In that way, the following phase of analysis unfolds at the local level and attempts to find out how people make decisions. The socialisation of the hydrological models is only fully developed with the creation of a local level of analysis, where it may serve as support for structuring enquiries for agents of change. Thereby, it will be important to understand forward the more detailed and founded explanations about the options and costs of the decision-making process.

3. Data compilation and methodology proposal

3.1 Population, demographic and migration policy analysis - Task 1

Population analysis, including migration issues and projections, i.e. evolution of the demographic variables and the trends observed in the near past.

For population data the analysis should rely mainly on the national, regional and local population census (or estimates) to define population’s projections to 2025. The projections are neither forecasts nor predictions, but rather calculations of future changes in population size given specific assumptions about trends in fertility, mortality and migration.

The main source of statistical data to collect for the study areas is the national statistic office. Primary data collection is not previewed in the socio-economic workpackage. The data should be as similar as possible in all the countries, however each country has different constrains, for example different years for the collection or different criteria or different spatial levels of data available. A first collection of the census data availability shows significant differences and information gaps in the countries considered. In order to achieve the integration proposes of the SMART project, the socio-economic analysis reference year should be 2000/01. Whenever possible; the constraints of census data availability should be solved with the data estimates.

The main goal of data collection is the build of demographic projections.

The data needs described below refers the ideal situation of data availability. In order to have a clear idea of the data constrains, please fulfil or/and correct the orange cells in the tables. Describe the alternatives in terms of estimations for the last decades in order to replace the census.

Table 2. Data needs for demographic analysis
Description

Resident population
Immigration
Emigration
Households
Life expectancy at birth
Immigration
Emigration

Municipality area

3.1.1 Demographic variables

The list of demographic variables should be analysed as follows:

Population density for the last three census dates/estimates (national, regional and municipal)

The total resident population / surface area (resident population/km²).

Number of persons by household for the last three census dates/estimates (municipality)

The evolution of this variable should imply significant changes on the domestic water consumption.

Natural growth rate (national, regional and municipal)

Natural Growth Rate of Population = Crude Birth Rate - Crude Death Rate

Crude Birth Rate (national, regional and municipal)

Number of Births / Resident Population x 1000 (expressed in ‰)

Crude Death Rate (national, regional and municipal)

Number of deaths / Resident Population x 1000 (expressed in ‰)

Elderly dependency ratio (compare two years, the first and the more recent)

People with more than 65 years / People between 15 and 64 years x 100 (expressed in %)

Life expectancy (compare two years, the first and the more recent) (country)

Life expectancy at birth (e₀) represents the number of years that, in average, a person would live in a generation subject to the mortality which the table describes. Similarly, (e_x) expresses the average number of years of life left to the survivors of this exact age.

Synthetic general fertility index (compare two years, the first and the more recent) (country)

Expresses the number of children a hypothetical mother would have at the end of her fertile life, if during this time her behaviour corresponded, at

each age, to that reflected in the series of specific fertility rates by age on the table.

Gross mortality rate (compare two years, the first and the more recent) (national, regional and municipal)

Gross mortality rate is the relationship between the number of deaths in a particular year and the average population of that year.

Gross birth rate (compare two years, the first and the more recent) (national, regional and municipal)

This is the relationship between the number of births recorded in any given year and the average population of the year in question.

Gross emigration rate for the municipality (compare two years, the first and the more recent)

This is defined as the relationship between registered emigrations in a given year with respect to the average population in that year: Expresses the number of emigrations for every thousand inhabitants.

Gross immigration rate (compare two years, the first and the more recent)

This is defined as the relationship between registered immigration in a given year with respect to the average population in that year: Expresses the number of immigrations for every thousand inhabitants.

Migratory balance (compare two years, the first and the more recent)

Difference between emigration and immigration by municipality

Rate of growth of urban population

Percent of population in urban areas

3.1.2 Analysis of demographic policies influencing the growth trends

Table 3. Demographic political matrix

Population, demographic and migration policies
Birth control policy (e.g. limiting or promoting the increase of fertility)
Migration policy (e.g. limiting or free migration policies)
Health (e.g. control of specific diseases or general improvement of the health system)

3.1.3 Projections, the scenarios until 2025

The projections are the result of extrapolating the future growth of the population based on the selection of a combination of probable hypotheses of evolution for each of the demographic phenomena involved in population growth based on the dynamics previously defined (i.e. mortality, fertility and migrations). The base year is 2000/01.

Also the demographic policies should be considered in the definition of scenarios.

Scenario A to 2025

This scenario results from the hypothesis of continuing the evolution of the demographic phenomena involved in population growth take place, i.e. mortality, fertility and migration balance.

Scenario B to 2025

The birth and mortality trends extrapolated to the future, excluding the migration trends.

Scenario C to 2025

The migration trends extrapolated to the future, excluding the birth and mortality trends.

The alternative methodological procedure is to adopt the official more recently demographic projections.

3.2 Political and economic options adopted for the study areas - Task 2

The level and the pattern of economic growth is, among other causes, a result of the existing policies. This task will analyse those policies and the options for economic growth that can be at the origin of competing uses of water.

The main objectives are to characterise the strategic and regulatory instruments at national, regional and municipal levels; and the identification and characterisation of the different levels of decision related to the water management.

In some countries there is a water management office with a direct influence in the case study area that should also be analysed.

3.2.1 Policy tools and institutional drivers

The planning and management instruments in the regions studied and the levels in which decisions are taken will be studied in this point of the workpackage.

Parallel to the policy analysis it is important to understand in what way is the political structure able to intervene, i.e. are the policies really applied in the case study areas? In some countries or regions, the policies are not applied and it can be identified a significant gap between the political and legal orientations and the practice.

Also the ratification of international agreements are an information to understand the political commitment of the country in sustainable water management.

Table 4. Guidelines for the policy frame matrix

Political and economic options adopted for the study areas
Pattern of economic growth, priorities and political orientation
Economic growth options that can be at the origin of competing uses of water
Regional development plans
Planning and management instruments for the regions studied and the levels in which decisions are taken
Other environmental and spatial planning and management tools influencing the case study area
Water policies evolution
Coastal zone policies

3.2.2 Economic options adopted for the study area: set of variables

The level and the pattern of economic growth (measured with some general and specific economic variables) and its consequences in terms of water demand will also be important issues to analyse. For example, the pressure over water will be much higher if the political orientation intends to improve an irrigated agriculture. In that case, the demand from agriculture will increase the pressure on accessible runoff dramatically, thereby constituting the main driving force for potential conflicts between different actors involved on the water management.

Table 5. Economic data needs

Description
G.D.P. (Gross Domestic Product) at market prices
Resident population
Number of persons with an economic activity
Agricultural income distribution by the main types of production
Income distribution by main industrial activity groups
Employment in tertiary sector
Tourism income
Regional product

Growth of G.D.P. (Gross Domestic Product) at market prices

Levels of GDP per capita are obtained by dividing annual or period GDP at current market prices by population.

A variation of the variable could be the growth of real GDP per capita which is derived by computing the annual or period growth rate of GDP in constant basic producers' or purchasers' prices divided by corresponding population

Household and per capita income**Activity rate**

Number of persons with an economic activity/total population

Population living below poverty line

This variable gives, in %, the measure with the number of persons/households classified as living below the nationally-defined poverty line, given as a fraction of the total population in the country (adapted from UN http://esl.jrc.it/envind/un_meths/UN_ME076.htm).

Primary sector**Agricultural activity variables****Subsistence agriculture**

Subsistence agriculture describes farming and associated activities which together form a livelihood strategy, where the main output is consumed

directly by the household, where there are few if any purchased inputs and where only a minor proportion of output is marketed. The subsistence sector is of considerable importance in most low income.

Market oriented agriculture

Income distribution by the main types of production

Secondary sector

Industrial activity variables

Percentage of secondary employment

Industrial production index

The industrial production index measures the physical volume of output of the nation's manufacturing sector, including factories, mines, and utilities.

Income distribution by main industrial activity groups

Market orientation

Technological level

Qualified and non-qualified workers

Tertiary sector

Tertiary activity variables

Percentage of tertiary employment

Commercial activities, social support services, tourism and other services

Tourism income contribution to the regional product

Level of occupancy in tourism units (%)

National and international tourists

Seasonality: occupation during the high and low season

3.3 Competing water uses - Task 3

The main objective of task 3 is the identification of water demands and the characterisation of the various actors and interests related with these demand. The competition between different economic activities for the water use is frequently a result of the growth of the urban systems. Nowadays, the water demands from cities compete directly with the demands from agriculture.

The economic and demographic structure of the rural/urban interface will be analysed in terms of the consequences for multi-sectoral current and projected water demand, and the implied conflicts. A comparative analysis, considering the demographic, economic, and political context will allow the understanding of the conflicts resulting from the water demands. Thus, the previous analysis will be used to identify current and projected water demands.

3.3.1 Data needs

Two types of data should be considered:

- The collection of the quantities of water needs by type of use.
- The confrontation between the different purposes of water use in order to understand the competing arguments between users.

For the last point, a group discussion with the stakeholders, that are representing the different water uses/demands, must be the best option to collect information. The UATLA team provided the guidelines for the group discussion.

Table 6. Water demand data needs

Description water consumption Time frame: most recent data
Water consumption per capita
Water domestic consumption in urban areas
Water domestic consumption in rural areas
Water consumption by industrial units
Water consumption in agriculture
Water consumption by type of tourist unit in the low season
Total water consumption

3.3.2. Water use variables

The data collection should be adapted to the main water uses in each region. The data should be collected by person/day or by unit/size/year.

Domestic use or drinking water:

- water consumption per capita (if possible, considering differences between urban and rural residents)

Industrial water use

Irrigated agriculture needs

Aquaculture needs

Tourism water needs

The variables of pressures caused by demand are as follows:

Domestic consumption of water per capita

It is the amount of water consumed per person for the purposes of ingestion, hygiene, cooking, washing of utensils and other household purposes including garden uses (adapted from UN http://esl.jrc.it/envind/un_meths/UN_ME076.htm).

Commercial water consumption (including and excluding the tourism activity)

It is the amount of water consumed per commercial activity. If the tourism is a significant activity in some case study, it is important to present also the water consumption in the tourism units.

Industrial water consumption per unit

It is the amount of water consumed per industrial unit.

Total water consumption

It is the amount of water consumed by all the activities. It is the sum of the water consumed by each sector.

3.3.3 Projected water demand

The results achieved in task 1 should be considered to build the water demand scenarios.

In the definition of the water demand scenarios will be considered the more important factor that is influencing the water use, for example:

- Population growth (urban and/or rural)
- Agricultural production

- Industrial production
- Tourism growth
- Aquaculture production
- Political framework
- Economic policy
- Legislation and water resource management

Based on the characterisation of those dynamics in the SMART case studies it will be possible to determine the following scenarios:

(The description presented below intends to be an example of the different realities that could be considered in the definition of water demand scenarios. Each team should define the trends that are adequate to their own situation as a result of the previous analysis.)

Business as usual scenario

- Assumes the continuation of existing trends
- Depend of the case studies dynamics framework

Water Crisis Scenario

- Population trends that can increase the pressure over water use.
- Aggravation of existing policies and trends that could have harmful effects over water.
- Economic activities growth implying an increasing water use.

Sustainable Water Use Scenario

- Assumes improvement of existing policies and trends and focus on environment.
- Higher water use efficiency due to water management reform.
- Water prices changes.

Projections of population, employment, and median household income to the year 2025 were prepared for this study.

The economy of a region depends on the economy of national or international scales. The case study areas are a part of the economy of their countries.

Therefore, forecasts and projections for these larger must be used, to the extent available, to prepare the projections of water demand.

Specific forecasts and projections include economic forecasts for each country and corresponding international forecasts to the year 2025, along with United Nations Demographic Bureau projections of the population of the Middle East countries 2025.

A projection extends the past into the future and is an accurate predictor of the future only if the future events follow the pattern established by that segment of the past.

The projections provide a range of values for population, employment, and income. The Business as usual scenario in this study show what would happen if the growth pattern of the last decade continues. For the high end, alternative projections must be developed by various methodologies designed to capture the likely impacts of continued development at the higher rates seen during the last few years. Together, the Business as usual, Water crisis and Sustainable water use scenarios provide a range within which growth can reasonably be expected to occur.

3.4 Economic analysis of water resources - Task 4

The scarcity of water should imply the consideration of water as an economic good. In this sense it is essential to carry out an economic analysis in each case study to evaluate the actual economic cost of water resources, and the levels of tariff. This scarcity affects all the users, from the households to farms, industries, tourism activities and other commercial sectors.

The purpose of this economic analysis of water resources is to bring into the WP2 the prices of water (by each economic sector), the costs among the different water users and other negative externalities, which can influence this economic analysis.

The water price is set on a political base; therefore full-cost pricing of water services is often not achieved. The results of a market price strategy must be analysed, but also the effects of a governmental intervention, which can be based on the defence of social interests. For example, when the value of water is not calculated according to use, the result could be an agriculture that often pays too little, and an industry that pays a too high price.

Table 7. Data needs for economic analysis

Description of water Time frame: most recent data

Water price

Domestic use
Agriculture
Industry
Tourism units

Water infrastructure investments

Water treatment
Reservoir storage
Water distribution and use systems

Economic variables: An integrated indicator of water pressure is proposed: the Water Poverty Index

The Water Poverty Index (WPI) uses five criteria - resource, access, use, capacity and environment - to construct an index underlining that it is not the amount of water resources available that determine poverty levels in a region or a country, but the effectiveness of how you use those resources.

Applying the index to the countries of the world yields few surprises - industrialized northern countries are at the top, poor developing countries in Africa and elsewhere at the bottom of the list - but nevertheless a basic understanding of the importance of social adaptive capacity in countries facing impending scarcity of the physical resource water (based on World Water Council definition).

Appendix A - SMART WP 2

SMART WP2 Indicators

	VARIABLES	UNITS in which the indicator is expressed	DATA NEEDS	UNITS in which the data is measured		
				spatial	temporal	Numeric
Task 1 Population, demographic and migration policy analysis	Population growth rate	% of growing	Resident population	Municipal/Regional	1990	yes
	Migratory balance	Number of people	Immigration	Regional	between 1990 and 2000	yes
			Emigration			yes
	Population Density	Number of people/municipality area (km ²)	Resident population	Municipal/Regional	1990	yes
			Municipality area			2000
	Number of persons by household	Number of persons by household	Resident population	Municipal/Regional	1990	yes
			Households			2000
	Crude Death Rate	‰	Resident population	Regional	1990	yes
			Number of deaths			2000
	Crude Birth Rate	‰	Resident population	Regional	1990	yes
Number of live births			2000			yes
Synthetic general fertility index	number of children by mother	Female population by age groups	Regional/National	1990	yes	
		Number of live births			2000	yes
Life expectancy at birth	number of years	Life expectancy at birth	Regional/National	1990	yes	
					2000	yes
	VARIABLES	UNITS in which the indicator is expressed	DATA NEEDS	UNITS in which the data is measured		
Task 2 Political and Economic Options Adopted for the Study Areas	Growth of G.D.P. (Gross Domestic Product) at market prices	%	G.D.P. (Gross Domestic Product) at market prices	Regional/National	1990	yes
					2000	yes
	Activity rate	%	Resident population Number of persons with an economic activity	Regional/National	1990	yes
					2000	yes
	Agricultural income distribution by the main types of production	€	Agricultural income distribution by the main types of production	Regional/National	1990	yes
					2000	yes
	Industrial Income distribution by main industrial activity groups	€	Income distribution by main industrial activity groups	Regional/National	1990	yes
					2000	yes
Percentage of tertiary employment	%	Employment in tertiary sector	Regional/National	1990	yes	
				2000	yes	
Tourism income contribution to the regional product	€	Tourism income Regional product	Regional/National	1990	yes	
				2000	yes	

	VARIABLES	UNITS in which the indicator is expressed	DATA NEEDS	UNITS in which the data is measured		
				spatial	temporal	Numeric
Task 3 Competing Water Uses	Water consumption per capita	liters	Resident population	Regional/National	1990	yes
			Total water consumed		2000	yes
	Domestic consumption of water per capita	liters	Resident population	Regional/National	1990	yes
			water consumed per person for the purposes of ingestion, hygiene, cooking, washing of utensils and other household purposes		2000	yes
	Commercial water consumption	liters	consumed per commercial activity	Regional/National	1990	yes
					2000	yes
	Industrial water consumption per unit	liters	consumed per industrial unit	Regional/National	1990	yes
					2000	yes
Total water consumption	liters	Total water consumed	Regional/National	1990	yes	
				2000	yes	
	VARIABLES	UNITS in which the indicator is expressed	DATA NEEDS	UNITS in which the data is measured		
Task 4 Economic Analysis of Water Resources	Water price for the domestic use	€	Water price for the domestic use	Regional/National	2000	yes
	Water price for the Agriculture	€	Water price for the Agriculture	Regional/National	2000	yes
	Water price for the Industry	€	Water price for the Industry	Regional/National	2000	yes
	Water price for the Tourism units	€	Water price for the Tourism units	Regional/National	2000	yes
	Water treatment investments	€	Water treatment investments	Regional/National	2000	yes
	Reservoir storage investments	€	Reservoir storage investments	Regional/National	2000	yes
	Water distribution and use systems investments	€	Water distribution and use systems investments	Regional/National	2000	yes