DEPARTMENT OF INTERNATIONAL AND EUROPEAN ECONOMIC STUDIES

ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS

MANAGING THE EFFECTS OF MULTIPLE STRESSORS ON AQUATIC ECOSYSTEMS UNDER WATER SCARCITY

EBUN AKINSETE
STELLA APOSTOLAKI
GONZALEZ DAVILA OSIEL
AMERISSA GIANNOULI
STAVROS GAVROGLOU
ALICE GUITTARD
PHOEBE KOUNDOURI
ELEFTHERIOS LEVANTIS
ELISAVET MOUSLECH
VASILEIOS PERGAMALIS
NIKITAS PITTIS
DIMITRIOS REPPAS
VASILEIOS SKIANIS
IOANNIS SOULIOTIS
STELLA TSANI

Working Paper Series

19-06

January 2019

Managing the effects of multiple stressors on aquatic ecosystems under water scarcity

Ebun Akinsete, Stella Apostolaki, Gonzalez Davila Osiel, Amerissa Giannouli, Stavros Gavroglou, Alice Guittard, Phoebe Koundouri, Eleftherios Levantis, Elisavet Mouslech, Vasileios Pergamalis, Nikitas Pittis, Dimitrios Reppas, Vasileios Skianis, Ioannis Souliotis, Stella Tsani

Collaboration: LMU- Ralf Ludwig, Verena Huber García, Swen Meyer, IES-JRC- Alberto Pistochi, ALTERRA- Philippe Ker Rault , Case Study leaders- Alberto Bellin, Nick Voulvoulis, Sergi Sabater, Nikolaos Th. Skoulikidis, Radmila Milačič

Contact: Phoebe Koundouri, ATHENA, email: pkoundouri@aueb.gr

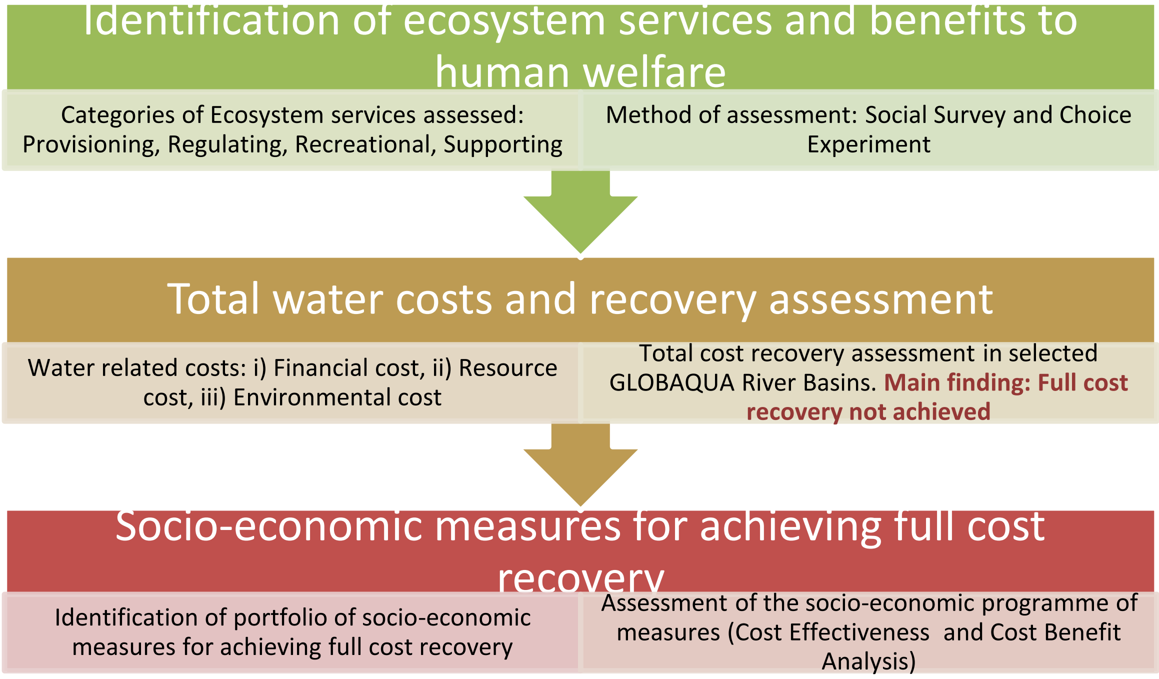
Sub-Deliverable 9.4

Integration of the results of STEP 3 of the implementation of the WFD in GA RB: Economic Assessment of Programme of Measures (Cost-Effectiveness) and Disproportionality Analysis to justify any derogations (Cost Benefit Analysis)

Factsheet

Full cost recovery links to the welfare economics literature which argues that for maximum economic efficiency, prices should be set equal to the marginal (opportunity) cost. Nevertheless it is well recognized, both in the scientific literature and in most of national legislations, that implementing full cost recovery may raise social and redistributive concerns which have to be addressed by public authorities. Also it entails several steps which are often difficult to complete from both a methodological and data availability perspective. This sub-deliverable assesses cost recovery levels in the selected Globaqua case studies and the measures put in place for achieving full cost recovery and sustainable water management. The approach employed includes both a qualitative and quantitative assessment of the costs and benefits related to water use and to the measures for achieving full cost recovery. The qualitative assessment aims at contributing to the theoretical debate on the subject and to the formulation of policy recommendations. The quantitative assessment aims at complementing the ongoing research on the subject with the collection of primary data and derivation of quantitative results on agents' perceptions of environmental goods and services. It also aims at filling the gap on data availability in the subject by bringing together data and information collected in the selected case studies. This work had to overcome significant data limitations. Secondary data and analysis has also been utilised in order to complement the cost-benefit and cost-effectiveness assessment of the measures for achieving full water cost recovery.

Several methodological steps have been utilised in the process of completing the work reported here as illustrated in the Figure next. The methodology followed is in accordance with the requirements of economic analysis in the WFD. In a nutshell, this approach consists of the following three steps: i) socio-economic characterization of the River Basin area, ii) assessment of the current recovery of water use cost and, iii) identification and suggestion of appropriate programs of measures for sustainable water management. The methodology is in line with the DPSIR (Drivers, Pressures, State, Impact, Response) framework. More specifically, both the socio-economic benefits (costs) yielded from the ecosystem services, but also the impacts of economic development are valued.



Methodological steps for the assessment of the ecosystem services provided by water, water cost recovery and the socio-economic instruments for achieving full cost recovery for water ecosystem services

The social survey and choice experiment developed for the understanding of the value people put on water ecosystems indicated that indeed agent appreciate the services and goods provided by the rivers. Nevertheless, the statistical significance of the findings indicated that more research should be done into the direction of establishing a robust estimation on the willingness to pay for water related ecosystem services. Under a related interpretation the findings might indicate affordability issues in the selected case studies. Efforts were made in order to assess these affordability issues in the river basins through the analysis of cost recovery and the cost – benefit and cost-effectiveness assessment of the socio-economic measures for achieving full cost recovery. These efforts are constraint by significant data limitations and non-clear description of the measures included in the RBMPs. This lack of information and of quantitative data limits the cost-benefit insights but also indicates the areas where policy efforts and recommendations need to put focus on. Indicative recommendations include:

- Demand for greater transparency and detailed information on the measures and the investments planned by the Member States in order to achieve the goals of the WFD
- Detailed analysis and breakdown of the cost estimations including analysis of administration and management costs, operation costs and discount rates
- Setting of a harmonised cost-benefit and cost-effectiveness assessment methodology across member states that enables comparability and transferability of results and policy implications after considering case-specific particularities

Index

Milestones reached

Sub-deliverable 9.4 works towards Milestone 7.

1. Introduction

The EU Water Framework Directive (WFD) aims at addressing multiple stressors put on EU Rivers. The WFD is considered a first systematic approach to ensure the quality of freshwater ecosystems holistically, and to address the simultaneous impact of multiple stres EU WFD, challenges remain particularly with regards to capturing the "total" costs and benefits of water use. Many studies stress the importance of conceptualizing and monetizing the total costs and benefits linked to water use (e.g. Koundouri 2008, 2009 and 2010). Acknowledging the importance of incorporating in water management the total costs and benefits of water use, recent policy developments have attempted to incorporate integrated measures into water resources and river basin management. EU Member States have agreed to a series of measures that aim at the sustainable management of water resources that explicitly consider the full cost recovery of water i.e. ensuring that all costs involved in water use are recovered through securing funding or charging at a level which includes a relevant proportion of the financial, environment and resource costs.

Full cost recovery links to the welfare economics literature which argues that for maximum economic efficiency, prices should be set equal to the marginal (opportunity) cost. Nevertheless, it is well recognized, both in the scientific literature and in most of national legislations, that implementing full cost recovery may raise social and redistributive concerns which have to be addressed by public authorities. Also it entails several steps from accurate cost benefit estimations (linked to the benefits agents receive from the use of water ecosystem services and goods, to environmental costs, to the financial costs and to the resource costs) to setting explicit investment and infrastructure projects and budgets. These steps are not easy to complete both from a design, methodological and data availability perspective.

This report summarizes the work completed for the assessment of cost recovery levels in the selected Globaqua case studies and the measures put in place for achieving full cost recovery and sustainable water management. The approach employed includes both a qualitative and quantitative assessment of the costs and benefits related to water use and to the measures for achieving full cost recovery. The qualitative assessment aims at contributing to the theoretical debate on the subject and to the formulation of policy recommendations. The quantitative assessment aims at complementing the ongoing research on the subject with the collection of primary data and derivation of quantitative results on agents' perceptions of environmental goods and services. It also aims at filling the gap on data availability in the subject by bringing together data and information collected in the selected case studies. This work had to overcome significant data limitations. Secondary data and analysis has also been utilised in order to complement the cost-benefit and cost-effectiveness assessment of the measures for achieving full water cost recovery. The work builds on and extends previous work on the importance of ecosystem services to the economy and socioeconomic development (D8.4), on the integrated methodology and assessment for the sustainable environmental and socioeconomic management of the water resources ecosystem services (D9.1) on the methodology to investigate the economic value of freshwater ecosystem services (D10.1), and on the assessment of the current levels of recovery of the costs of water resources ecosystem services and development of the package of socioeconomic measures for achieving full-cost recovery (D9.3).

2. Methods

The development of the Water Framework Directive aims at establishing an integrated framework of water management at the European level. In the process of achieving the environment and ecological objectives set from the Directive, the role of economics is put at the core of the water management. More specifically, the

WFD requires the application of economic principles, approaches and instruments at River Basin level.[1] In harmony with the WFD, for each River Basin District the managers of the resource have to undertake specific steps. The first step is to conduct an economic characterization of water at River Basin District level. This involves the estimation of the socio-economic significance of water uses and the investigation of the dynamics of key economic drivers that may influence water pressures and its current status. The second step is an assessment of the recovery of the costs of water services, and the final step is an economic assessment of potential measures for balancing water demand and supply.

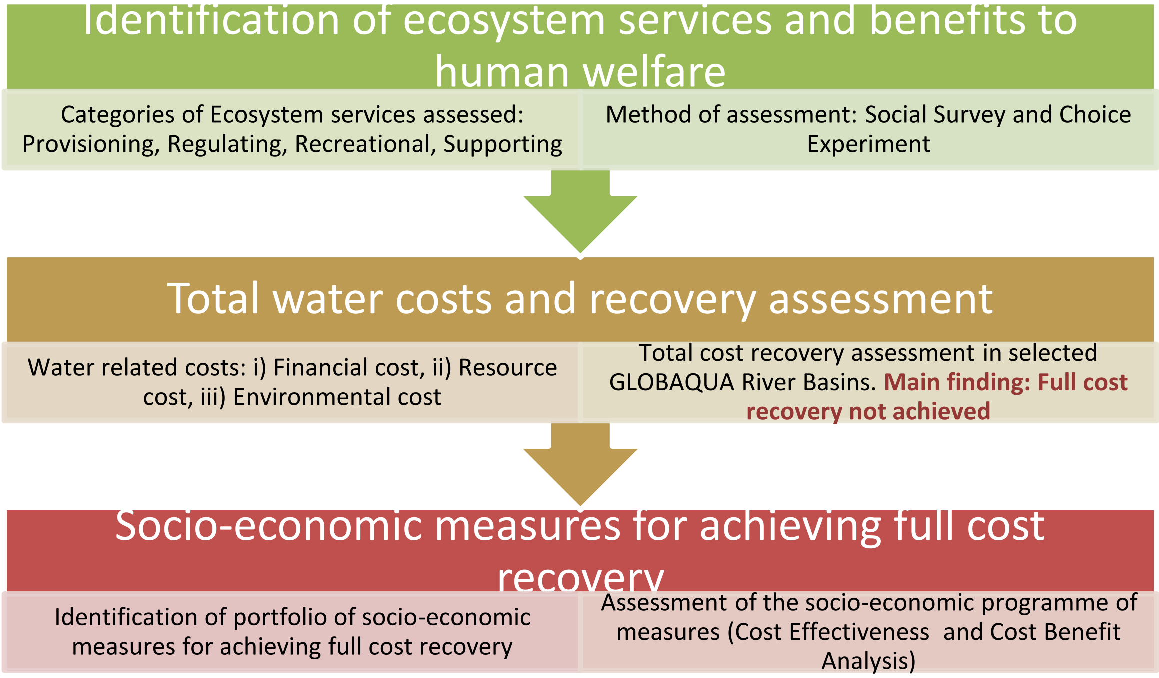


Figure 9.4.1. Methodological steps for the assessment of the ecosystem services provided by water, water cost recovery and the socio-economic instruments for achieving full cost recovery for water ecosystem services

Several methodological steps have been utilised in the process of completing the work reported here. The methodological steps are illustrated in Figure 9.4.1. The methodology followed is in accordance with the requirements of economic analysis in the WFD. In a nutshell, this approach consists of the following three steps: i) socio-economic characterization of the River Basin area, ii) assessment of the current recovery of water use cost and, iii) identification and suggestion of appropriate programs of measures for sustainable water management over space and time. The methodology is in line with the DPSIR (Drivers, Pressures, State, Impact, Response) framework. More specifically, both the socio-economic benefits (costs) yielded from the ecosystem services, but also the impacts of economic development are valued.

[1] Article 5 “Characteristics of the river basin district, review of environmental impact of human activity and economic analysis of water use,” Article 9 “Recovery of costs for water services,” Article 11 “Programme of Measures (PoMs)” and Annex III “Economic analysis” discuss those economics elements.

2.1. Water ecosystem services, costs and benefits to human welfare

The ecosystem services approach is at the core of the methodology for the implementation of a more sustainable and efficient water management. Following this approach, emphasis is given on the functions of the ecosystem "as a whole" and on the variety of services that can be beneficial for human well-being, instead of just focusing on specific functions and relevant beneficiaries. This enables us not only to better realize the total value of an ecosystem and its benefits to human welfare, but also to identify the complex interlinks among actions that affect the function and balance of the ecosystem (deciding for example whether to utilize the water of a river basin), and the effects on various economic sectors and stakeholders (using the water of a river may yield certain benefits, i.e. income for farmers and agricultural products for consumers, on the one hand, but will/might destroy a wide variety of ecological values that a river can offer on the other hand).

According to the Total Economic Value of Ecosystems and Biodiversity initiative (TEEB) ecosystem services can be provided into four main categories:

(i) provisioning services, i.e. products obtained from ecosystems,

(ii) regulating services, i.e. benefits arising from the regulation of ecosystem processes and functions,

(iii) habitat services, i.e. services that are supportive for the production of all other ecosystem services, and

(iv) cultural services, i.e. benefits for humans such as spiritual enrichment, cognitive development, recreation and education, and contains examples of ecosystem services across the four main categories as defined by TEEB

These ecosystem services categories have been used in the work reported here. Some of the ecosystem services, such as food and timber, can be easily valued, since a market price is available for those products. On the other hand, it is rather difficult to quantify the value of non-marketed services, such as aesthetic values. Moreover, some of the benefits may be derived by the actual use, direct or indirect, of the ecosystem, whereas other types of benefits can be derived only by the knowledge of its existence, even if there is no actual use of the ecosystem. The implementation of ecosystem services approach requires the identification and quantification of all types of values, called Total Economic Value -TEV that an ecosystem can provide.

Ecosystem services have started gaining attention in the 1980s. Since then, a significant number of publications emerged, which grows significantly. Nevertheless the data limitations remain important with regards to the assessment of ecosystem services mainly due to the lack of understanding the relationship between ecological services, ecosystem services and economic values.

The conventional economic instruments aim to address the externalities and government failures in the management of water resources by considering the integrated value of water (i.e. economic, financial, environmental etc.). The economic and financial values are easier to quantify with the use of market derived mechanisms (e.g. price of water, investment cost for infrastructure etc.). On the other hand, the environmental liability systems internalize and recover the costs of environmental damage through legal action and make polluters pay for the damage their pollution causes. If the penalties are sufficiently high, and enforcement is effective, liability for damage can provide incentives for taking preventative measures. For such systems to be effective there need to be one or more identifiable actors (polluters); the damage needs to be concrete and quantifiable; and a causal link needs to be established between the damage and the identified polluter. What is more difficult to quantify is the changes of physical, chemical, biological or ecological nature that impact on the number and the quality of ecosystem preservation functions. The benefits of these resource functions to society (and social welfare) are not confined to their physical functions. Such values, constituted through social processes, represent ethical, aesthetic and cultural concerns as much as scientific knowledge. The sources of river values are diverse and heterogeneous, thus decisions on the river and water management-related policies and projects should not be made on scientific and/or economic (including financial, management, restoration costs and benefits) grounds alone; social and cultural aspects also need to be considered for. For the integration of these values policy-makers have to explore water values held by 'ordinary' citizens in the context of developing a non-monetary approach to valuation, and suggest how these values should be integrated in water resources management policies.

In economics, the basis of value is determined by individual preferences. Preferences reflect the utilities that are expected to be derived from the consumption of resources, given the needs, wants and wishes of consumers. In order to correctly evaluate a given resource, one needs to consider the TEV of the resource, that is, the whole class of values that have a basis in human preferences. TEV is composed of direct and indirect use values, as well as non-use values. Current use value derives from the utility gained by an individual from the consumption of a good or service, or from the consumption of others (for example parents may obtain utility from their children's consumption). Current use value is composed of direct use value (commercial and recreational) and indirect use value (such as amenity value or general ecosystem support). Option value derives from retaining an option to a good or service for which future demand is uncertain. If we are not certain about either our future preferences or about future availability, we may be willing to pay a premium (the option value) to keep the option of future use open. The option value is an additional value to any utility that may arise if and when the good is actually consumed. Existence value derives from human preferences for the existence of resources as such, unrelated to any use to which such resources may be put. Individual preferences may exist for maintaining resources in their present forms even where no actual or future 'use' is expected to be made of the resource.

Given that many of these components of value are not reflected in market prices of water, economists have to estimate the true resource value through user willingness to pay (WTP) for a given quantity and quality of supply. Valuation techniques are therefore necessary to assign appropriate prices that will enable water to be allocated in the most efficient manner. A variety of techniques has been developed over the years to address this issue and is generally classified as revealed preference techniques and stated preference techniques. Revealed preference techniques use data on goods or services that are marketed and do have observable prices, in order to value some environmental attribute which is embodied in the marketed goods and services, but is not traded itself in any particular market. In stated preference techniques, individuals are provided with a constructed scenario in which they are asked how much they are willing to pay for changes in environmental quantity.

The category of revealed preference techniques for water resources includes residual value method, which values all inputs for the good produced at the market price, except for the water resource itself. The residual value of the good is attributed to the water input. For example, one can value water as an input in the production of different crops. A problem with this methodology is that only part of the use value of water can be captured. Another approach is the hedonic pricing method whereby implicit prices of characteristics which differentiate closely related goods are estimated. Suppose that an environmental resource that you wish to value is not itself traded in any market, possibly because the resource is a public good. As a result, no market price exists which can reveal preferences or willingness to pay for the resource. Suppose also that the resource can be defined in terms of services it yields or an ‘attribute’ it embodies. This attribute may be embodied in other goods or assets which are marketed, and which do have observable prices. A limitation of the hedonic pricing technique is that it is only capable of measuring that subset of use values for which people are willing to pay, and do so indirectly through the related market. It also relies on the assumption that consumers are fully informed about the qualities of the attributes being valued; otherwise hedonic price estimates are of little relevance. There are other problems in that the hedonic price equation and the second-step demand equation impose rather strong assumptions about separability of consumers’ utility functions. The functional forms of regression models that are usually chosen impose weak separability. However standard consumer demand theory and evidence from applied studies doubt the validity of weak separability, particularly when large changes occur, as is often the case when dealing with environmental projects.

Travel cost models (also known as recreation demand models) are an alternative revealed preference technique which focuses on choice of trips or visits for recreational purposes and looks at the level of satisfaction, time and money spent in relation to the activity. Patterns of travel to a particular sight can be used to analyse how individuals value the site and, for example, the water quality of a river stretch.

Within the category of stated preference techniques, one can use contingent valuation methods, choice modelling approaches, and meta-analysis. Many water quality evaluation problems occur in a framework for which no value measures can be derived from observing individual choices through a market. This is mainly due to the public good aspect of water. Other examples where actual consumer choices are unobservable are cases where the policy change is potential rather than actual. In such cases, respondents are offered conditions simulating a hypothetical market in which they are asked to express willingness to pay for existing or potential environmental conditions not registered on any market. The most common form of questioning on hypothetical futures is called the contingent valuation method (CVM). This involves asking individuals directly what they would be willing to pay contingent on some hypothetical change in the future state of the world (Mitchell and Carson, 1989). Alternatively, this can be expressed as the minimum monetary compensation they would accept to go without an increase in that good or tolerate a decrease (willingness to accept compensation-WTAC). Thus an individual’s WTP or WTAC will depend on the description of the contingent market, the information they have about the environmental good (which depends partly on what they are told about it as part of the CVM survey), their own preferences and their budget constraints, and the availability of substitutes and complements. In brief, a CVM exercise consists of a description of the environmental change in question and the contingent market, establishing a bid vehicle (for example an increase in monthly water bills), and a reason for payment (for example to reduce water shortage incidents from three times a month to once a month). The WTP bids can be elicited in a variety of methods including an open-ended format, a bidding game, a payment card or a single or double-bounded dichotomous choice mechanism. Once the mean and median WTP has been estimated, the average bid can be aggregated to a population total value.

There are many problems associated with CVM that may bias the value estimates (for example interviewing bias, non-response bias, strategic bias, embedding effects, yea-saying bias, hypothetical bias, information bias), and best practice guidelines for conducting CVM studies have been developed (NOAA, 1993). These recommend for example the use of dichotomous choice formats over other alternatives, that in-person interviews should be conducted as opposed to for example mail surveys, and that WTP, not WTAC, measures should be elicited.

Partly as a response to these problems, valuation practitioners are increasingly interested in alternative stated preference formats such as choice modelling (CM). CM is a family of survey-based methodologies (including choice experiments, contingent ranking, contingent rating and paired comparisons) for modelling preferences for goods, which can be described in terms of their attributes and of the levels they take. Respondents are asked to rank, rate or choose their most preferred alternative. By including cost as one of the attributes of the good, willingness to pay can be indirectly recovered from people's rankings, ratings or choices. An excellent critical review of CM alternatives and investigation of their potential to solve some of the major biases associated with standard CVM is provided by Hanley et al. (2001). In the class of CM alternatives, probably the one receiving the most attention is the choice experiment method (CEM). This is a survey-based technique which can estimate the total economic value of an environmental stock/flow or service and the value of its attributes, as well as the value of more complex changes in several attributes. Each respondent is presented with a series of alternatives of the environmental stock/flow or service with varying levels of its attributes and asked to choose their most preferred alternative in each set of alternatives.CEM eliminates or minimizes several of the CVM problems (for example strategic bias, yea-saying bias, embedding effects).

Each of the valuation methodologies discussed above have advantages and disadvantages associated with them, and depending on the component of total economic value one is trying to estimate, some methods are more suitable than others. Once realistic estimates of surface and groundwater values are available, it is then necessary for governments to determine which policy measures are most suitable to achieve the desired outcomes.

2.2. Social survey and choice experiment for the valuation of water ecosystem services

The methodology employed for the work documented in the present report, adopts an ecosystem services approach that puts emphasis on the functions and provisions of the ecosystems to humans both in terms of services (such as recreation and leisure) and goods (provision of food, water, etc.). The approach, thus, consists on identifying and understanding the total ecosystem value, as well as the links among actions that affect the functions and the balance of the ecosystem. In the case of river basin management this would regard, for instance, decision on whether to utilize the water and on the effects this decision would have on the different economic sectors and stakeholders. Subsequently, the decision on the utilization of water may generate income for some stakeholders while it may put pressure on the income of others.

ATHENA team working in cooperation with the rest of the GLOBAQUA partners and the case study leaders has developed a Choice Experiment that has been implemented in the Sava and Evrotas river basins, i.e. in four countries in total namely: Slovenia, Croatia and Serbia (Sava River) and in Greece (Evrotas river). The choice experiment has been embedded in the social survey conducted in each case study. The questionnaire developed consists of three parts (the survey questionnaire is presented in the Appendix in English and in the local language, the format that respondents have seen in each country):

Part A: General Attitudes and Activities of the Respondents

Part B: Valuation Scenario and

Part C: Follow-up Questions

The design of the choice experiment has followed close consultation with GLOBAQUA partners and case study leaders. In September 2017 a closed workshop has been held in Athens among partners with the intention to finalise the list of ecosystem services and attributes that would be considered in the choice experiment developed by ATHENA team. Based on the outcomes of this workshop and the discussions among partners the following methodology has been employed.

Based on the Water Framework Directive overall approach to the classification of ecological status and ecological potential[2] the following levels have been defined for each case study examined:

Poor	Moderate	Good	High

Following an ecosystem services approach the attributes and levels summarized in Table 9.4.1-9.4.3 and Table 9.4.4 are identified for the choice experiment for the Sava and Evrotas rivers accordingly. The identification and characterisation follows the standard practice in the literature and expert views from the case study leaders.

Table 9.4.1 Attributes and levels for Sava river- Slovenia

Ecosystem services	Attribute	Current Status	Levels		
Provisioning	Water quality[3]	Good	Poor	Good	High
Regulating	Flood regulation and soil erosion	Good	Poor	Good	High
Cultural	Recreational activities	High	Poor	Good	High
Supporting	Biodiversity	High	Poor	Good	High

Table 9.4.2 Attributes and levels for Sava river- Croatia

Ecosystem services	Attribute	Current Status	Levels		
Provisioning	Water quality	Good	Poor	Good	High
Regulating	Flood regulation and soil erosion	Good	Poor	Good	High
Cultural	Recreational activities	Good	Poor	Good	High
Supporting	Biodiversity	Good	Poor	Good	High

Table 9.4.3 Attributes and levels for Sava river- Serbia

Ecosystem services	Attribute	Current Status	Levels

[2] See: https://circabc.europa.eu/sd/a/06480e87-27a6-41e6-b165-0581c2b046ad/Guidance%20No%2013%20-%20Classification%20of%20Ecological%20Status%20(WG%20A).pdf

[3] We focus on water quality only as there are methodological limitations when combining water quality with other aspects (like water quantity). For instance in case of Evrotas water quality is defined by the case study leader as moderate but defining quantity is difficult as it is a major problem in Evrotas, in the sense that due to natural drought and water abstraction, whole sections of the river dry out during the summer-so unable to define quality and quality in one composite indicator for provisioning services.

Provisioning	Water quality	Moderate	Poor	Good	High
Regulating	Flood regulation and soil erosion	Good	Poor	Good	High
Cultural	Recreational activities	Moderate	Poor	Good	High
Supporting	Biodiversity	Moderate	Poor	Good	High

Table 9.4.4 Attributes and levels for Evrotas river- Greece

Ecosystem services	Attribute	Current Status (Confirmed by CSL)	Levels		
Provisioning	Water quality	Moderate	Poor	Good	High
Regulating	Flood regulation and soil erosion	Moderate	Poor	Good	High
Cultural	Recreational activities	Moderate	Poor	Good	High
Supporting	Biodiversity	Good	Poor	Good	High

The payment method assumed includes a cost price over and above the household current water bill (annual payment, infinite). This approach is selected following relevant literature.[4] It emerges as most appropriate as water bill includes water quality improvements and environmental considerations/resource cost. The price vector used in the design is: 10, 25, 50, 75 and is chosen based on previous contingent valuation studies in South Europe[5]. The price vector is adjusted so as to account for lower income and lower water bills in the case study countries (so payments above 75 Euro/year that are used in previous studies are excluded here). Put simply respondents are asked to choose between alternative policy options that come with different costs attached and different impact on the quality of the ecosystem services provided. By choosing a specific option respondents indicate their willingness to pay for a specific policy that will have specific improving effects (or no improving effects in the case of no action) of the water ecosystem services under study.

---

[4] See: Glenk, K.; Lago, M.; Moran, D. Public preferences for water quality improvements: Implications for the implementation of the ECWater Framework Directive in Scotland. Water Policy 2011, 13, 645–662, Ferrini, S.; Schaafsma, M.; Bateman, I.J. Revealed and stated preference valuation and transfer: A within-sample comparison of water quality improvement values. Water Resour. Res. 2014, 50, 4746–4759. and Roy Brower, Julia Martin-Ortega, Julio Berbel (2010) Spatial Preference Heterogeneity: A Choice Experiment, Land Economics, 86 (3): 552–568

[5] See: Roy Brower, Julia Martin-Ortega, Julio Berbel (2010) Spatial Preference Heterogeneity: A Choice Experiment, Land Economics, 86 (3): 552–568

The following definitions apply for each attribute and level used in the choice experiment design. These definitions have been explained in simple words to the respondents prior to taking the survey. Definitions are based on the existing approaches in the literature and in particular in the work of Brower et al (2009)[6].

Water quality: Measure of water quality. Quality refers to biological and physio-chemical elements.

- Poor: not suitable for drinking, fishing, swimming or boating
- Moderate: Suitable for boating and fishing, not for swimming or drinking
- Good: suitable for boating, fishing and swimming, not for drinking
- High: Suitable boating, fishing, swimming, and drinking

Flood regulation and soil erosion: Measure of frequency of flooding and erosion and of vulnerability to erosion and flooding as percentage of areas and economic activity affected.

- Poor: High occurrence of flooding and erosion and high percentage of population/economic activity being affected (51% or more)
- Moderate: Moderate occurrence of flooding and erosion (26-50% of population/economic activity being vulnerable to erosion and flooding)
- Good: Low occurrence of flooding and erosion (11-24% of population/economic activity being vulnerable to erosion and flooding)
- High: Very low occurrence of flooding and erosion (0-10% of population/economic activity being vulnerable to erosion and flooding)

Recreational activities: Measure of the number of recreational activities undertaken on site

- Poor: Combination of less than two of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating
- Moderate: Combination of at least two of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating
- Good: Combination of at least three of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating
- High: Combination of at least four of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating

Biodiversity: Measure of the number of plant and animal species that can be found in and around the river

- Poor: 25% of the maximum potential number of plant and animal species that can inhabit the area is actually present

[6] Roy Brouwer, David Barton, Ian Bateman, Luke Brander, Stavros Georgiou, Julia Martín-Ortega, Stale Navrud, Manuel Pulido-Velazquez, Marije Schaafsma, Alfred Wagtendonk (2009). Economic Valuation of Environmental and Resource Costs and Benefits in the Water Framework Directive: Technical Guidelines for Practitioners. Aquamoney.

- Moderate: 50% of the maximum potential number of plant and animal species that can inhabit the area is actually present
- Good: 75% of the maximum potential number of plant and animal species that can inhabit the area is actually present
- High: 100% of the maximum potential number of plant and animal species that can inhabit the area is actually present

The Choice Experiment has been applied at a randomly selected sample of stakeholders that have acquaintance with the areas of interest, i.e. Evrotas and Sava river basins. The list of potential respondents was developed by the Case Study Leaders and there was effort to reach as many stakeholders and local residents as possible. The survey was active from October 5, 2018 until October 31, 2018 in all four countries. Weekly reminder emails have been sent to participants kindly asking them to fill the questionnaire.

The Survey was developed using a Research Survey software, Qualtrics, which enables for randomization of questions, a fundamental component in the Choice Experiment implementation. Qualtrics is user friendly; it enables for online completion and submission and allows for anonymity in the responses. The respondents were not asked personal questions and their anonymity was strictly kept, while their identity could not be revealed in any way. Figure 9.4.2 presents a snapshot of the Qualtircs interface that respondents have viewed when agreeing to take the survey. The survey respected GDPR guidelines and no sensitive or personal information where used for the completion of the survey. Respondents were informed with an automated message before taking the online survey that: '*The Questionnaire is strictly anonymous and confidential. The socio-economic characteristics of the respondents are asked for statistical reasons, only, and they will not be used in any other way. All socio-economic characteristics provided will be used exclusively for the purpose of this survey*.' Figure 9.4.3 provides a snapshot of the choice card each respondent was faced with when completing the survey. The cards appeared in randomised manner to the respondents ensuring the technical soundness of the online approach to the completion of the survey.

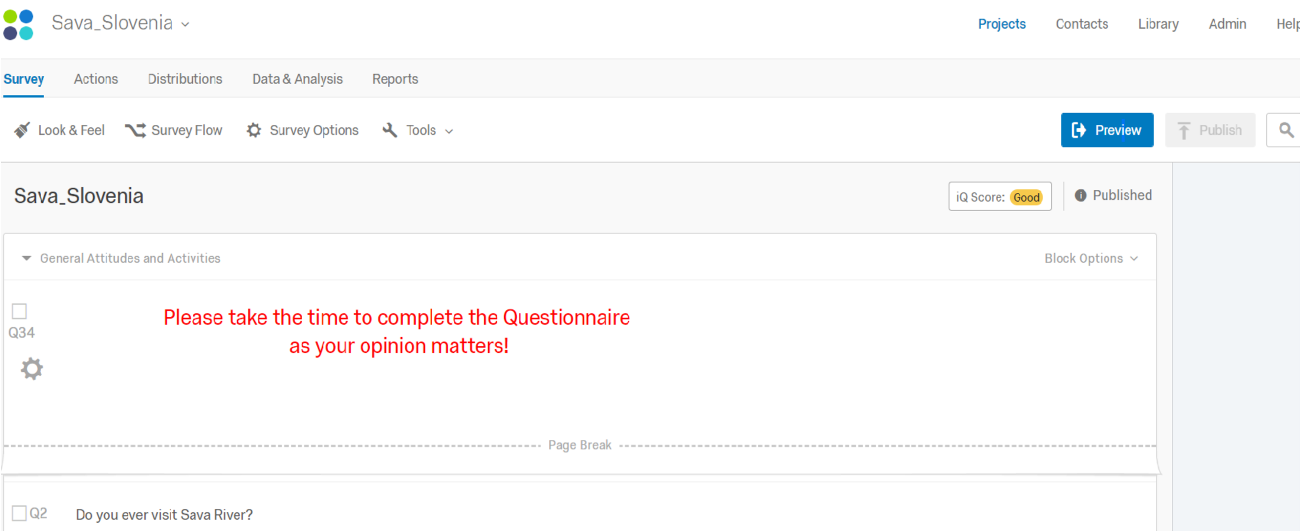


Figure 9.4.2 Qualtrics interface snapshot

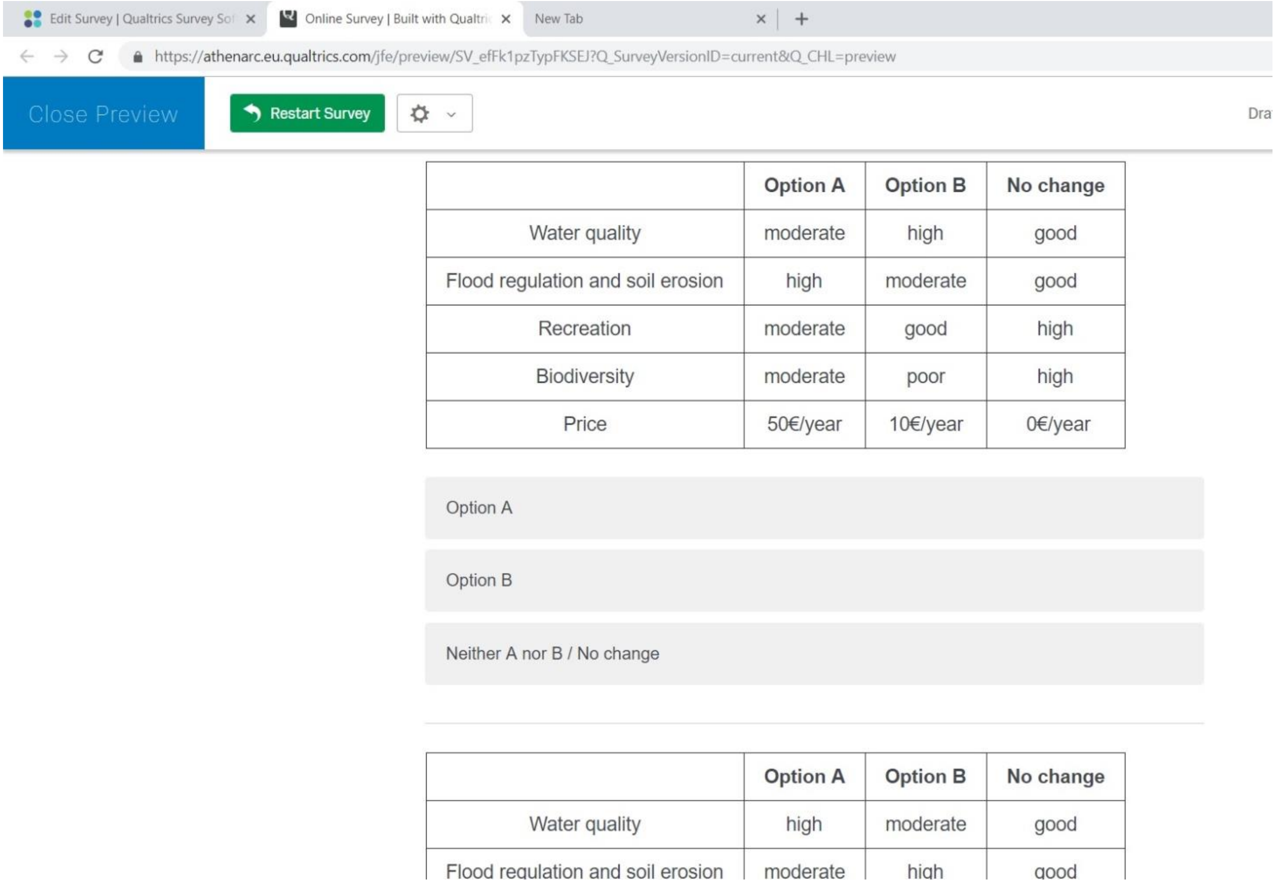


Figure 9.4.3 Qualtrics snapshot on choice experiment

On the technical details of the methodology used, in a random utility framework, the choice experiment methodology employed assumes utility functions with a linear-in-attributes deterministic component V and a random idiosyncratic component ε reflecting the unobserved influences. As a result, the utility from the j^{th} alternative is given by:

$$U_j = V_j + \varepsilon_j \; where \; V_j = \beta_k \, X_{kj}$$

with X_{kj}, the value of the k^{th} attribute for this alternative. The various X_{kj} are generated by the experimental design as described above and the analyst has control over the parameters and this is where we determine how they enter into the utility function. Parameters may be treated as either generic parameter estimates, or alternative specific parameter estimates. An unlabelled choice experiment design has been used in the case studies. In such discrete choice experiments, it makes no sense that one or more parameters might be alternative specific, so βs are assumed to be constant across alternatives.

Assuming that preferences are represented by a utility function U, a choice of an unlabeled alternative between two alternatives i and j is reveals:

$$U_i > U_j \Rightarrow V_i + \varepsilon_i > V_j + \varepsilon_j \Rightarrow V_i - V_j > \varepsilon_j - \varepsilon_i$$

The unknown parameters of the above utility model can be consistently estimated from stated choice outcomes between different alternatives using the Conditional Logit model. When ε_s are Independently and Identically Distributed (IID) with Independent extreme value (Gumbel) distribution (i.e. $F(\varepsilon_{itj}) = e^{-e^{-\varepsilon_{itj}}}$), random components can be integrated out and the probability that individual n chooses alternative j (makes choice j_n) when the choice set contains choices $j = 1, \ldots, J$. have a closed form solution of the form:

$$\Pr(j_n \mid J_n) = \frac{e^{V_{nj}}}{\sum_{i=1}^{J} e^{V_{ni}}} = \frac{e^{\sum_{k=1}^{K_j} \beta_{j_n k} x_{n, j_n k}}}{\sum_{i=1}^{J_n} e^{\sum_{k=1}^{K_j} \beta_{jk} x_{n, jk}}}$$

The information is summarized in the below log likelihood function that is the probability attached to the observed data:

$$LL(\beta \mid x, y) = \sum_{n=1}^{N} \sum_{j=1}^{J} y_{nj} \ln\left(P_{nj}(x_{nj} \mid \beta)\right)$$

Given that the choice sets had 4 alternative states with each state consisting of 4 attributes with 3 levels (see tables 9.4.1-9.4.4), we end up with a full factorial of 48 choices. Clearly, it would have been infeasible to ask respondents to make so many choices, so we had to reduce the size of the design. Randomly selecting a subset of the full factorial for each respondent was discarded because it may lead to biased estimates due to attribute level imbalance while orthogonal designs, although they satisfy attribute level balance and are able to estimate each parameter independently, they are inefficient since they create unnecessarily large design matrices. Here, we use a ``D-optimal" design that maximizes attribute level differences and the determinant of the information matrix. Bayesian ``D-efficient" design, aiming to minimize the elements of the Asymptotic Variance-Covariance (AVC) matrix but they depend on the parameter estimates and when such prior information is not available (as here), they are not very useful. However, using elements from such designs, such as stating the expected sign of each attribute has benefited out design in terms of generating more informative choices, avoiding dominant alternatives. The final design was split in 4 blocks, so that each respondent faced 16 choice situations.

The estimation results are discussed in section 3 and provide quantitative insights on the valuation of ecosystem services by agents, on the willingness to pay for specific improving policies but also insights on potential cost allocation options for water use that can support sustainable water management.

2.3. Assessment of socio-economic measures for achieving full cost recovery

In order to ensure sustainable management of the water resources it is important to identify the total costs and benefits of water ecosystem services. The choice experiment provides quantitative insights on the benefits agents receive from water ecosystem services. On the cost side it is important to identify the total costs linked to water use, i.e. the financial costs, the resource costs and the environmental costs. With regards to the identification of water costs and assessment of full-cost recovery in the GARB the notion of total water costs has been employed that makes use of estimation of the financial cost, the environmental cost and the resource cost of water use. Figure 9.4.4 provides a graphic summary of the methodology employed for the assessment of cost recovery levels in the selected GLOBAQUA case studies (based on Sub-Deliverable 9.3).

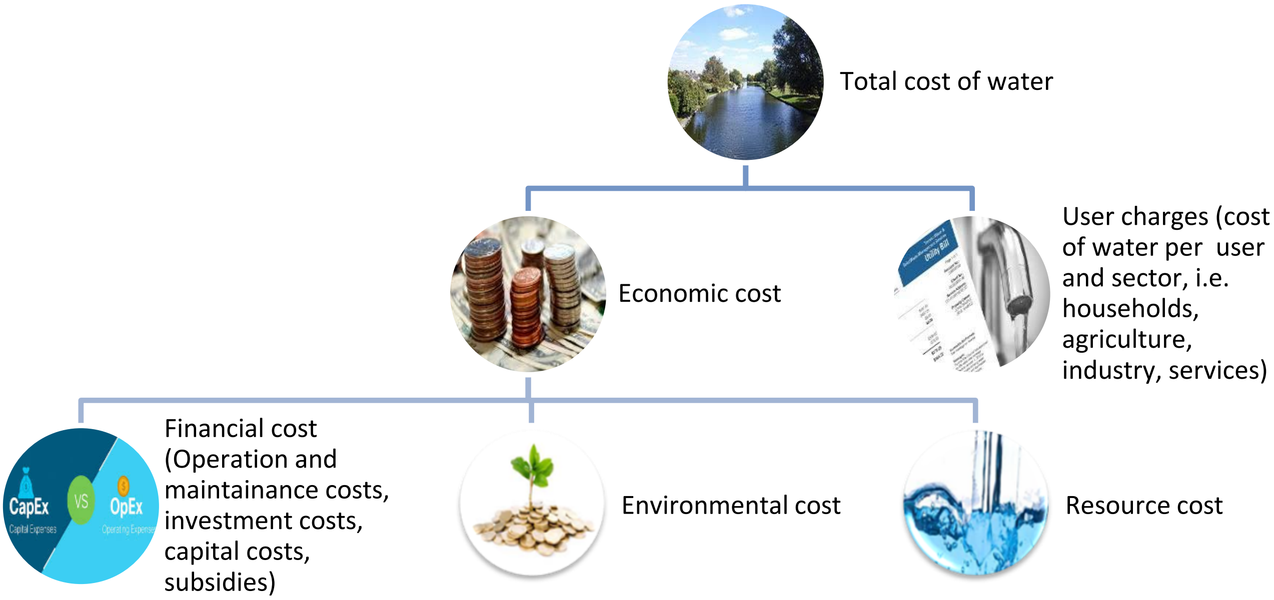


Figure 9.4.4 Graphic representation of full cost recovery estimation methodology

The financial cost of water is retrieved from the financial statements of the utility companies and information provided by case study leaders. This information is often missing at the basin scale and it also complicated by the choice of appropriate values adopted for existing and new investment projects, the discount rates, the value of existing infrastructure and depreciation methods. Also information on taxes and subsidies is also essential for the accurate estimation of the financial costs. The assessment of the resource cost is assessed on the basis of the foregone economic benefits from competitive water uses.

The environmental cost is assessed using quantitative evidence provided in the economic literature and estimations provided by case study leaders. The methodology employed has been constrained by data availability in each case study. In the case of Ebro River, quantitative data on the water cost and uses have been retrieved by the PoM, the utility services and the case study leaders. For the Sava region the assessment of cost recovery is more complex due to the transboundary nature of the river basin. The water pricing and cost recovery data are retrieved from the case study leaders, from the River Basin Management Plan of the Sava river basin and 2 major assessments that took place in all the countries sharing the common water resource: (1) an assessment survey on cost recovery of water services published by the International Sava River Basin Commission (2013) and (2) assessments of the water and wastewater services in the Danube region produced by the World Bank Group & the International Association of the Water Supply Companies in the Danube river catchment area (2015).

In the Adige River Basin recovery of costs was assessed based on the Water Protection Plan for the Trento province (Agenzia provinciale per la protezione dell'ambiente, 2015) and on the General Plan for the Use of Public Water for the Bolzano province (Provincia Autonoma di Bolzano, 2017) both compiled as part of the 2nd round of River Basin Management Planning. Water pricing in the domestic sector is determined annually by the Provincial council taking into account the costs of operation and investment of the purification plants managed by the province, both regarding drinking water purification and wastewater treatment.

In the case of Evrotas River the methodology follows the data and approach developed in Koundouri et al (2008) that work on the implementation of the WFD in Greece. The report contains data and quantitative estimations for the region of East Peloponnese, in which the Evrotas river basin lies. Koundouri et al (2008) estimate full cost recovery for water use in households, irrigation and industry. For the estimation of water supply costs information comes from the ministry of Environment in Greece and the regional water utilities. Cost recovery is done at four different levels: cost recovery from sales, from fixed charges of consumers, sewage charges and cost recovery fees (80%) for system maintenance and expansion. Cost recovery for irrigation is based on the irrigation charges per hectare or cubic meters. Industrial water cost recovery has been estimated based on data available from other regions in Greece (the average cost of industrial water use in Greece has been estimated at 1.031 Euro/m^3). The environmental cost recovery estimations have made use of the wide literature on the subject and the quantitative estimations therein (indicatively we refer in the work of Ahmad et al 2005, Basili et al 2005, Bateman et al 2004, Birol et al 2006, Brouwer et al, 2004, Crandall 1991, Crutchfield et al 1999, Day 2002, Farber et al 2000, Forster 1985, Georgiou et al 2000, Green et al 1993, Green 1991, Hanley 1991, Jordan et al 1993, Lindhjem et al 1998, Miliadou 1998, Mitchell et al 1984, Ozdemiroglu et al, 2004, Poe et al 1992, Whitehead et al 1992 και Koundouri et al, 2005).

Resource cost has been estimated as the opportunity cost of best alternative uses of water that reflects the rising opportunity costs in the case of water scarcity. This cost is zero when all demand from water for different uses and different users is covered while in contrast this cost can be significantly high under water scarcity. For the case of the region of East Peloponnese where Evrotas RB belongs to, the resource cost has been estimated based on the cost of the next best alternative for water provision in the case of water scarcity.[7] The estimations of subsidies costs have made use of statistical data from the national statistical office and Eurostat on the subsidies provided per crop category in agriculture. The subsidies per crop have been weighted for water as input to production with the employment of price elasticities estimated in Koundouri et al. (2008).

The last methodological step consists of the critical assessment of the portfolio of measures for achieving full cost recovery in the selected Globaqua river basins. In this step a two way approach has been developed with the intention to provide an up to date and as complete as possible assessment of measures of achieving full cost recovery, in light of the data limitations existing in each case. The two way approach (illustrated in Figure 9.4.5) consists of:

i) Qualitative cost benefit analysis of the proposed package of measures in each case considering the benefits and the costs associated to the measures, the final beneficiaries but also the cost bearers of the measures.
ii) A quantitative assessment in terms of cost-benefit and cost effectiveness of the proposed measures for achieving full cost recovery as derived from the analysis of quantitative information at each Globaqua case study. This step had to overcome significant data limitations thus the analysis remains limited indicating the need to take actions towards provision of more information on the costs and the benefits of the proposed measures for sustainable water management.

---

[7] In this case the provision of recycled water has been found to be the lowest cost option (0.5Euro/m^3).

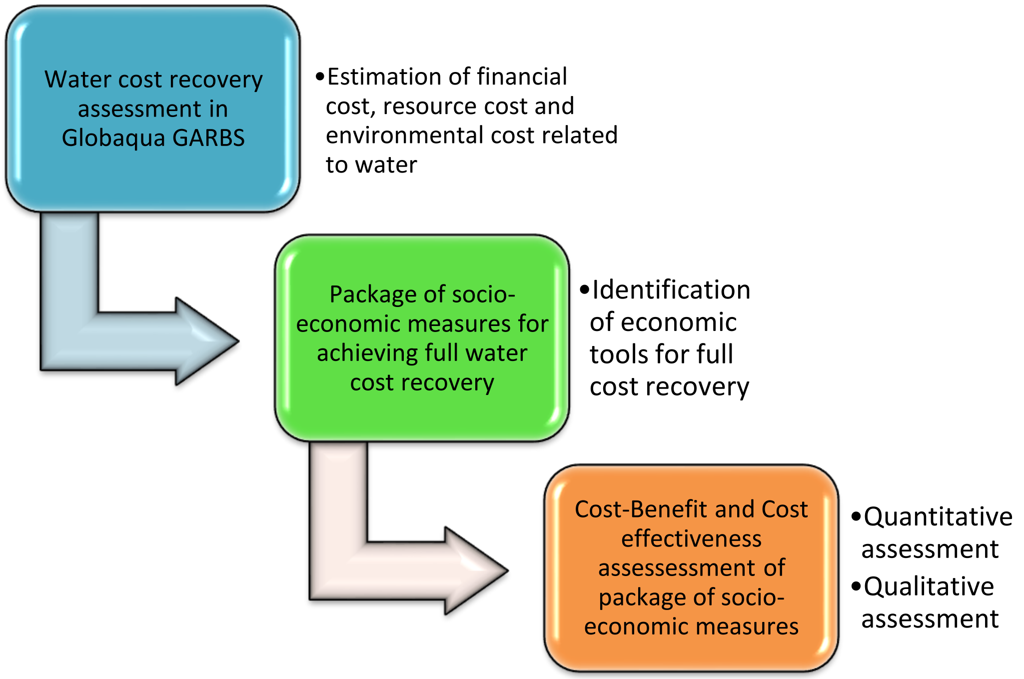


Figure 9.4.5. Graphic representation of methodology steps for the assessment of economic instruments for achieving full cost recovery and derivation of guidelines for sustainable water management

The analysis performed considers a range of costs with reference to various key parameters that affect costs and benefits over time such as economic development, sectoral activity and population growth. The assessment is done with the intention to identify a fair cost allocation among the various water users and the identification of relevant losers and winners. In discussing the cost benefit and cost effectiveness of each proposed measure it is also examined the impact of the measures on key economic sectors and uses. In particular it is assessed the impact of measures on the wider socio-economic conditions, of households, and changes in sectoral operation from changes in the price of watery supply.

3. Results and discussion

3.1. Costs and benefits of water ecosystem services and willingness to pay

For the correct identification and quantification of the full water cost, the costs associated to water provision and use must be linked to different water uses for different sectors, such as households, industry and agriculture and should explicitly reflect the financial cost, the resource cost and the environmental costs. While financial costs may be easily quantified, resource and environmental costs are much harder to estimate. Here the concepts of ecosystem services and Total Economic Value (TEV) can prove useful. A key challenge is that these costs cannot be expressed in pure monetary or market values. Thus, it is necessary to consider the total economic value of water resources and aquatic ecosystem services, considering the value they bring to society and the costs of their protection or restoration. These are necessary steps in order to evaluate the sustainability, balance and equity of water use.

The ecosystem services approach puts emphasis on the functions and provisions of the ecosystems to humans both in terms of services (such as recreation and leisure) or goods (provision of food, water, etc.). The approach, thus, consists on identifying and understanding the total ecosystem value, as well as the links among actions that affect the functions and the balance of the ecosystem. In many cases, the value of ecosystems is associated to their intrinsic existence, and not directly associated to their actual use. The TEV approach consists on identifying and quantifying all types of values that an ecosystem can provide.

The quantitative analysis of the questionnaire applied in the river basins of Evrotas and Sava aimed at identifying perceptions and habits of respondents in relation to the state of the river and the use by the local communities. Overall, the response rate was low in all countries (19% in Slovenia, 13% in Greece, and 15% in Serbia and in Croatia) but in accordance with the response rates recorded in similar studies, as documented in the literature. The respondents seemed aware of environmental issues in the relevant river basin and indicated activities they undertake in the area. It is interesting to note that despite the non-positive perception of the environmental conditions, the local inhabitants use the river surroundings for recreation and leisure and this can be perceived as an indicator of desire to enjoy the services and goods offered but also for improved conditions in the relevant ecosystems. In the following paragraphs we summarize the main findings of the social survey per case study. Tables 9.4.5-9.4.8 summarize the responses in a comprehensive format.

The average respondent in Greece and Evrotas River survey is over 40 years old, and the average number of household residents is 2 to 3 persons, while household income ranges from 700€ to 1500€. The educational level of the respondents is high, with most of them being educated at university level and in full time employment. Overall, the appreciation of the environmental condition at the Evrotas river ranges from moderate (31% of respondents) to very bad (19% of respondents), with 13% claiming it is bad and only 6% characterizing it as good. Usually the respondents (31%) visit the area less than 5 times a year and 13% more than once a month. The most common activity near the river is walking, while respondents stated they visit the river for recreational purposes, nature observation, cycling, running and observation due to work related reasons. It is interesting to note that a significant number of the respondents (50%) seemed environmentally aware as they claimed to be members of an environmental organization.

The socioeconomic profile of the respondents with regards to Sava in all countries is on average above 30 years of age, with a university degree and in full-time employment. The average household is 4 members in Slovenia and 3 in Croatia and Serbia; the residence owned near the river is usually the main one (23% in Slovenia and Croatia, 41% in Serbia). The response rate regarding the household income is generally low (less than 40% of participants provided replies to this question). In Slovenia 26% of those who responded earns more than 2000€, in Serbia the respondents' income ranges between 500€ and 1200€, and in Croatia there is a wider distribution of income rates starting from below 900€ (8%) to over 1700€ (6%).

The appreciation of the environmental conditions at the Sava River seems to lower from the upstream to the downstream part of the River. This can be attributed to added chemical pollution and increased bank erosion faced downstream. In Slovenia, located upstream, the public perception of the river environmental condition is good to moderate (26% of respondents providing each answer), in Croatia most respondents characterize the area as moderate (44% of respondents) to bad (22% of respondents) while only 5% claims it is good and 3% characterizes it as very good. In Serbia, 43% of the respondents state it is moderate to bad (24% of respondent), 6% claims it is good while 6% claims it is very bad. In Slovenia and Croatia, about 40% of the respondents visited the Sava River less than 5 times during the year and 30% more than 10 times. In Serbia, the people surveyed tend to visit the Sava area more often (40% more than 10 times while only 20% less than 5 times.

The most popular activities near the river appear to be walking and cycling. The geographical and local characteristics seem to have an impact on the selected activities near the Sava River. In Slovenia, 19% of the respondents hike in the area, 13% swim in the river, while nautical activities (boating, rowing, canoeing) are practiced by 10% of respondents and are more popular than in the other river basin countries. In Croatia people mainly go walking near the river (40%), practice jogging (10%), cycling (8%), visit for recreation and nature observation, such as bird watching, fauna observation (7%), while 4% simply pass by the river due to their residence proximity to the river while they are not involved in other activities near the river.

In Serbia the most popular activity near the river is walking (43%), visits for recreation (22%), biking (12%), swimming (6%), sailing (6%), fishing (4%). It is interesting to notice that in Serbia some respondents referred to the river area as a good place for socializing contrasting the general negative perception regarding the environmental conditions. In Croatia and in Serbia the area is strongly characterized as a recreational/touristic place. A number of respondents in all three countries (8% - 13%), stated that they visit the area for work related reasons, while about 30% of those stating that they undertake activities near the river they identified more than one activity.

Table 9.4.5 Social survey results from Slovenia

	Number of replies	**Replies, in % of total**
Do you ever visit Sava River?		
Yes	27	87
No	4	13
No answer	0	0
How would you describe today the general environmental condition in the Sava area?		
Very good	0	0
Good	8	26
Moderate	14	45
Bad	1	3
Very bad	0	0
no answer	8	26
How many times do you visit the river per year?		
0-1	4	13
1<x<5	7	23
=5<x<10	2	6
=10<x<15	5	16

15 and over	4	13
no answer	9	29
Which activities do you undertake when visiting Sava River?		
walking	9	29
swimming	4	13
hiking	6	19
working (sampling)	4	13
see sighting	2	6
boating/rowing/canoeing	3	10
bicycling	3	10
Multiple activities	7	20
no answer	9	29
Gender		
Male	8	26
Female	10	32
no answer	13	42
Age		
<20	0	0
20<x<30	3	10
30=<x<40	3	10
40=<x<50	5	16
50 and over	7	23
no answer	13	42
no answer	27	53
Number of household members		
2	3	10
3	2	6
4	10	32
5	3	10
no answer	13	42
Educational Level - Selected Choice		
Without a school degree	0	0
Primary School	0	0
High School	1	3

University	4	13
Post-graduate	13	42
Other, please specify	0	0
no answer	13	42
Occupation - Selected Choice		
Full-time employed	14	45
Part-time employed	1	3
Student	3	10
Retired	0	0
Unemployed	0	0
Other	0	0
no answer	13	42
Your occupation is related to		
Agricultural sector	1	3
Industrial sector	0	0
Energy production	1	3
Tourism	0	0
None of the above	0	0
no answer	29	94
Do you have a residence in the Sava area?		
Yes	7	23
No	11	35
no answer	13	42
If yes, what describes it best?		
Main residence	5	71
Second residence	2	29
If yes, is it owned or rented?		
Owned	5	71
Rented	2	29
Monthly household income after tax		
Less than € 300	0	0
€ 301-500	0	0
€ 501-700	1	3

€ 701-900	0	0
€ 901-1200	1	3
1201-1500	1	3
1501-1700	1	3
1701-2000	0	0
Above € 2000	8	26
Don't want to answer	6	19
no answer	13	42
Town of residence		
Ljubljana	10	32
Maribor	1	3
Bohinjska Bistrica	1	3
Mengeš	1	3
Velika Loka	1	3
Polhov Gradec	1	3
Trbovlje	1	3
not disclosing	1	3
medvode	1	3
no answer	13	42
Are you a member of an environmental organisation?		
Yes	7	23
No	11	35
no answer	13	42

Table 9.4.6 Social survey results from Serbia

	Number of replies	**Replies, in % of total**
Do you ever visit Sava River?		
Yes	50	98
No	1	2
No answer	0	0
How would you describe today the general environmental condition in the Sava area?		
Very good	0	0
Good	3	6
Moderate	22	43

Bad	12	24
Very bad	3	6
no answer	11	22
How many times do you visit the river per year?		
0-1	2	4
1<x<5	8	16
=5<x<10	9	18
=10<x<15	7	14
15 and over	13	25
no answer	12	24
Which activities do you undertake when visiting Sava River?		
walking	22	43
swimming	3	6
hiking	1	2
working (research)	4	8
recreational	11	22
sailing	3	6
cycling	6	12
Socializing	3	6
Fishing	2	4
Multiple activities	11	29%
no answer	13	25
Gender		
Male	6	12
Female	19	37
no answer	26	51
Age		
<20	0	0
20<x<30	1	2
30=<x<40	8	16
40=<x<50	10	20
50 and over	6	12
no answer	26	51
Number of household members		

1	3	6
2	5	10
3	11	22
4	5	10
5	1	2
no answer	26	51
Educational Level - Selected Choice		
Without a school degree	0	0
Primary School	0	0
High School	0	0
University	1	2
Post-graduate	18	35
Other (specified PhD)	6	12
no answer	26	51
Occupation - Selected Choice		
Full-time employed	25	49
Part-time employed	0	0
Student	0	0
Retired	0	0
Unemployed	0	0
Other	0	0
no answer	26	51
Do you have a residence in the Sava area?		
Yes	21	41
No	4	8
no answer	26	51
If yes, what describes it best?		
Main residence	18	86
Second residence	2	10
No answer	1	5
If yes, is it owned or rented?		
Owned	17	81
Rented	3	14

no answer	1	5
Monthly household income after tax		
Less than € 300	0	0
€ 301-500	0	0
€ 501-700	6	12
€ 701-900	7	14
€ 901-1200	6	12
1201-1500	0	0
1501-1700	1	2
1701-2000	0	0
Above € 2000	0	0
Don't want to answer	1	2
no answer	27	53
Town of residence		
Beograd	23	45
Smederevo	1	2
No answer	27	53
Are you a member of an environmental organisation?		
Yes	7	14
No	17	33
no answer	27	53

Table 9.4.7 Social survey results from Croatia

	Number of replies	Replies, in % of total
Do you ever visit Sava River?		
Yes	102	91
No	10	9
No answer	0	0
How would you describe today the general environmental condition in the Sava area?		
Very good	3	3
Good	6	5
Moderate	49	44
Bad	22	20

Very bad	1	1
no answer	31	28
How many times do you visit the river per year?		
0-1	19	17
1<x<=5	23	21
5<x<=10	6	5
10<x<=15	11	10
>15	21	19
no answer	32	29
Which activities do you undertake when visiting Sava River?		
walking	44	39
swimming	1	1
running	11	10
working (research)	15	13
recreational / tourism	9	8
rowing	4	4
bicycling	9	8
Bird watching / flora observation	8	7
Fishing	2	2
Just passing	5	4
Multiple activities	24	31
no answer	35	31
Gender		
Male	14	13
Female	28	25
no answer	70	63
Age		
<20		1
20<x<30		5
30=<x<40	1	12
40=<x<50	6	10
50 and over	13	9
no answer	11	63

Number of household members		
1	6	5
2	6	5
3	15	13
4	9	8
5	3	3
6	1	1
7	1	1
no answer	71	63
Educational Level - Selected Choice		
Without a school degree	0	0
Primary School	0	0
High School	1	1
University	22	20
Post-graduate	17	15
Other (specified PhD)	2	2
no answer	70	63
Occupation - Selected Choice		
Full-time employed	36	32
Part-time employed	1	1
Student	3	3
Retired	1	1
Unemployed	1	1
Other	0	0
no answer	70	63
Do you have a residence in the Sava area?		
Yes	26	23
No	16	14
no answer	70	63
If yes, what describes it best?		
Main residence	22	85
Second residence	2	8
No answer	2	8

If yes, is it owned or rented?		
Owned	19	73
Rented	5	19
no answer	2	8
Monthly household income after tax		
Less than € 300	0	0
€ 301-500	1	1
€ 501-700	1	1
€ 701-900	7	6
€ 901-1200	11	10
1201-1500	5	4
1501-1700	2	2
1701-2000	5	4
Above € 2000	7	6
Don't want to answer	1	1
no answer	72	64
Town of residence		
Zagreb	31	28
Velika Gorica	3	3
Kutina	1	1
Rovinj	1	1
Čazma	1	1
Zabok	1	1
Zaprešić	1	1
Dresden	1	1
No answer	72	64
Are you a member of an environmental organisation?		
Yes	10	9
No	30	27
no answer	72	64

Table 9.4.7 Social survey results from Greece

	Number of replies	**Replies, in % of total**

Do you ever visit Evrotas River?		
Yes	15	94
No	1	6
No answer	0	0
How would you describe today the general environmental condition in the Evrotas area?		
Very good	0	0
Good	1	6
Moderate	5	31
Bad	2	13
Very bad	3	19
no answer	5	31
How many times do you visit the river per year?		
0-1	0	0
1<x<5	5	31
=5<x<10	3	19
=10<x<15	1	6
15 and over	2	13
no answer	5	31
Which activities do you undertake when visiting Evrotas River?		
Walking	5	26
Swimming	0	0
Hiking	0	0
Working (research)	1	5
Recreational / Tourism	2	11
Flora /fauna observation	2	11
Bicycling	1	5
Running	1	5
Just passing	1	5
Multiple activities	3	23
No answer	6	32
Gender		
Male	5	31
Female	1	6
no answer	10	63

Age		
<20	0	0
20<x<30	1	6
30=<x<40	1	6
40=<x<50	2	13
50 and over	2	13
no answer	10	63
Number of household members		
1	1	6
2	2	13
3	2	13
4	1	6
5	0	0
no answer	10	63
Educational Level - Selected Choice		
Without a school degree	0	0
Primary School	0	0
High School	0	0
University	1	6
Post-graduate	5	31
Other (specified PhD)	0	0
no answer	10	63
Occupation - Selected Choice		
Full-time employed	4	25
Part-time employed	1	6
Student	0	0
Retired	0	0
Unemployed	0	0
Other	1	6
no answer	10	63
Do you have a residence in the Evrotas area?		
Yes	3	19
No	3	19
no answer	10	63

If yes, what describes it best?		
Main residence	3	100
Second residence	0	0
No answer	0	0
If yes, is it owned or rented?		
Owned	1	33
Rented	2	67
no answer	0	0
Monthly household income after tax		
Less than € 300	0	0
€ 301-500	0	0
€ 501-700	0	0
€ 701-900	1	6
€ 901-1200	1	6
1201-1500	2	13
1501-1700	0	0
1701-2000	0	0
Above € 2000	1	6
Don't want to answer	1	6
no answer	10	63
Town of residence		
Tripolis	2	13
Sparti	3	19
Skala	1	6
No answer	10	63
Are you a member of an environmental organisation?		
Yes	3	19
No	3	19
no answer	10	63

With regards to the Choice Experiment embedded in the survey run in the Sava and Evrotas river basins, as discussed in the previous section, it is assumed in a random utility framework, a linear-in-attributes deterministic component V and a random idiosyncratic component ε reflecting the unobserved influences. As a result, the utility from the j^{th} alternative is given by:

$$U_j = V_j + \varepsilon_j \; where \; V_j = \beta_k X_{kj}$$

with X_{kj}, the value of the k^{th} attribute for this alternative. The various X_{kj} are generated by the experimental design. In the Choice Experiment run for GLOBAQUA is used an unlabelled choice experiment design, so βs are assumed to be constant across alternatives. The econometric estimations are summarized in Table 9.4.8.

Table 9.4.8 Estimation results on choice experiment and willingness to pay for water related ecosystem services. Discrete choice Model (multinomial logit)

	Coefficient	*Standard Error*	*z*	*Probability z>Z**	*95% Confidence Interval*	
WQ1	-0.18123	0.24448	-0.74	0.4585	-.66040	.29793
WQ2	-0.04471	0.18633	-0.24	0.8104	-.40992	.32050
WQ4	-0.26	0.20674	-1.26	0.2085	-.66520	.14520
FLOOD1	-0.187	0.25254	-0.74	0.459	-.68198	.30797
FLOOD2	-0.15089	0.23019	-0.66	0.5122	-.60205	.30028
FLOOD4	-0.08251	0.22156	-0.37	0.7096	-.51676	.35175
REC1	-0.29499	0.24372	-1.21	0.2261	-.77268	.18269
REC2	0.05679	0.192	0.3	0.7674	-.31952	.43310
REC4	-0.22244	0.17661	-1.26	0.2079	-.56859	.12371
BIO1	0.04678	0.2313	0.2	0.8397	-.40656	.50011
BIO2	0.02516	0.18945	0.13	0.8943	-.34615	.39647
BIO4	0.22117	0.17848	1.24	0.2153	-.12864	.57099
PRICE	-0.00585	0.00383	-1.53	0.1263	-.01335	.00165
ASC	0.00317	0.26396	0.01	0.9904	-.51417	.52051

Notes: WQ: Water quality; FLOOD: Flood regulation and soil erosion, REC: Recreational activities, BIO: Biodiversity. Figures stand for quality levels: 1: Poor, 2: Moderate, 4: High (base quality: Good). Observations (N) = 368, AIC Information Criteria =809.7 AIC/N = 2.200

To study consumer's preferences towards policies, we need to investigate the trade-offs between their application and the change of other attributes that are likely to be affected. Usually, such trade-offs are examined using the marginal willingness to pay (WTP). The results indicate that no parameter is statistically significant. In economic terms this leads to the paradox finding that respondents have a zero value willingness to pay for all the ecosystem services provided by the water in the Sava and Evrotas river basins.

When examined in isolation this is a discouraging results with regards to the benefit consumers get from using water related ecosystem services and goods. Nevertheless the combination of these findings with the results of social survey indicates to other potential sources of limitations of our analysis. These results might also be either the outcome of estimation limitations related to sample size, selection bias or response bias. An additional interpretation might be related to affordability issues, i.e. respondents might well value the benefits from using water ecosystem services, nevertheless they either cannot afford to pay the cost of preserving this ecosystem services provision or they do not want to reveal the costs willing to bear. Into this direction more research is required so as to test for the robustness of the estimation results.

3.2. Achieving full water cost recovery: Assessment of the socio-economic measures

The social survey indicated that agents appreciate the services and goods offered by the river ecosystems. Nevertheless the statistical significance of the estimations from the choice experiment provides inconclusive results on the willingness to pay for the provision of these goods and services. These findings add to the debate on the policy challenge to identify the total costs and benefits of water ecosystems, to value and monetize these costs and benefits and to allocate them in a fair and efficient way among different users. With the aim to add to these efforts the work reported here has also been looking at full water cost recovery options and available socio-economic tools that can be employed in the different Globaqua case studies. This work has been completed with the intention to provide an integrated cost-benefit and cost-effectiveness assessment in each case.

The assessment of cost recovery in the selected GARBS documented in Sub-Deliverable 9.3 showed that full cost recovery is not achieved. While efforts are made to Article 9 of the WFD (Directive2000/60/EC) for Member States to ensure recovery of costs for the water resources while taking into account the environmental and resource use costs and engulfing the 'polluter pays' principles, in practice deviations from this goal are identified in all the selected Globaqua River Basins. The analysis depicted estimation of cost recovery, which is primarily based on the estimation of financial costs related to access to the resource, network construction, distribution, operation and maintenance, as those costs are more easily assessed and monetized. Despite the legal instruments engaged to ensure full cost recovery, 100% cost-recovery is not achieved in most occasions. Cost recovery levels differ within the river basins examined. Cost recovery is applied primarily for the water supply and sewage collection and treatment in the Globaqua River Basins, while provisions for cost recovery in agriculture are met in the Evrotas river basin, and in the Ebro river basin. The environmental and resource impact deriving from the use of resources is not fully monetized as it comprises a difficult task.

The valuation of environmental and resource costs comprises a challenging task, which is not fully explored and implemented at the Globaqua river basins. The reasons being the difficulty in associating current water use with future consequences and state, as well as the difficulty in setting a monetary price for environmental degradation or resource impacts. Estimation of environmental cost requires good background knowledge and assessment of the conditions in the region and individual assessment of the different water related attributes, such as water quantity and availability, water quality, recreation, biodiversity, water attenuation etc. The ability to monetize the environmental and resource costs of water use is facilitated by the plethora of methodological approaches identified in the literature but at the same time is limited by the identification of the appropriate economic tools and instruments which can incorporate full cost recovery into the water pricing systems.

These alternatives that can be employed for the achievement of full cost recovery include several approaches and all of them aim for efficient water pricing that can correct for the market externalities, governance and management failures. Pricing water in a fair, equitable and efficient way is essential in order to achieve sustainable management of the resource but also maximize social welfare from the resource use. Different pricing mechanisms are applied in the Globaqua RBs with the aim to achieve sustainable management of the resource. Each approach comes with its own advantages and shortcomings and limitations when it comes to full cost recovery of water ecosystem services. Prior to discussing the socio-economic instruments, through which it can be achieved, full cost recovery it is important to refer to the pricing mechanisms for water and distinguish between their main advantages and shortcomings. It is these shortcomings and the market inefficiencies that the proposed socio-economic measures discussed next come to address with regards to achieving full cost recovery.

Efficient water pricing comes with the advantage of incentive provision for water use and quality protection. Changes in prices can provide signals to the consumers and producers alike with regards to real water costs and water scarcity. Through the pricing mechanism, the necessary revenues for infrastructure maintenance and upgrade can also be collected. Last efficient pricing can ensure that all consumers will have fair and sustainable access to the resource. On the downside, water pricing comes often with opposing views on the objectives that water pricing and tariff design should meet. It is also often the case that the water prices are not set in a transparent manner or the setting is based often in a complex system, as documented from the analysis of the Globaqua case studies. This lack of transparency and high complexity often lead to the misunderstanding on the real value of water or the aims that are to be met from the revenues collected from water pricing.

Water pricing approaches often include:

i) Fixed charges through water bills irrespective of the volume of water consumed,
ii) Uniform volumetric tariffs that apply same rate charges to water consumption, irrespective of the total amount water consumed,
iii) Increasing or decreasing step-wise volumetric charges where volumes of water are priced at the same rate in blocks (volumes) in an increasing or decreasing accordingly rate irrespective of actual total consumption, and
iv) Two parts tariffs that have both a fixed and a variable charge component.

Pricing of water is coupled with particularities and limitations in efficient setting and application and in addition it requires a wider political-economic approach and agreement (consider for instance affordability issues or equal rights to the resource use). Water resources are a *sui generis* social commodity, with strong elements of natural monopoly, with high environmental and public health protection requirements, well-established perceptions of usage rights and intense differentiated institutions for its distribution to users. In this regard, each of the economic instruments for achieving full cost recovery discussed next should be viewed under the prism of the existing pricing system and the review of the established practices.

In the context of conventional markets, private firms price under profit maximization objectives, with known technological limitations. In the resource markets, such as that of water, price setting should be primarily concerned with full cost recovery, including environmental cost and resource costs. By full cost recovery is captured the entire range of the financial instruments (prices, fees, taxes) through which it is determined, the entire range of costs, allocated and collected by the competent body as compensatory payments for the use of water services. In achieving full cost recovery it is important to keep in mind the wider pricing implications that are associated to developmental (exportability, productivity), social (employment, securing a basic amount of water, avoiding social conflicts, etc.) and environmental objectives (saving water resources, ensuring good status of water bodies) of water management and supply (Koundouri P, 2009).

When discussing the alternative socio-economic instruments for achieving full cost recovery is important to keep in mind the basic functions that have to be met (Baumann et al., 1998), i.e: i) monetization (computational and management convenience, affordability), ii) cost allocation (fair and full cost allocation), and iii) provision of incentives (dynamic efficiency, saving of the resource, transparency and accountability).

Keeping in mind the latter functions several pricing models coupled with socio-economic instruments can be proposed for achieving full cost recovery. The criterion of economic efficiency refers to maximizing the net benefits that result from the potential uses of water. In this case of efficient pricing the price of the water must be equal to the marginal cost. However, setting the appropriate efficient price may be faced with several practical issues arising from (a) network losses, (b) cost recovery and (c) taking into account environmental and social criteria acceptance. Pricing methods that can ensure economic efficiency are: Marginal cost pricing, two parts tariff & nonlinear pricing (increasing or decreasing block tariffs).

With regards to the monetization and revenue generation function of water pricing, the theory advocates applying water pricing based on average costs. If each user pays the average cost of the amount of water he consumes, then revenues will be equal to the total cost of water supply. Nevertheless it is usually the case that the largest percentage of the financial costs of the enterprises (services) of water consists of fixed costs, i.e. costs that are not related to the amount of water consumed. Such a cost structure coincides with the conditions of "natural monopolies" and is characterized by a declining average cost, which is greater than the marginal cost in the largest segment of the production capacity of the enterprise. In those cases that are specific to natural monopolies (average cost greater than marginal), billing based on marginal cost is unable to cover the total cost of water supply. Two alternatives usually are proposed for addressing this case: Decreasing block water tariffs (Griffin, 2006) or average cost pricing (Tsur, 2004). The critisim in this case is that pricing based on average costs results in social losses in prosperity and therefore is not effective as it cannot maximize surpluses for producers and consumers (Griffin, 2006).

With regards to social acceptance issues, if high water consumption comes from the richer layers of the society then differentiated pricing based on incremental block rates can work towards social equality. Bar-Shira et al. (2006) summarize a series of empirical studies that apply block rates pricing and advocate that the increasing block tariffs work in favour of equity and fairness. On the contrary, the work of Dahan and Nisan (2007) find that increasing block pricing may work against social equality. This may happen in the case where high water consumption does not comes from the richest households but from the large households which it is often the case to be also the households with low incomes.

Considering the computational and management ease of the different water pricing mechanisms for achieving full cost recovery it can be argued that the volumetric measure of the consumed water is the most important factor that determines the computational and management convenience of the pricing methods. Average cost calculation is possible if all that is required is dividing the total cost by the amount of water supplied. Therefore, pricing based on average costs is preferend from a computational and management ease point of view. On the contrary, the methods which use the marginal cost pricing, nonlinear cost pricing, and two part tariffs are more complex, since an estimate of the cost function is required.

Table 9.4.9 next summarises the main pricing approaches to water and ranks their performance (high/low) with regards to computational and management ease, their ability to provide incentives for current and future sustainable water use and their ability to achieve full cost recovery.

Table 9.4.9 Assessment of the main water pricing alternatives

Water pricing approaches	Monetization benefits (computational & management ease, affordability)	Benefits related to provision of incentives (dynamic efficiency in water demand and supply, transparency and accountability)	Cost-efficiency and social acceptance (fair and full cost allocation)
Fixed charges	High	Low	Low
Uniform volumetric tariffs	High	Low	Low

Increasing or decreasing step-wise volumetric charges	Low	High	Low
Two parts tariffs	Low	High	Low

Water pricing may differ based on the economic sectors which are called to pay the cost of water consumed. Agricultural water use in particular is often subject to pricing schemes that differ from domestic and industrial water uses (EEA, 2013). For example, England and Wales allow for self-service abstraction for irrigation within the abstraction license system. Irrigation abstractors are still required to pay abstraction charges (Arcadis et al., 2012). Spain that is included among the EU countries which use most of the water for irrigation (68 % according to the World Bank (2008)), has a comprehensive pricing system for agricultural water use. In its integrated report on Article 5 and Annex III of the WFD published in 2007, the Spanish Ministry of Environment (MMA) recognised the existence of the following modalities of pricing for irrigation water in the country:

- The user pays a yearly amount based on the area of land irrigated, independent of the volume of water used. This fee covers all the costs of the irrigator community. This model is commonly applied by traditional irrigator communities.
- The user pays fixed amounts per unit of land which provide them with irrigation rights. These fees commonly cover maintenance, vigilance, administration and other fixed costs, but no variable costs. The latter are recovered through variable fees which are calculated as a function of the number of hours of irrigation, and in some cases, of the volume of water used.
- The user pays per application, regardless of the volume of water used. This model is applied in some communities which use surface water for irrigation.
- The user pays using a theoretical flow rate during a designated amount of time. This model is applied in the majority of entities managing groundwater.
- The user pays for the volume of water used. This model is only applied in entities using drip irrigation (MMA, 2007).

Table 9.4.10 Water pricing structures for water and wastewater services in selected European countries (Source EEA, 2013)

Country	**Water pricing structures**		
	Drinking water	**Sewage/sanitation**	**Irrigation**
England and Wales	**Households:** fixed + rateable value (if unmetered) or fixed + volumetric **Industry:** fixed + volumetric	**Households:** fixed + rateable value (if unmetered) **or** fixed + volumetric **Industry:** Small users	Abstraction charges (fixed + volumetric) apply

		pay volumetric; large users pay fixed + higher volumetric rate	
Slovenia	**Households:** fixed + volumetric (sometimes solely volumetric) **Industry:** fixed + volumetric	**Households:** fixed + volumetric. **Industry:** fixed + volumetric	No pricing aside from water abstraction charge
Croatia	**Households:** fixed + (sometimes) volumetric **Industry:** N/A	**Households:** (sometimes) fixed + volumetric **Industry:** N/A	N/A
Serbia	**Households:** volumetric **Industry:** volumetric	**Households:** volumetric **Industry:** volumetric	N/A
Spain	**Households:** fixed + volumetric (sometimes block rates) **Industry:** fixed + volumetric (sometimes block rates)	**Households:** fixed + (often) volumetric **Industry:** fixed + (often) volumetric	Several models: (1) based on land area (2) fixed (based on area) + variable (based on hours of irrigation or volume) (3) per application (independent of volume) (4) per flow rate over a period of time (5) volumetric (only for drip irrigation) (Ministerio de Medio Ambiente, 2007)
Greece	**Households:** fixed +	**Households:** fixed +	2 models: (1) volumetric (based on irrigated land size)

			(2) abstraction charges
	volumetric	volumetric	
	Industry: fixed + volumetric	**Industry:** fixed + (often) volumetric	
Italy	**Households:** fixed fee+ volumetric (based on the polluter pays principle) **Industry:** fixed + volumetric (based on the polluter pays principle)	**Households:** fixed + volumetric(based on the polluter pays principle) **Industry:** fixed + volumetric (based on the polluter pays principle)	Fixed + volumetric (based on the polluter pays principle)

Full-cost recovery of water services, through estimation of efficient water pricing schemes is considered the backbone of integrated sustainable water management at river basin level. The most challenging part, however, in achieving full cost recovery at river basin level is the valuation of environmental and resource costs due to the difficulties in estimation and monetisation of values related to current and future resource use. According to the WFD services are any acts, which have the ability to change the characteristics and abundance of naturally occurring water, while water uses include services and activities with a significant impact on the environmental state. This covers the entire spectrum of human activities, i.e. agriculture, households, industries, navigation, protection from floods, power generation. Along this line the valuation of environmental and resource costs is not just a central concept and requirement for achieving full cost recovery, but it can also be used for achieving the goals of integrated water management.

The literature offers a wide range of studies on the economic tools and alternatives to fair and efficient allocation of natural resources with particular focus on water which based on the insights provided by valuation studies can be employed for achievement of full cost recovery by addressing market inefficiencies and government failures that lead to inefficient use of natural resources. Drawing on the existing literature, the main tools and their characteristics as discussed in Sub-Deliverable 9.3 are summarized next. Table 9.4.11 summarizes the main advantages and shortcoming of each approach.

Water Abstraction and Pollution Taxes

Taxes can be used to restrain water users from excessive use. Pollution taxes represent an efficient method of addressing water quality problems if these are adopted at the optimum level. Pigouvian taxes are statically and dynamically efficient as they trigger innovation. Area pricing is probably the most common form of water pricing whereby users are charged for the water used. Other less commonly used forms of taxes include output and input pricing. Output pricing methods involve charging a fee for each unit of output produced per user whereas input pricing involves charging users for water consumption through a tax on inputs (for example a charge for each kilogram of fertilizer purchased in agriculture). The effectiveness of water pricing methods is associated to institutional factors as well as to the administrative and monitoring capacity of the setting body. The effectiveness of a tax depends on the correct estimation of the marginal tax level and on how risk-averse users are with respect to damage from reduced water availability (both in quality and quantity terms). The administrative costs of such approach can also be high since a differentiated tax is not easy to control and monitor. The financial impact on affected parties depends on the restitution of revenues, which affects tax acceptability. Finally, there are practical implementation problems as it may be hard to define a good basis for a tax.

Subsidies

Subsidies can be directly implemented for water-saving measures to induce users to behave in a more environmentally friendly way. Alternatively, indirect subsidy schemes may also be implemented. These include tax concessions and allowances, and guaranteed minimum prices. Subsidies however may not b economically efficient as they create distortions and do not provide incentives for the adoption of modern technologies.

Tradable Permits

Another instrument prescribed by economists in the face of demand–supply imbalances is the introduction of water markets in which water rights, or permits, can be traded. The rationale behind water allocation through tradable rights is that in a perfectly competitive market, permits will flow to their highest-value use. Different types of tradable permit systems can be established which address different aspects of the water resource problem. These include tradable water abstraction rights for quantitative water resource management, tradable discharge permits for the protection and management of (surface) water quality, tradable permits to use or consume water-borne resources. The financial impact on affected parties and related acceptability of tradable permits depends on the initial allocation of rights. These can either be distributed for free (for example depending on historical use or other criteria), or auctioned off to the highest bidders. If they are auctioned, revenues are created that can be used by the government generating thus a fiscal effect.

Standards and Quotas

Standards and quotas are legally set binding restrictions on natural resource use. A legal water standard or quota can be introduced that places restrictions on the amount of water that can be extracted for use. Such instruments remain effective if users are faced with substantial monetary penalties for lowering the water level below this standard or not adhering to the quota. Water quality standards may also be established. Standards and quotas although easy in setting and implementation, may not improve economic efficiency to the extent required and may hinder the incentives to innovate. The financial impact is not always equally distributed among affected parties, since there are differences in the vulnerability of areas to changes induced by these instruments. Differentiated standards and quotas however pose a large burden on the administrative capacity and this is one of the reasons that these instruments are less preferred.

Voluntary Agreements

Voluntary agreements regard agreements between different local users and stakeholders and rely on specialized knowledge of participants about local conditions. When costs and benefits are not equitably distributed among affected parties, both parties can bargain about compensation payments. The allocation of such payments depends on the assignment of rights.

Environmental liability systems

Environmental liability systems can internalize and recover the costs of environmental damage through legal action and make polluters pay for the damage their pollution causes. If the penalties are sufficiently high, and enforcement is effective, liability for damage can provide incentives for taking preventative measures. For such systems to be effective there need to be one or more identifiable actors (polluters); the damage needs to be concrete and quantifiable; and a causal link needs to be established between the damage and the identified polluter.

Table 9.4.11 Economic tools for full cost recovery and efficient water management

Economic Instrument	**Benefits**	**Costs**
Standards and Quotas	Ease of application	Economic efficiency my not be fully achieved
Water abstraction/ Pollution charges	Adjustment of price signals to reflect actual resource costs; encouragement of new technologies; flexibility; generation of revenues	Incorrect charge levels may lead to overutilization of resource
Subsidies	Ease of application	Economic efficiency my not be fully achieved
Tradable permits	Quantity based targets that are able to attain least-cost outcome; Flexibility	May entail high transaction costs
Voluntary agreements	Readily acceptable	Monitoring/binding difficulties
Liability legislation	Assess and recover damages ex-post but can also act as prevention incentives	Require an advanced legal system; high control costs; burden of proof

The theoretical views on the tools to integrating the externalities in the market for natural resources and to address market inefficiencies vary in terms of the tools proposed, on the practicalities attached to each alternative and on their effectiveness. From a theoretical perspective all the economic instruments discussed above can be proposed to be used in a complementary manner in order to achieve sustainable river management in the case studies. In each case though it has to be communicated clearly the advantages and the shortcomings attached to each alternative economic instrument and this to be matched to the particularities of each case, to the severity of the problem that needs to be addressed and to the particular social and economic conditions prevalent in each case study. Thus, the final selection has to be based on stakeholder views and priorities.

We complete next an assessment of the different socio-economic measures in terms of cost-benefit and cost effectiveness so as to identify optimal approaches for the Globaqua river basins but also to formulate a set of arguments for each alternative that considers the costs, the benefits and the final beneficiaries or bearers of the cost associated with achieving full water cost recovery and sustainable management of water resources. The assessment develops in two parts: in the qualitative part we make a comparative analysis based on the existing stock of knowledge. In the second part we make a quantitative assessment based on figures and trends recorded in the selected Globaqua case studies.

The main arguments in the qualitative assessment of the socio-economic instruments are summarized in Table 9.4.12. The cost-benefit and cost-effectiveness analysis of the different approaches evolves around affordability issues, ease of application, accuracy in achieving the policy targets and fairness in allocating the cost among different agents. This is also linked to adherence to the “polluter pays” principle.

On the cost side the economic instruments come with administrative costs that vary from relatively high in the case of monitoring standards and quotas to relatively low in the case of tradable permits. While in the former case the legislator needs to closely monitor the eligibility criteria and the end recipients/beneficiaries of standards and quotas, in the latter case the only administrative cost is related to establishing the permits to be traded and then just the update of the virtual or physical place in which the trading takes place. The administrative costs can also be high in the case of abstraction and pollution charges or in the provision of subsidies. Here the costs are associated with close monitoring and regular need for updates on the status and eligibility of end-beneficiaries/eligible agent. An additional cost to the application of different socio-economic instruments for achieving full cost recovery is related to the possible distortions induced in the market. While the starting point and end goal of using such instruments is to restore market efficiency, the end result might be quite different. This is related to the fact that the setting of these instruments is based on expert views and estimations on potential impact on the market. Nevertheless uncertainty related to the discount rates employed, to the future economic conditions, to assumptions on sectoral development etc., may result in over-estimation or under-estimation of the degree of intervention in the market leading to over-or under-correction of the market inefficiencies.

On the benefit side the economic instruments put forward come with the advantage and benefit of ease of application, sped of impact and fairness in burden allocation. In some cases like in the case of tradable permits these benefits might be relatively high while in the case of other instruments like use of standards and quotas or subsidies the latter benefits can be low. This outcome is related to the design of the instruments and to the effectiveness of their application. In terms of fairness of allocation of the costs, tradable permits might be proposed as the best alternative as market driven forces of demand and supply distinguish the polluters from the non-polluters, but in the case of standards, quotas and subsidies, fairness in cost allocation depends on the capacity of the legislator or the administrator to distinguish between the polluters or the non-polluters and to allocate the burdens in a fair matter.

Table 9.4.12 Costs, benefits and effectiveness of selected socio-economic measures for achieving full water cost recovery

Socio-Economic Instrument	Administration and management costs	Ease of application	Accuracy of achieving the target	Adherence to "polluter pays principle"	Speed of impact	Possibility of inducing distortions in the market
Standards and Quotas	+++	+	+	+	+	+++
Water abstraction/ Pollution charges	+++	+	+	++	++	+++
Subsidies	+++	+	+	+	+	+++
Tradable permits	+	+++	+++	+++	+	+

Voluntary agreements	++	++	++	+	+	+

Notes: + : Low, ++: Medium, +++: High

In terms of cost-effectiveness under the standard approach to appraisal of government policies and actions, policy makers consider not only the balance between costs and benefits, but also who would have to bear the costs and how they might be affected. When identifying the programme of measures to be included in the river basin management plans for meeting these objectives, the WFD promotes the application of economic principles, methods and instruments. This includes the assessment of whether costs and expenses are "disproportionate", and EU guidance suggests that decision makers may want to consider information on ability to pay, or affordability, as part of this assessment. Given that policy makers are naturally concerned with the socio-economic consequences for those who will have to bear the costs of such measures, the question arises as to whether environmental measures are affordable and what is an appropriate methodology to assess their affordability.

As noted in the Defra report (2015), the WFD does not include a definition of disproportionate cost, or of affordability. However, a technical document published in 2003 by the Common Implementation Strategy (CIS)[2] Working group (European Commission, 2003) provides some methodological tools that Member States should follow to assess if costs are disproportionate or not. The word "affordability" is used only in the context of analysing the levels of cost-recovery of water services, where it is referred to as "complementary information". In this context, a very narrow definition is adopted, focused only on the water sector and its customers/users. Affordability is defined as "*the relative importance of water service costs in users' disposable income, either on average or for low-income users only*" (European Commission 2003, p 68). However, without using the word "affordability", the guidance on evaluating whether costs are disproportionate does refer to comparing costs to available financial resources (European Commission 2003, pp. 24-25). The guidance notes that "disproportionality is a political judgement informed by economic information" and that the information may include "the ability to pay of those affected by the measures" (European Commission 2003, p.193).

Although intuitively there is considerable agreement about what affordability means (ability to purchase a necessary quantity of a product or level of a service without suffering undue financial hardship) a simple official definition of affordability in relation to water industry services and their customers has not been found helpful. It is clear though that this sector differs considerably from other sectors and this can readily be appreciated by considering the two aspects of industry and market structure.

- The sector is comprised of a small number of companies that are regulated due to their monopolistic positions with regard to the supply of services (potable water and sewerage). Demand for these services is dominated by demand from households, with commercial, industrial and other customers accounting for much smaller levels of the services supplied.
- The companies operate within the private sector and regulated in terms of cost pass through under the principles of full cost-recovery, including in relation to any requirements to carry out environmental protection measures under the WFD and other legislation.

As a result of the regulated nature of the industry, the fact that there is very high level of cost pass through, and that household's account for the majority of the services provided, the assessment of affordability for this sector it is most appropriate considered for households. From the literature, a number of potential indicators of affordability to households can be identified:

- An indicator based on the concept of a "burden ratio", e.g. water bills as a proportion of household income or expenditure
- Self-reported problems with water affordability (e.g. based on household surveys)
- An indicator based on levels and age of water debt.

Table 9.4.13 provides a summary of the advantages and drawbacks of these different indicators based on the literature review.

Table 9.4.13 Affordability indicators for water

Indicator	Benefits	Costs
Burden ratio: The burden ratio is the most commonly used indicator of the affordability of utility services. Different variants exist with most common being expenditure relative to household income or expenditure	✓ Could be developed to support a cross-utility indicator of affordability	- Relies on setting subjective thresholds of affordability - Does not take account of other factors that could impact on final consumption
Self-reported problems with water affordability: Existing research uses a number of questioning approaches, like: Satisfaction with value for money; Perceived bill fairness, and Ability to pay	✓ Enables the consumers' perspective to be captured ✓ Linked to bill payment behaviour	- Possible distortions from self-reporting - Influenced by bill increases other than water - Cannot be used to predict and assess the impact of social tariffs
Levels and age of water debt: Indicator based on levels of household revenue outstanding	✓ Could be developed to support a cross-utility indicator of affordability ✓ Enables the impact of some limited social tariffs to be evaluated	- Disconnection ban masks those who can pay but who choose not to pay - Some people will pay even if they struggle to - Influenced by bill increases other than water

Source: Ofwat (2011a; 2011b)

When discussing about affordability of water costs it should be also taken into consideration the water price elasticity that is measured as the percent change in water demand over the percent change in water price i.e. the responsiveness of agents to price changes in water. Water price elasticity impacts on full water cost recovery and is also related to the water pricing policies adopted in each case. Price elasticity varies and the literature finds that it increases at higher income levels. Table 9.4.14 provides a summary of price elasticities estimated in the literature. These can be used as guidance in polices aiming for full water cost recovery and in the assessment of policies in place.

Table 9.4.14 Indicative literature findings on water price elasticity

Source	Elasticity estimation (absolute figure)
Koundouri et al. [2003]	0.39-0.75

Frank and Beattie [1979]	1.01-1.69
Nieswiadomy [1985]	0.8
Ogg and Gollehon [1989]	0.26
Moore et al. [1994]	0.03-0.1
Hexem and Heady [1978]	0.06-0.10
Ayer and Hoyt [1981]	0.06-1.45
Hoyt [1982]	0.05-0.16
Kelley and Ayer [1982]	0.04-0.21
Ayer et al. [1983a]	0.01-0.03
Ayer et al. [1983b]	0.001-0.7
Hoyt [1984]	0.03-0.16

In the following sections we proceed further and link the theory discussed above with the quantitative insights on the selected Globaqua case studies. The economic assessment in terms of cost-benefit and cost effectiveness of the socio-economic measures employed in each case study is limited by the data availability and the information aggregation level. Ideally the assessment necessitates details on water related projects in each river basin with full information on the financial, environmental and resource costs per project and case study. Also the analysis necessitates information on the discount rates and alternative future scenario developments so as to make a full spectrum assessment of the policies and the tools in place. Unfortunately data availability has rendered this analysis difficult as no quantitative data have been made available per project, economic tool and instrument in each case study. Where possible the analysis has made use of secondary data and data at aggregate level in order to complete the cost-benefit and cost effectiveness analysis and to identify possible derogations and affordability issues raised in the selected Globaqua case studies.

3.2.1 Adige River Basin

The Adige river basin, a sub-basin region of the greater Eastern Alp basin region, covers an area of 12.100 km^2 across the provinces of Bolzano (62%), Trento (29%), and the Veneto Region (9%). Adige is the third largest river in Italy, after Po and Tiber. The Adige sources are mainly developed by snowmelt and rainfall and by 185 glaciers with a total glacial surface of about 200 km^2. Adige covers a length of 409 km before it reaches the Adriatic Sea (Bruno et al., 2014). In terms of demographics, the Adige RB has approximately 1,4 million people, with 54.15% of those living in municipalities with more than 10,000 residents, 33.59% in municipalities with less 5.000 and a 4.5% living in areas with less than 1.000 people (RBMP, p.12). According to the River Basin Management Plan, between 1971 and 2001 the population was increasing on average by 0.27% per year. During the decade the population in the region has showed a significant rate of increase. In addition to the permanent population, the region attracts a large number of tourists. Based again on information from the RBMP, the number of tourists visiting the area of Adige river basin is approximately 455,000 per year. The Adige region (RBMP, p.12) has approximately 455,236 tourist settlements. Of those tourist settlements, 46.51% are located in the Province of Bolzano, 48.5% are located in the Province of Trento, and another 5% are located in the Province of Veneto.

With regards to the economic development in the region, Adige River basin has been facing high development during the previous decade. Regarding the importance of each sector to the economy, industry is the most important sector in the region. Agriculture and construction have a high value added in the regios as well. The same applies for services as well that include tourism, nevertheless the statistical data are not enough so as to separate the total value added of the tourism sector and contribution to the local economy.

In total, the Adige region has 479 natural surface water bodies, 93 artificial or heavily modified surface bodies, and 34 groundwater bodies. According to estimations provided by the Adige RBMP, 51 natural and 42 artificial bodes are considered to be at risk (RBMP, Table 1.9, p.49). Some of the key stress factors include: nitrate pollution, pesticides, intensive agricultural (for example around the Adige valley in Veneto) and industrial activities, contaminated areas and salt intrusion causing problems mainly to drinking and agricultural water uses. However, a significant volume of water is purified by wastewater treatment facilities across the Adige region. The mean annual discharge of Adige is 202 m^3/s, which peaks during June and September.

The greatest volume of water in Adige is abstracted and used for hydropower electricity generation, followed by fish farming. It should be noted that most of the water quantities that are used in the hydropower sector are returned into the surface water system. For the needs of this sector, large reservoirs have been constructed with a total capacity of approximately 700 Mm^3 per year . Significant volumes of water, as expected, are used for agricultural activities, followed by residential water supply and industrial activities. Although there is adequate availability of water, shortage issues may appear in periods where excessive water quantities are demanded by sectors such as agriculture during summer or periods of drought, and industries, for cooling purposes. Overall, water demand for water uses has been estimated to be about 50 Mm^3 per year (RBMP). The Bolzano and Trento regions do not have favourable conditions for industry expansion. Thus, there should not be expected significant changes in the corresponding water demand.

Table 9.4.15 Adige RB freshwater uses per sector and area (in Mm3/year). (Source: RBMP)

	Bolzano	Trento	Veneto	Adige RB	Share (%)
Irrigation	199	376	1,953	2,528	6.9
Residential	47	187	74	308	0.8
Industrial	79	3	1	83	0.2
Hydropower	11,266	11,771	10,792	33,829	91.9
Fish farming	-	-	-	67	0.2
Snowmaking	-	-	-	13	0.03
Total	11,591	12,337	12,820	36,828	100
Province irrigation share (%)	7.87	14.86	77.28	100	-
Province residential share (%)	15.37	60.76	23.87	100	-
Province industrial share (%)	94.70	4.17	1.14	100	-
Province total share (%)	33.30	34.79	31.90	100	-

Based on public supply and consumption statistics provided by the Italian Statistics, we observe a slight increase both in water delivered and consumed between 1999 and 2012 (7.11% and 4.3% accordingly). This increase is basically caused by the increase in supply and consumption in the area of Trento. Tourists consume a considerable amount of public water supply as discussed with case study leaders and shown in the RBMP. According to RBMP, water consumption per capita is 241 liters per person and 448 liters per person (RBMP, Chapter 2, p.43) for permanent residents and tourists respectively.

Table 9.4.15 Adige RB public water supply (in thousand m3/year) (Source: Istat.it.)

	1999	2005	2008	2012	Change (%)
Bolzano					

Water delivered	63238	60311	63768	61474	-2.79
Water consumption	48664	47241	50769	45779	-5.93
Trento					
Water delivered	74514	83809	84842	85439	14.66
Water consumption	53727	61986	65800	63471	18.14
Veneto					
Water delivered	69444	72941	73502	75018	8.03
Water consumption	48303	50988	51472	48275	-0.06
Total water delivered	207196	217061	222112	221931	7.11
Total water consumption	150694	160215	168041	157525	4.53
Deliv/Consum	72.73	73.81	75.66	70.98	-2.41

The Adige RB is a region with significant water pressures. These are related to the increasing population, the agricultural and energy sectors. Diffused pollution is caused by units of the agricultural sector that pollute the river, especially in the central and lower courses. Additionally, the geomorphological characteristics of the basin serve well the production of energy. However, the dams that have been created to serve such purposes have had a severe impact in terms of changing the course of the river. Some other issues, in the Adige RB, are the saline intrusion that have dramatically increased close to the river mouth the last decades, induced hydro peaking, that has severe consequences on contaminant loads transported in the stream, and pollution caused mainly in the upper part of the RB.

In the Adige region, the cost recovery principle is applied according to the Italian regulation by Law 36 of 1994: article 13, paragraph 2 that determines that water services price is based on the water quality and the services provided, the infrastructure, maintenance and operation costs. The recovery of costs for water services includes the environmental and resource-related costs and it is estimated on the ground of the "polluter pays" principle (Article 119 of Legislative Decree 152/2006). More specifically it includes:

- the license fees for the diversion of public water which takes into account the environmental costs and resource costs
- the fees of water services for different users such as households, agriculture, services and industry contribute adequately to the recovery of costs on the basis of economic analysis."

In the sub-basin region of Bolzano covering 62% of the river basin, the water tariff consists of a basic fee for connection to the network that covers the network costs and a volumetric assessment that is accounting for the protection of the water resource. In the Province of Trento that covers 29% of the river basin, the tariff model includes costs related to water supply and sewage services while there is an additional fee on water treatment/purification, which is reviewed on an annual basis. The tariff model also includes costs related to the use of the public water resource (a fixed rate and a progressive rate that depend on consumption). Cost recovery in the industrial sector is based on the “polluter pays” principle and rates are in relation to the pollutant load (RBMP, 2010). Regarding the purification processes the recovery of the investment costs has decreased from 28% in 2012 to 22% on 2013 and 2014, while the total cost of recovery remains substantially unchanged, equal, on average in the years considered to 67.32% (Agenzia provinciale per la protezione dell’ambiente, 2015). Estimates for 2017, for the Trento region, show that the average price charged for water supply and sewage facilities in Year 2013 equals to €0.81/m^3 while full cost recovery could be achieved for a price of €1.15/m^3, thus the recovery of costs is estimated at approximately 70%.

Data limitations do not allow us to make detailed cost-benefit and cost-effectiveness analysis per user and project related to water in the Adige river basin. Thus we make an assessment based on the estimations on the average price charged for water supply and sewage facilities for 2013 and full cost recovery estimations for the same year which indicate that the water charges have to increase by 42% in order to achieve full cost recovery (€0.3402/m^3). We assume that this additional charge is allocated to water users proportionally to their share in water consumption, reported in Table 9.4.13. In this case the largest increase in water costs should be allocated to the energy sector while agriculture sector and households would be faced with the lowest cost increases. In terms of affordability the increase should not bear significant burden in the case of households or industry nevertheless the increase might be important in terms of costs faced by agricultural producers and energy sector.

In terms of fair allocation it seems that this approach might be compatible with the "polluter pays" principle. On the other hand it has to be estimated the impact on household and agricultural consumption will have this marginal increase in the price of water. Based on price elasticity estimations identified in the literature and discussed in the previous section it appears that the price increase for households might not bear significant consumption constraints. For agricultural producers the availability of data does not allow us to estimate changes in demand. Nevertheless it seems that the price increase remains important in order to rationalise water use and ensure an efficient market price that depicts the real impacts of the agricultural activity in the region on the available water bodies.

3.2.2 Ebro River Basin

The Ebro River is the longest (928km) river in Spain extending to the largest river basin (total surface area of 85,362 km2); it is located to the north-east of the Iberian Peninsula. It is sourced in the Cantabrian Mountains and moves eastwards across Spain, the Ebro is accompanied by a wide range of climatic conditions. The topological characteristics of the basin and more specifically, the existence of mountains that surrounds it, result in the isolation of the area from the influence of the oceanic climate. Consequently, the level of precipitation varies between the eastern and western parts of the river. Areas that are close to the ocean or the Mediterranean Sea have more frequent and more intense rainfall events, whereas other areas are dominated by poor and erratic rainfalls. The climate is continental in the biggest part, characterized by hot summers and cold winters, and low levels of precipitation. As a result, aridity is a predominant climate characteristic in some areas of the basin. As noted in the RBMP, the level of precipitation between 1980/81- 2005/06 was 618 mm per year, ranging between 452-817 mm per year. Comparing the level of precipitation for the period between 1940/41 and 2005/96 to that of 1980/81-2005/06, a 3.6% decrease is noted. As far as the chemical and ecological status is concerned, most of the surface and ground water bodies are in a good status. More specifically, 489 water bodies have reached good status, 182 have failed to reach it and 23 are of an unknown status. Additionally, good ecological status has been reached in 81 groundwater bodies, whereas in 24 bodies the same status has not been reached.

The total population of the Ebro River Basin is approximately 3 million which corresponds to 34.1 inhabitants per km^2. The average population growth was approximately 1% in the last decade. With regards to employment the industrial sector employs the highest number of people. Additionally, agriculture is the sector with the second highest number of employees, followed by the hotel industry. The annual income per capita varies in the region. Confederación Hidrográfica del Ebro reports that in 2002 the average annual income per capita in the Ebro area was approximately 14,131, spanning from 12,000-17,000 in certain areas. Unfortunately, information for later or earlier years could not be found.

Table 9.4.165 Employment per sector (Source: RBMP)

Sector	2008	% change between 2001-2008
Agricultural	90,828	+3.2
Food Industry	46,409	+2.6
Other industries	224,716	-0.3
Production and distribution of electricity	3,668	+0.7
Water supply and sanitation	8,963	+5.1
Hotel industry	81,389	+4.6

The agricultural sector contributes for approximately 5% to the total gross value added (GVA) generated in the region. Likewise, 5% of the population is employed in this sector. On the other hand, the industrial and energy sectors contribute to the regional GVA for 23% and employ approximately 22.3% of the local population. As mentioned in the RBMP, Ebro is a special case within EU, due to the high number of different organizational structures involved in the management of the river, as well as the decentralized nature of the management itself. More specifically, according to the Spanish Constitution the territory is organized into Municipalities, Provinces, and Autonomous Communities (17 in total). A wide range of competencies is given in each entity. Municipalities are responsible for issues related to urban water supply, sanitation and land planning. In some cases, RBA include territories from more than one Autonomous Community. In cases where a river basin lies only within an Autonomous Community, the responsibility of managing the river is transferred to Autonomous Governments. In the opposite case, the RBA manages the river. However Autonomous Governments are still significantly involved in water management, due to their full responsibility for land uses and health-related issues. Finally, it should be noted that regional institutions organized by the Autonomous Governments have been established in order to assist in the implementation of the WFD.

The Ebro RBMP puts under the same category all uses, whose supply is facilitated by the connection to the piping system located in city areas. This means that the reporting of residential demand, includes the quantity of water used by businesses, shops and other establishments located in cities.

Regarding the agricultural activity (irrigation and livestock) there is use of both surface water and groundwater resources, with surface the water use holding the highest share. Overall, according to the RBMP analysis of the agricultural sector, the amount of water used corresponds to 1050 m^3/individual/year, while there is projection for dramatic increase in the next 10 years. As far as production of energy is concerned, leaving apart wind and solar energy, the total capacity of the Ebro region is 11,000 MW. 31% is attributed to hydropower production, 46% to production of thermal energy and 23% to nuclear power production.

The following analysis of industrial water uses includes both the water distributed to industrial units through the municipal system and own sources. It should be noted that the analysis of the residential uses included some industrial uses as well. This part of the report accounts only for the water used by industries. Drawing information solely from the RBMP, the analysis is based on the National Classification System of Economic Activities.

Table 9.4.17 shows how the demanded quantity of water changes over time. The values are projections taken from the RBMP report. Demanded quantities of water will be increasing between 2015 and 2027. The most significant increase will take place in the supply of water outside of the municipal piping network. Overall the volumes of water per year are expected to double until 2027 as compared to 2007 levels.

Table 9.4.176 Water demand for industrial purposes (projections) in hm^3 (Source: RBMP)

	2007	2015	2027

	Connected to network	Not connected to network	Total	Connected to network	Not connected to network	Total	Connected to network	Not connected to network	Total
Total (excluding transfers)	31.93	147.30	179.23	34.66	216.95	251.61	37.86	380.31	418.71
Tasnfers to Camp de Terragona	4.34	26.93	31.27	4.83	34.60	39.43	5.68	50.63	56.31
Transfers to Gran Bilbao	5.46	32.38	37.83	5.39	45.21	50.60	5.29	73.05	78.34
Other transfers	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00
Total including transfers	41.73	207.61	249.34	44.88	297.76	342.64	48.82	504.99	553.82

The cost recovery principle in Spain is applied in a decentralized way and has the form of water levy, an environmental tax, aimed at recovery of environmental and natural resource use costs that ensures water availability and quality. The levy addresses the domestic and the industrial use, while agricultural use (irrigated agriculture in Spain accounts for 68% of the water use World Bank, 2008), and livestock farming are exempted, unless there is identified contamination from pesticides, fertilisers or organic material, and pollution discharges, respectively. Table 9.4.18 next summarizes the estimation on current cost recovery levels in the Ebro River. The estimations River indicate that full cost recovery is not achieved in any case or use. Cost recovery rates range from as low as 2% to as high as 86% (self-service in agriculture). Indicative of the Ebro case is that in many uses is not achieved even the financial full cost recovery let alone the total cost recovery.

Table 9.4.18 Cost recovery levels in Ebro river basin

Water services		Water uses	Financial costs (M€)		Non-financial costs (M€)		Incomes by taxes and surcharges of water (M€)	Total cost recovery index (%)
			Operation and maintenance	Investments CAE*	Environmental cost CAE*	Cost of the resource		
			A	B	C	D	E	F=E/(A+B+C+D) *100
Extraction, reservoir, storage, treatment and	Services of wholesale surface water	Urban	11.93	20.77	31.00	0.0	21.96	34%
		Agriculture/livestock	56.31	99.20	31.00	0.0	104.35	56%
		Industry/energy	8.36	13.35	33.00	0.0	19.20	35%

distribution of surface and ground water	Floods and monitoring	Floods - Public hydraulic domain	4.92	53.27	1.00	0.0	2.73	5%
		Quality monitoring networks and others	7.31	28.80	0.00	0.0	0.76	2%
	Services of wholesale ground water	Urban	2.67	9.48	0.00	0.0	7.41	61%
		Industry/energy	0.57	2.04	0.00	0.0	1.59	61%
	Distribution of retail water supply for irrigation	Agriculture	39.50	131.80	0.00	0.0	79.75	47%
	Urban supply	Households	92.55	106.24	0.00	0.0	149.83	75%
		Industry/energy	12.74	14.62	0.00	0.0	20.62	75%
	Self-services	Agriculture/livestock	298.50	148.02	70.00	0.0	446.53	86%
		Industry/energy	71.78	75.33	51.00	0.0	147.11	74%
Collection and treatment of wastewater to surface waters	Collection and purification out of public networks	Industry/energy	6.99	9.48	19.90	0.0	14.57	40%
	Collection and purification within public networks	Urban supply	83.67	113.40	29.70	0.0	143.18	63%
		Industry/energy	11.52	15.61	4.00	0.0	19.71	63%

The pricing schemes used for the cost recovery in the Ebro river basin make use of several legal instruments and depend either fully or partially on volumetric charges and are aimed at enabling moving from partial to total cost recovery (Table 9.4.19).

Table 9.4.19. Legal instruments for the cost recovery of different water services (Source: CHE, 2015)

Water services (defined in WFD)	Detail of the service	Legal instruments for the cost recovery	Volumetric fees/surcharges	Service price average (€/m^3)
Extraction, reservoir, storage, treatment and distribution of surface and groundwater	Services of wholesale surface water	Regulation surcharge	Partially	0.02
		Water use taxes		
		Agreements of state-owned companies		
		Surcharge for hydropower production		
		Project management and inspection		
		Surcharge for the use of the hydraulic public domain		
	Extraction and supply of groundwater	Regulation surcharge	Yes	0.11
		Water use taxes		
		Supply and treatment taxes		
	Distribution of retail water supply for irrigation	Taxes, revenues or shares of irrigation associations	Partially	0.02
	Urban supply	Supply taxes	Yes	0.48
	Self-services		Not valid	0.27
	Water recycling		Yes	-
	Desalination		Not in the basin	-

The assessment of the programme of measures for Ebro remains limited due to the lack of data and the level of detail of measures provided in the RBMP. The Programme of Measures outlined in the RBMP for Spain classify measures regarding topics/problems (usually “achievement of environmental objectives”, “satisfaction of water demand”, “risk management – floods and droughts” and “knowledge and governance”, though this grouping is slightly different between the individual plans). It is complex or impossible to understand how the PoMs are linked and respond to the identified pressures and to the status assessment, and how the measures ensure the achievement of objectives. The measures to satisfy water demand –which use on average nearly half of the PoMs budgets - are not targeted to the WFD objectives, and might even hamper their achievement (see European Commission, 2015). According to aggregated information provided by Spain, measures addressing the WFD environmental objectives make up 46% of the PoMs budgets, measures for water supply 42%, floods and droughts a 9% and 3% is targeting knowledge and governance.

The RBMPs are based on estimates and standard data on water uses and not on real data on consumption because the use of metering is not generalised, in particular in agriculture. Despite the requirement in the water law to install and maintain meters, this is not enforced and implemented, and hence there is a lack of real data on consumption and a lack of adequate control on water use.

The budgets of the PoMs vary between 150 and 7000 Million Euro for the first cycle; and between 1000 and 18000 million Euro for the overall period from 2009-2027. The reported figures include also “non-WFD-targeted” water supply infrastructure works, which are considered in the Spanish legislation as part of the RBMPs, and in some RBDs cover a significant proportion of the overall budget (e.g. measures expected to increase water availability by an estimated 20 % increase compared to current abstractions). At the same time budget constraints are referred to as being responsible for the reduction in the ambition of the PoMs and the achievement of WFD environmental objectives.

Considering the limited improvements and the costs, the cost-effectiveness ratio of the 2009-2015 RBMPs can be characterised as low indicating that the RBMPs might have to explore other less expensive and more effective measures to achieve their objectives. The main sources for funding are public authorities, namely the national authorities, followed by regional and local authorities. This does not allow for a cost break-down as it is not clear how the public will raise funds for the specific programme of measures (e.g. taxes, subsidies etc). Private contributions are only marginal. Some plans (e.g. ES017, ES030) mainly define infrastructure investments, and do not budget in the RBMP other measures. The information available in the PoMs regarding the details of the measures is scarce for most measures. Measures are not linked to water bodies and are unclear regarding the pressures or economic sectors.

With regards to measures in agriculture a key objective in the RBMPs is increased efficiency of water usage in agriculture, by improving/changing supply. Given the increases in efficiency, the consumption of water after modernisation can increase, even if abstraction decreases. In the public consultation process, many stakeholders have expressed their concerns regarding the effectiveness of these measures, and the lack of clarity regarding net water savings and the lack of clarity on the possible review of related water rights to ensure that efficiency measures contribute to environmental objectives.

With regards to the economic measures and links to Article 9 of the WFD, in 2012 a national tax on hydropower was introduced for the protection of water resources, although the revenue goes into the general budget with only 2% of the tax incomes are specifically earmarked for the River Basin Authorities. There is furthermore scarce information about existing (and planned) water pricing systems and tariffs, in particular regarding agriculture where a large variety of systems still co-exist. From the assessment of cost pricing and cost recovery mechanisms it appears that there are no adequate incentives for farmers to use water efficiently as the water consumption is, to a large extent, not measured and therefore water charges are not linked to real consumption. The environmental and resource costs are high (large percentages of water bodies in less than good status) but they are not recovered either. Moreover illegal water abstraction is an important obstacle for efficient water policy.

A large number of discounts are being applied when calculating cost recovery. According to the Article 7.3 IPH, flood protection, and future water users (e.g. of dams) are not considered as recoverable costs, and different estimations are developed in the plans. The discounts for flood protection in dams are not justified and appear arbitrary. In some basins is always a fixed percentage (e.g. 50% in ES040), in others depend on the dam (e.g. ES050) and can even evolve within the life cycle of the project. A discount of approximately 80% appears to be applied in one specific case in ES080, including 50% discount due to “over sizing of the infrastructure”.

With regards to the investments foreseen in the RBMP (Table 9.4.20), they involve actions that may lead to the occurrence of new pressures that may be analysed in order to verify their feasibility. In relation to the offer of resources, the foreseen investments usually lead to the increase of demands, which may also require a specific analysis in the corresponding management plans regarding the allocation and reservation of resources. The review of the investment plan indicates that the programming is adjusted to the period until the end of 2021, the first horizon set for the updated planning and date on which these new river basin management plans must be reviewed in order to establish future plans corresponding to third planning cycle 2021-2027.

Table 9.4.20 Investments considered by the Ebro river basin management plan

Number of measures	*Environmental Objectives*	*Demand satisfaction*	*Extreme phenomena*	*Knowledge and Governance*	*Other investments*	*Total*
2072	*6045.7*	*3129.33*	*230.91*	*239.18*	*5451.17*	*15096.29*

Source: European Commission (2017), Summary of Spanish river basin management plans second cycle of the WFD (2015-2021), Directorate General for Water

The analysis of cost recovery measures and status in the Ebro river basin is limited by the availability of data and adequate information on the costs of foreseen investments. Overall it can be argued that the system in place and the foreseen measures apply water costs to all users irrespective of actual use or metering data. In terms of cost-benefit analysis it is difficult to distinguish the positive and negative implications among agents given the limited information. In terms of cost effectiveness the cost recovery level and mechanisms in place in the Ebro river basin do not allow for a fair allocation of burden among different sectors (particularly with regards to agriculture) and users. In terms of affordability, measures have to be put in place in order to achieve full cost recovery in a way that clearly considers the ability of the agents to bear the costs and the impact that any water price changes will have on the economic activity in the region. In some sectors full cost recovery would require a substantial increase in water tariffs or change in pricing policies so as to consider volumetric changes. This would imply significant cost increases for households. Also might impact on the economic profits of the industrial units operating in the region, especially if the effects of the last economic crisis that hit Spain are considered. In this regard it can be recommended further investigation into cost recovery approaches in Ebro and more flexibility in terms of time requirements for achieving full cost recovery.

3.3.3 Evrotas River Basin

The Evrotas river basin is located in the south of Peloponnese. The river has a catchment size of 2240 km^2. It is part (26.5% approximately) of the greater river basin district of “Eastern Peloponnese”. The Evrotas RB area overlaps mainly with the Laconia Prefecture, but also includes small parts of Argolida and Messinia Prefectures. While the river basin includes many cities, Sparta is the largest. The Evrotas RB has a total population of approximately 82,500, of which 68,400 permanent residents (according the latest official census, 2011) and 14.100-second home residents and tourist overnight stays (184,800 in 2011), within an area of 2,239 square kilometres. The climate is typical Mediterranean with significant precipitation levels (total annual precipitation: 900 mm/year resulting in 2.031 hm3 or 2,0 billion m3 of water/year), with high fluctuation between the mountainous parts (800 -1200 mm/year, with 1600 mm on the top of Taygetos mountain) and the lowlands/coastal areas which receive considerably lower precipitation (400 – 600 mm/year). Evapotranspiration level is estimated at 500 mm/year.

Table 9.4.21 Local population in Evrotas RB (Source: Main RBMP, Statistics between 2005 and 2021 are estimates made by RBMP)

Residents	1991	2001	2011	2015	2021
Population	59,807	61,722	68,400	71,600	76,900
% Population change	-	3.2%	10.8%	4.7%	7.4%

Table 9.4.22 Seasonal residents and tourists in Evrotas RB (Source: Main RBMP, Statistics between 2005 and 2021 are estimates made by RBMP)

Tourists	2001	2005	2007	2011	2015	2021
Summer residents	12,571	-	-	14,100	14,750	15,850
% Change in summer residents change	-	-	-	-	4.6%	7.5%
Number of tourists overnight stays	-	208,560	191,447	184,800	185,650	-
% Change in tourists overnight stays change	-	-	-8.2%	-3.5%	0.5%	-

The regional economic activities contribute by 12% to the national GDP of the primary sector; the industrial and manufacturing sector, mainly focusing on food production and processing, contribute by a share of 10%, the agricultural sector, also contributes significantly to the local economy, with 20,000 farms approximately, with and an overall land take of livestock farms and pasture land of 570 km^2, and agricultural activity with an agricultural land uptake of approximately 720 km^2. Overall, the regional economic activities contribute by 12% to the national GDP of the primary sector, with a total GDP of the RB being 1,249.16 (millions Euros) and the per capita GDP 13,697.93 Euros. In more detail, the industrial and manufacturing sector contribute by a share of 10% (2.23% and 7.46% respectively) in the total GVA (average value in Laconia Prefecture for the period 2005). Overall, the regional economic activities contribute by 12% to the national GDP of the primary sector.

The region of Evrotas in general is characterized by cold winter and hot and dry summers. Regarding water sources, there is a total number of 61 water bodies where water can be abstracted from. The total number of water bodies account for: 100 surface water bodies (80 rivers of a total length of 567.4km, 11 coastal water bodies of a total length of coasts of 1,106.1 km, 1 lake of 1,23 km^2 land cover and 6 transitional, covering a total area of 5.94 km^2 and including lagoons and a river estuary) and 27 groundwater bodies primarily karstic or granular aquifers, identified to cover a total area of 8,064.1 km^2, 19 out of the 27 are directly linked to surface waters or terrestrial ecosystems. The overall water balance in the region from the rivers is 918 million m^3/year total flow). In addition, one desalination unit operates at the stream basin of Argolikos Gulf, of a capacity of 4500 m^3/month.

Water needs in the Tripoli Plateau Basin and in the Stream Basin of Argolikos Gulf, are covered by groundwater abstractions and springs connected to the groundwater aquifer (accounting for 216,4 mil.m^3/year), while the agricultural activities in the Evrotas River Basin, covering an area of approximately 9000 km^2, depend primarily on surface water from the main bed of Evrotas and its confluents, via dams and direct stream flows. All other needs are covered by groundwater abstractions.

Based on data and estimations between 2006 and 2009, all water bodies except for one are in good condition both in terms of quantity and quality. On the other hand, it appears that a considerable degradation exists for freshwater bodies with regard to their chemical status, with 17 rivers having bad chemical status. However, most rivers are in moderate or good condition with regards to their ecological status. It is important to highlight that, according to the available estimations; the status of 36 out of 49 river bodies is at risk. On the contrary, only three groundwater sources (two bodies for quantitative status and one for pollution status) appear to be at risk.

The water supply and sewage services are considered in the case of Greece as a public service. Across the country there are 214 enterprises for water supply and sewerage (Safarikas et al., 2006; Tsagarakis et al., 2003). In Eastern Peloponnese water is supplied by the Company for Water Supply and Sewerage (DEYA). They are inspected by the Ministry of Environment that approves the pricing policy. There are 13 companies in total in Eastern Peloponnese. In Greece, cities with more than 10,000 inhabitants are managed by Municipal Enterprises for Water Supply and Sewerage (DEYA) operating as private companies, but owned by the municipalities (Law 1069/80). However, there are also cities with population less than 10,000 inhabitants in which DEYAs have been established. There are about 210 DEYAs around the country from which 177 are organized and represented by the Union of Municipal Enterprises for Water Supply and Sewerage and provide their services to 3.500.000 residents. The area of DEYA's jurisdiction is defined as the area of the corresponding Municipality. According to the Law 2539/97 "Ioannis Kapodistrias" new Municipalities were created having a population of more than 10.000 residents resulting to the obligation of establishing a DEYA, since according to the Law 1069/80, a Municipality with population of over 10.000 residents that does not create a DEYA is not entitled to be subsidized by the Public Investment Program (DEYA 65% and Program 35%). This is the reason that has led the number of DEYA to double from 105 in 1997 to 210 today. DEYAs have as an objective the water supply and sewerage services provision while being responsible for the water quality, the early response to water shortage, the maintenance of the water supply and sewerage network, the construction of water supply projects etc. Population served by DEYAs is estimated to be 35% of the total population of Greece.

In the rest of the areas (towns/municipalities with less than 10.000 residents) the competent bodies are the Municipalities. These Municipalities, which are responsible directly for water supply and wastewater services, are about 830 and account for only 12% of the total population served. The Wastewater Treatment Plan of Tripoli (priority B agglomeration) operates secondary treatment, denitrification and dephosphorization (2NP). In addition, the main urban centres, 9 priority C and 3 priority B agglomerations within the River Basin are served in which WWTP. The construction of more WWTP and sewage works has been foreseen in other agglomerations and coastal areas, some of them are included in corresponding financing programs.

According to the RBMP, the pricing policy of DEYA in Eastern Peloponnese is differentiated into 4 to 7 categories. The pricing policy in the region is defined by priorities regarding local characteristics. The average price of water for consumption thus varies between 0.3 and0.8 €/m^3. According to the same source, the average price for water for irrigation is 0.07€/m^3. However, the price ranges between 0.04 and 0.08€/m^3.

Most of the water withdrawals are used for agricultural and livestock activities. In percentage, agricultural and livestock sector represent 92% of total water use, 90% and 2% for the two sectors accordingly. Subsequently, the residential sector has a 7% share in total water use, followed by the industrial sector with an only 1% share.

Table 9.4.23 Water uses and abstractions in 2011 in the Evrotas RB (Source: RBMP Background document No.8)

	Use		Abstraction		Balance	
	Annual	Summer	Annual	Summer	Annual	Summer
Residential sector	6,626,000	2,456,000	8,807,000	3,253,000	2,181,000	797,000
Irrigation sector	82,856,000	76,400,000	136,334,000	125,528,000	53,478,000	49,128,000
Livestock sector	1,120,600	374,400	1,400,400	467,800	279,800	93,400
Industrial sector	1,270,000	425,000	1,816,000	609,000	546,000	184,000
Total	91,872,600	79,655,400	148,357,400	129,857,800	56,484,800	50,202,400

It appears that intensive agricultural activity is the only demand-driven factor that could possibly increase demand for water in the future. According to ELSTAT statistics for Laconia Prefecture, only one third of agricultural land units are irrigated. A potential increase on irrigated land areas would cause an increase on water needs for agriculture. Irrigated areas during the last decade (between 2003 and 2009) have not changed significantly. The same can be observed for the other demand-driven socio-economic and demographic factors, such as total population, tourists and local GDP. Finally, according to estimations provided by RBMP background document No.3 (Fig 2-1), the sector-specific GDP value provided by each cubic meter of water use is 272,7 Euro, 1,4 Euro and 155,8 Euro for touristic, agricultural and industrial sector respectively.

Overall, the Evrotas RB appears to have ample resources and relatively stable water needs across the various economic sectors, ensuring a satisfactory water balance at least in the mid-term. However, a range of various factors such as over-exploitation of water for agricultural purposes, point and diffuse sources of pollution and the climate change effects are potential threats for the disturbance of the balance between water supply and demand. In addition, there are a few more factors that may cause extra difficulties in predicting demographic, socio-economic and water-related trends: (i) the effects of the severe financial crisis that might cause important changes in the socio-economic character of the region and in the planning of investments and technological advancements, (ii) the very limited data availability particularly with reference to available water resources and uses.

Pressures in the River Basin are mainly related to pollution; water supply is satisfying the demand. Groundwater pollution in the area is linked to agricultural activities; increased levels of Fe, Mn, SO_4 have been measured, as a result of natural infiltration processes. In addition, there is nitrate pollution (NO_3) due to the use of fertilisers in the agricultural activities.

Industrial activities in the river basin district are related to food production, primarily dairy and cheese products, and food processing (meat processing, oil production, fruit and vegetable juice production) and a significant number of metal treatment plants and chemical industries. Overall, 378 industrial plants and 373 livestock farms are identified to operate in the river basin district. Diffuse pollution in the Evrotas River Basin comes from agricultural runoff of the 491,000 km^2 of cultivated land, from free range livestock (cattle, poultry, sheep and goats), urban sewage diffused in both surface and groundwater, not connected to WWTP, and from atmospheric depositions and natural uses of land, i.e. forests and pastures. The overall annual surface loads from diffuse and point sources as well as atmospheric depositions are 2773.5 tons/year BOD, 701.9 tons/year N and 52 tons/year P. During the summer period, the relevant pollutant loads are 935.5 tons/year BOD, 230.1 tons/year N and 16.8 tons/year P respectively. Groundwater quality is monitored by IGME (Greek Institute of Geology and Mineral Exploration).

In Greece the implementation of the cost recovery principle is very difficult. The main water use in Greece is identified in the agricultural sector where there is partial cost recovery that only addresses operational costs. Water infrastructure in the domestic sector has been subsidized in large by the state. The estimation of cost recovery levels for the Evrotas river basin has made use of the study of Koundouri et al. (2008). The authors find that total cost recovery on average for Evrotas river basin amounts to to 34.2%. At disaggregate level the total cost recovery for water supply is estimated at 37.89% while for irrigation is estimated at 15.66%.

Acording to the RBMP the average revenues per m^3 of water for the entire water supply in the Eastern Peloponnese District was estimated at €0.72/m^3, whilst for the DEYA €0.85/m^3 and for Municipalities €0.53/m^3.Also the financial cost recovery is estimated to amount to 57.6%. Overall the analysis included in the RBMP depicts a relatively low financial and total cost recovery for the Evrotas river basin, in line with the findings of Koundouri et al. (208). The analytical data of the report show substantial differentiation among the various providers. In particular, recovery varies from 25% to 65%.

From these figures it becomes apparent that several measures have to be implemented in the Evrotas river basin so as to achieve full cost recovery. This will have a significant impact on the market price as in its current levels the price fails to provide efficiency in the market and ensure sustainable management of the water bodies. In the attempt to achieve full cost recovery it is expected that agricultural users will be faced with the largest increase in water costs. With regards to specific measures included in the RBMP a summary of main targets, cost estimations and impact assessment is summarized in Table 9.4.24. Lack of data does not allow to undertake a detailed quantitative cost-benefit and cost effectiveness analysis but to do just an overall assessment of expected outcomes. In the RBMP are not detailed specific measures to address full water costs but just general measures that address specific goals mainly related to pollution and erosion control. Thus we are unable to estimate the allocation of full cost recovery burden among agents and sectors in the region. Nevertheless, given the socio-economic characterisation of the region (important agricultural sector in terms of GVA and employment, limited industrial production, low population density but with seasonal variability) it can be argued that the main effects of achieving full cost recovery are expected to be recorded in agriculture. In terms of affordability again lack of data does not allow us to complete the assessment.

Table 9.4.24. Socio-economic measures for the Evrotas River Basin (Source: RBMP of Eastern Peloponnese, and authors' elaboration)

Socio-economic measure	RBMP Impact assessment	Cost-benefit and cost effectiveness assessment
Recreation and restoration of wetlands areas: Enhancement of monitoring facilities/infrastructure for biotic and abiotic parameters of river estuary, in view of identifying the ecological flow at the river estuary based on biotic and abiotic indicators of the transitional WB. Competent Authority: Region	Investment cost: 3,000 Operation cost: 0 Social impact: Negligible Financial Impact: Negligible Environmental impact: Negligible	Given the low investment costs foreseen it can be anticipated the measure to have no effects on the costs of water use (i.e. through an increase in the water prices so as to cover the costs of the measure). In terms of affordability the cost of the measures will not put pressure on access to water and ability to pay for water. The financial impact might be negligible; nevertheless, the environmental and social impact might be considerable. This impact is expected to be high not in terms of financial costs but in terms of the non-monetized effects (e.g. benefits that the society enjoys due to access to improved ecosystem services and goods provided by water ecosystems). Also the environmental benefits might be considerable due to improved environmental status and this can add more value to the benefits agents get from access to better ecosystem services.
Works of research, development & presentation of best practices: Enhancement of infrastructures monitoring waters, inflow of fresh water as well as the movement and behavior of streams. Competent Authority: Region	Investment cost: 10,000 Operation cost: 0 Social impact: Negligible Financial Impact: Negligible Environmental impact: Negligible	Low investment costs are expected to put insignificant pressure on the affordability of agents of water costs due to higher prices. The benefits are expected to spread across different sectors and categories of users (households, industry, agriculture). Impossible to distinguish the main funders of the measure as the Competent Authority remains the Region and it is not clear whether funds will come from national funding, private funding or EU funding. The costs (social, financial, environmental) are not high but the benefits should be considerable with regards to social welfare and environmental improvement. These benefits spread across the entire range of agents making use of the ecosystem services and goods provided by Evrotas

		river and should be proportional to the extent of their use.
Structural construction works: Rational wastewater management by settlements with population peak <2000 PE (priority D agglomeration) Competent Authority: Region	Investment cost: 1,500 Operation cost: 0 Social impact: Negligible Financial Impact: Negligible Environmental impact: Negligible	The financial costs of the measure are negligible and should not put pressure on water prices and affordability faced by different users. Nevertheless, the social and environmental costs might not be negligible as the construction might impact on the social welfare and/or the environmental status in the area of the infrastructure. The costs cannot be estimated due to lack of detailed information on the measure. Construction works might impact disproportionally on the costs borne by different agents (households, industry, tourism sector etc.).
Abstraction control: On-site inspections at authorized/licensed water abstractions. Competent Authority: Region	Investment cost: 0 Operation cost: 0 Social impact: Negligible Financial Impact: Moderate Environmental impact: Negligible	The investment and operational costs of the measure are zero according to the RBMP. Nevertheless, the measure is associated to administration and management costs that are not reported. They might form already part of the regional authority budget and spending nevertheless in order to make an accurate analysis and efficient use of alternative policy options this cost needs to be compared to the benefits resulting from the measure. The social and environmental costs are negligible but the benefits are considerable if "free-riding" effects and illegal excessive abstraction is captured. Affordability issues are associated to agents caught for unauthorised water abstractions. The impact might be significant for households and agricultural producers making use unauthorised abstractions. If implemented in full the measure can eliminate "free-rider" effects.
Other relevant measures: Further investigation as regards the measurements and causes of excessive chemical substances recorded in the WB. Competent Authority: Decentralized Administration (Direct. for Water)	Investment cost: 3,000 Operation cost: 0 Social impact: Negligible Financial Impact: Moderate Environmental impact: Negligible	Low investment costs will have marginal impact on water prices. The cost of the measures will not put pressure on access to water and ability to pay for water. The financial cost is negligible for the competent authority but can be important for the agents polluting the water body. If appropriately applied this can lead to full implementation of the "polluter pays" principle. As a result of this the environmental and social impact might be considerable. The social benefit of these measures can be considerable given the non-monetized effects (e.g. benefits that the society enjoys due to access to improved ecosystem services and goods provided by water ecosystems). The environmental benefits can be considerable due to improved environmental status.
Penalties for illegal sand extraction	Investment cost: 3,000 Operation cost: 0 Social impact: Negligible Financial Impact: Large Environmental impact: Negligible	The measure comes with a low investment cost and zero operational cost. As this is mainly a legislative measure it appears strange that this measure comes with an investment cost and no operation cost. It would be rational to expect some management and or administration costs related to the measure that reflect the labour costs, the inspection costs, communication costs, etc. related to the measure. These costs should

		not be significant and are not expected to have a significant impact on water prices and affordability. The financial impact is characterised as high in the RBMP. Nevertheless, this depends on the amount of the penalties set by the legislator (no information provided here). Also it is not clear how this penalty is set and what are the cost ranges (e.g. will an individual pay a fixed amount irrespective of income? Or will the penalty be monetized based on the estimates on the environmental/social damage related to illegal sand extraction?). The benefits of the measure cannot be quantified as there is no monetized information of the effects of sand extraction.

From the review of the measures the following comments arise:

- The measures are general and underestimate the associated impact and costs. It is estimated that measures come with no operational cost or marginal impact nevertheless no adequate documentation of the reasons reaching to this conclusion is given.
- The measures lack a clear explanation on how they are going to be implemented. Thus it is impossible to assess in cost-benefit terms or to assess who is going to be the end beneficiary or the agent bearing the cost of these measures.
- No information is provided with regards to the estimation of investment costs and particularly with regards to the discount rate applied. Thus it is not accurately estimated the impact of the effect as no Net Present Value inferences or calculations can be made due to lack of data.

3.3.4 Sava River Basin

The Sava River Basin is a transboundary basin, a sub-basin of the Danube River Basin, shared by the countries of Republic of Slovenia (SI), Republic of Croatia (HR), Bosnia and Herzegovina (BA), Republic of Montenegro (ME) and Republic of Serbia (RS), with a total population of 8,759,000 million within an area of 97,713.2 square kilometers. The Sava RB has a total population of 8,759,000 million within an area of 97,713.2 square kilometers. The Sava RB is one of the sub-basins of Danube River Basin, comprising 12% of the larger basin. The management of water resources of the Sava river basin is the objective of the Framework Agreement for the Sava River Basin (FASRB), which is coordinated by the International Sava River Basin Commission (ISRBC). This body has been created by the four riparian countries of the Sava RB to provide the conditions of the preparation of the Sava RBMP according to the WFD. In 2001, Slovenia, Croatia, Bosnia and Herzegovina and Yugoslavia entered into a process of negotiation, which resulted in the FASRB. The Framework was signed in 2002 and entered into force at the end of 2004. The ISRBC is responsible for the implementation of FASRB and the coordination of the implementation of the WFD in the Sava River Basin. This has been crystallized into Article 12 of the FASRB that states, "The Parties agree to develop the joint and/or integrated Plan on the management of the water resources of the Sava River Basin and to cooperate on its preparatory activities".

61.5% of Sava employees come from Croatia and Bosnia & Herzegovina (30.34% and 30.81%), whereas the rest 31.95% is offered by the other three countries, 21.76% for Slovenia, 15.42% for Serbia and another 1.67% from Montenegro Additionally, most of the employees work for the agricultural, industrial and public sector. Only a small share of the total number of employees (1.4%) work for the energy sector.

Table 9.4.25 Employment in Sava RB (Source: Sava RBMP)

	Slovenia	Croatia	Bosnia & Herzegovina	Serbia	Montenegro	Total
Country employees	910,000	1,496,000	811,000	2,069,000	171,000	5,457,000
Country employees within Sava RB	560,000	781,000	793,000	397,000	43,000	2,574,000
Sava RB country employees share (%)	21.76	30.34	30.81	15.42	1.67	100.00
Employment rate in Sava RB (%)	54.37	35.29	23.50	20.39	22.05	-

Table 7.4.26 Employment by sector Source: (Sava RBMP)

	Slovenia	Croatia	Bosnia & Herzegovina	Serbia	Montenegro	Total	Sector Share (%)
Agriculture employees	50,000	97,000	125,000	11,000	9,000	292,000	11.34
Industry employees	140,000	157,000	187,000	139,000	9,000	632,000	24.55
Energy employees	5,000	13,000	5,000	12,000	1,000	36,000	1.40
Public service employees	115,000	156,000	296,000	117,000	13,000	697,000	27.08
Other employees	250,000	358,000	180,000	118,000	11,000	917,000	35.63
Total Country employees within Sava RB	560,000	781,000	793,000	397,000	43,000	2,574,000	100.00

Although the public sector is the biggest in terms of employment, industry is the biggest sector in terms of GVA (21.33%). Further on agriculture has a 5.83% of total GVA, being the second smallest (after 'Energy") sector. Finally, Slovenia and Croatia offer the greatest contribution to Sava total GDP, 36.06 % and 36.30 % respectively, followed by Bosnia & Herzegovina, Serbia and Montenegro, 13.69%, 12.46% and 1.57% respectively.

Table 9.4.27 Sava RB GVA (millions of €) (Source: RBMP)

	Slovenia	Croatia	Bosnia & Herzegovina	Serbia	Montenegro	Total	Sector Share (%)
Agriculture GVA	350	950	563	431	230	2,524	5.83
Industry GVA	4,250	3,331	601	663	395	9,240	21.33
Energy GVA	6,00	372	332	165	129	1,598	3.69
Public service GVA	3,550	2,279	550	398	547	7,324	16.91
Other GVA	9,000	7,347	3,454	1,659	1,175	22,635	52.25
Total Country GVA within Sava RB	17,750	14,279	5,500	3,316	2,476	43,321	100

Table 9.4.28 GDP per country and their contribution to the Sava RB GDP

	Slovenia	Croatia	Bosnia & Herzegovina	Serbia	Montenegro	Total
Country GDP (in thousands €)	28,750,000	31,262,000	8,654,000	23,610,000	2,680,467	94,956,467
Country GDP per capita	14,535	7,045	2,268	3,186	4,272	-
Country GDP within Sava RB (in thousands €)	17,100,000	17,212,000	6,490,000	5,906,844	710,892	47,419,736
Country GDP per capita within Sava RB	16,602	7,776	1,924	3,033	3,640	-
Country share (%) of Sava Total GDP	36.06	36.30	13.69	12.46	1.50	100

As far as the land uses are concerned, 42.35% of the area of the basin concerns agricultural areas, whereas 54.71% concerns land classes related to forests and semi natural areas. Additionally, artificial surfaces comprise only 2.23% of the total surface of the basin, as showed in the table below.

Table 9.4.29 Land uses in Sava RB (Sources: RBMP)

Land class	Area (km^2)	Share
Artificial surfaces	2,179	2.23%
Agricultural areas	41,381.5	42.35%
Forest and semi natural areas	53,458.9	54.71%
Wetlands	78.2	0.08%
Inland water (water bodies)	615,6	0,63%
Total	97,713.2	100%

The total annual water use in the Sava River Basin is estimated at about 4.8 billion m^3 /year. The water uses in the Sava RB are: (i) residential, (ii) industrial, (iii) agricultural, and (iv)electricity production (nuclear and thermal power, hydropower etc.). The water use for the production of electricity is the bigger consumer accounting for 3.3 billion m^3/year (69.2%), the residential water use is about 783 million m^3 /year (15.1%), the industrial activity makes use of about 289 million m^3 /year (4.8%), and the agricultural water use (i.e. fish production, livestock farms, or other uses), although it is relatively high, it accounts for just 8.4%. This difference in the use of water volumes used is attributed to the fact that water used for fish production does not represent the consumptive use and also to the high groundwater abstraction rate through private drills. Although there is significant pollutant load from diffuse pollution due to the agricultural activity (chemical fertilisers and pesticides, nutrient pollution) the overall water quality in the surface water bodies in the Sava River basin is satisfactory. The groundwater bodies are at risk due to over-abstraction and ¼ of them are subject to chemical pollution from infiltration of diffuse agricultural pollution.

Table 9.4.30 Average water use, 2000-2011 (Source: Eurostat)

Sector	Average (Mm^3)	Share (%)
Residential	41.90	2.21
Industrial	17.98	0.95
Agricultural	1.34	0.07
Electricity	1,765.98	93.25
Other	66.68	3.52
Total	1,893.88	100.00

Comparing total water uses and water abstractions, it appears that the latter always exceeds the former, implying that there are water quantities in storage every year. Although the Sava RB is a region with ample water resources[8], the increasing trend in water uses and abstractions, as well as various natural, climatic and pollution conditions (as we will discuss later), highlights the importance of achieving sustainable management of the available water resources in order to avoid water shortage problems in the long term.

Table 9.4.31Water uses summary by sector (Source: Eurostat)

Year	Residential	Industrial	Agricultural	Electricity production	Total Water Use	Water Abstractions	Balance
2000	47.05	20.90	1.36	1,596.12	1,665.43	1,849.13	183.70
2001	45.43	25.44	1.56	1,739.72	1,812.15	2,006.70	194.55
2002	46.86	18.38	1.38	1,686.4	1,753.02	1,946.73	193.71
2003	45.48	18.71	1.23	1,736.95	1,802.37	2,027.86	225.49
2004	44.14	22.62	1.41	770.73	838.90	1,008.71	169.81
2005	42.84	27.01	1.62	1,771.09	1,842.56	2,032.5	189.94
2006	41.58	17.19	1.43	1,921.69	1,981.89	2,212.14	230.25
2007	41.02	14.60	1.27	1,977	2,033.89	2,133.3	99.39
2008	42.66	15.64	1.69	2,043.27	2,103.26	2,188.39	85.13
2009	35.84	11.87	1.55	1,974.17	2,023.43	2,112.89	89.46
2010	34.76	11.28	1	1,914.12	1,961.16	2,069.8	108.62
2011	35.16	12.07	0.59	2,060.5	2,108.32	2,197.09	88.77
Mean annual change (%)	-2.48	-2.75	-4.8	9.0	7.86	6.31	-6.35

Amongst the countries that share the Sava River and are participating in the River Basin Management, Slovenia and Croatia are full member states of the EU. The involved countries signed an international agreement committing on the development of a joint Integrated River Basin Management Plan, the Framework Agreement for the Sava River Basin (FASRB), which is coordinated by the International Sava River Basin Commission (ISRBC), according to the WFD requirements; the IRBMP follows a 3-step process, completed respectively in 2015, 2021 and 2027. According to the River Basin Management Plan for the Sava and in accordance to Article 9 and Annex III of the WFD there is provision for developing a common cost recovery scheme within the River Basin. Although the WFD does not provide a clear setting for the cost recovery requirement of transboundary regions, it is recognized that there is need for provision for a basin level cost recovery of water services. In the case of the Sava region cost recovery covers primarily the domestic water use (water services and sewerage). The cost recovery level for water services (domestic water supply and sewerage) in non-EU member states are between 63 to 78%, while there is no available information on cost recovery of self-supply for the industrial and the agriculture sectors.

The most common pricing scheme within the Sava River Basin is volumetric pricing. The price-setting authorities are the municipalities; they approve regular fee increases, which are usually below the inflation rate. Due to the individualities of the GARB region (transboundary region, 2 EU member state countries and 1 candidate country, Serbia) the cost recovery provisions will be examined separately per country. Three

[8] To give an example, estimated renewable stocks of groundwater in the Pannonian region (Croatia) is 379 Mm3/year, while groundwater pumping is 21 Mm3/year (IRMO 2013). However, Sava RB is a region with heterogeneous hydrological conditions, mainly dependent on local rainfall and other physical characteristics.

economic instruments are in place in Slovenia, as set and regulated by the national government, for the recovery of environmental and resource costs:

- Wastewater charge, determined according to pollution load and paid only for the discharge of industrial and municipal wastewater, excluding diffuse pollution from agricultural activities. When the relevant regulation came into force, there was provision for wastewater charge reduction for the Municipalities, which invested in wastewater collection and treatment infrastructure until the year 2010.
- Payment for water rights, obligatory for certain activities (i.e. hydropower generation, gravel abstraction)
- Water use fee, addressed to water rights owners for water abstraction and for the use of waterside land, owned by the state.

The assessment survey for Sava (Background paper No 6, 2013) identified complex ways, through which the aggregation of revenue and formulation of water prices for the different uses are estimated, in Croatia, with the participation of water companies, local, regional and central authorities. Water pricing differs according to use (domestic and commercial) and includes operation and maintenance costs; capital costs, external environmental cost and water resource costs, as well as the cost of provided services, are not included. Overall the domestic sector is subsidized by the commercial sector, fact that means higher water price for commercial buildings. Provided the complexity in financial interactions that formulate water price, we cannot proceed to a safe estimation of total economic cost and, consequently of cost recovery, while the main challenges for achieving that would be the full estimation of capital costs, estimation of environmental costs and integrated management and coordination among authorities.

In Serbia the Municipal Authorities, which are responsible for pricing, apply a unified component fee for domestic water supply and wastewater services based on volumetric pricing. The industrial fee is 2 to 3 times higher as a means to cross-subsidize the domestic sector as a result the average household spends 1.3% of its net income on water and sanitation services, a small average for EU standards. Water prices are reformulated on an annual basis, fact that is particularly stressful for the industrial sector resulting in high share of outstanding bills. It is estimated that the drinking water supply (treatment and distribution) as well as the sanitation sector are depreciated, resulting in depreciation of 78% and 22% respectively. If the needs for annual re-investment are taken into consideration great lack of resources is identified, with re-investment requirement reaching up to 40-50%; the rest to be financed through tariffs and mainly through subsidies or bank loans (the biggest part).

The Municipalities of Slovenia can provide subsidies for public water supply and municipal wastewater treatment services, for the costs of depreciation of public infrastructure. Several assessment efforts have shown that the cost recovery of financial costs for public water supply and for municipal wastewater collection and treatment is not achieved in the Republic of Slovenia. Overall, an assessment survey for the development of the Integrated River Basin Management Plan of the Sava River Basin, realised in 2007, and included in the Background paper No 6 (2013) identified cost recovery for water supply, municipal wastewater collection and for the municipal wastewater treatment (operating, maintenance, and capital costs) were 77%, 72% and 104% respectively; while the first two costs maintained a similar cost recovery level in the latter case there was an increase of the level of cost recovery by 20%. A method of assessment of financial costs towards full cost recovery in Slovenia is the monitoring of water services and the annual reporting of the public water supply service and the municipal wastewater collection and treatment companies to the Ministry of environment and spatial planning.

The same assessment survey (Background paper No 6, 2013) identified that the utilities only recover operation and maintenance costs through tariffs. With water tariffs controlled by the central government until January 2013, water utilities struggled to generate adequate revenues to cover their costs. According to the national legislation on water tariff setting, local government units can partially subsidize the water price using their municipal budget, although this option is not often used. Based on the above, the water tariffs are formulated based on a fixed fee and on variable fee and amount to an average residential tariff that includes water and wastewater, of €2.14/m^3, an operation and maintenance unit cost of 1.60 €/m^3, while the operating cost coverage, estimated as the billed revenue/operating expense is 0.97 (WBG & IAWD - Slovenia, 2015). According to the January 2013 decree, the water tariff comprises a fixed charge for service availability, which is set depending on the meter diameter, and a volume charge proportionate to water consumption. This tariff structure is uniform for all categories of water users (households, public institutions, industry). However, in specific cases, very large industries can directly negotiate water tariffs with the local public provider. The average water price is €0.98/m^3, including the fixed charge. The average sanitation price is €1.16/m^3, including the fixed charge. Water prices can vary depending on conditions under which the water is supplied in Slovenia's regions. Some areas benefit from abundant and qualitative water resources, which are supplied through a gravity conveyor system at very low production costs, whereas in other regions (especially karstic ones), water must be transported over long distances, with notable pumping costs and high potable treatment costs.

The assessment survey for Sava (Background paper No 6, 2013) identified complex ways through which the aggregation of revenue and formulation of water prices for the different uses are estimated, in Croatia, with the participation of water companies, local, regional and central authorities. Water pricing differs according to use (domestic and commercial) and includes operation and maintenance costs; capital costs, external environmental cost and water resource costs, as well as the cost of provided services, are not included. Overall the domestic sector is subsidized by the commercial sector, fact that means higher water price for commercial buildings.

70% of services providers in Croatia recover their operational costs from tariffs, and there is no national operational subsidy scheme in place (except for specific cases, such as small islands without local water supply). Significant cross-subsidies between residential and industry tariffs exist, with industrial tariffs reaching up to 50% above residential tariffs (Figure 9.4.6.). Water tariffs are amounting to an average residential tariff that includes water and wastewater, of €1.80/m^3, an operation and maintenance unit cost of €1.43/m^3 and an operating cost coverage, estimated as the billed revenue/operating expense is 0.97 (WBG & IAWD - Croatia, 2015). Tariffs have increased and are expected to increase further in the near future provided the significant investments and subsequent operating costs linked to Croatia meeting the European environmental acquis. Average residential tariffs are higher than the regional average (WBG & IAWD - Croatia, 2015). Tariffs increased an average of 7.5% annually between 2005 and 2012, while average annual inflation was 3% (WB&DE, 2012). Tariffs are expected to continue increasing.

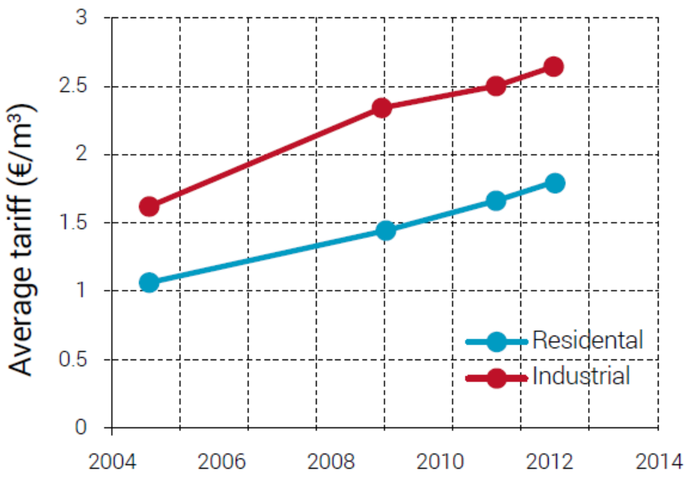


Figure 9.4.6. Evolution of average tariff in Croatia (*Source: WB&DE, 2012*)

In Serbia the Municipal Authorities, which are responsible for pricing, apply a unified component fee for domestic water supply and wastewater services based on volumetric pricing. The industrial fee is 2 to 3 times higher as a means to cross-subsidize the domestic sector, as a result the average household spends 1.3% of its net income on water and sanitation services, a small average for EU standards. Water prices are reformulated on an annual basis, fact that is particularly stressful for the industrial sector resulting in high share of outstanding bills. It is estimated that the drinking water supply (treatment and distribution) as well as the sanitation sector are depreciated, resulting in depreciation of 78% and 22% respectively. If the needs for annual re-investment are taken into consideration great lack of resources is identified, with re-investment requirement reaching up to 40-50%; the rest to be financed through tariffs and mainly through subsidies or bank loans (the biggest part).

The above mentioned low price of drinking water and wastewater (€0.48 per m^3, or 1.2% of the average household budget), the operation and maintenance unit cost is 0.42€/m^3 and the operating cost coverage (billed revenue/operating expense) is 0.95, resulting on barely covering the operation and maintenance costs. As a result, there is cross-financing from other sectors, some utilities have significant losses (WBG & IAWD - Serbia, 2015), approval of costs passes from the municipalities to the central government to ensure that the tariffs do not exceed the official target rate for annual inflation. The later measure makes it more difficult for municipalities to recover the water service cost, and may place an additional burden on central and local government finances. Tariffs and fines for wastewater discharge above authorized limits are very low compared to treatment facility costs, and sanctions for noncompliance are not enforced. Thus, there are no adequate incentives for the industrial and domestic sectors to comply with existing regulations. Average residential tariffs are lower than the regional average, although they have increased on average by 12% annually between 2004 and 2012 (Figure 9.4.7), while inflation reached an annual average of 10% during the same period. Tariffs are expected to continue to increase, given the significant investments and subsequent operating costs linked with Serbia meeting the EU environmental acquis.

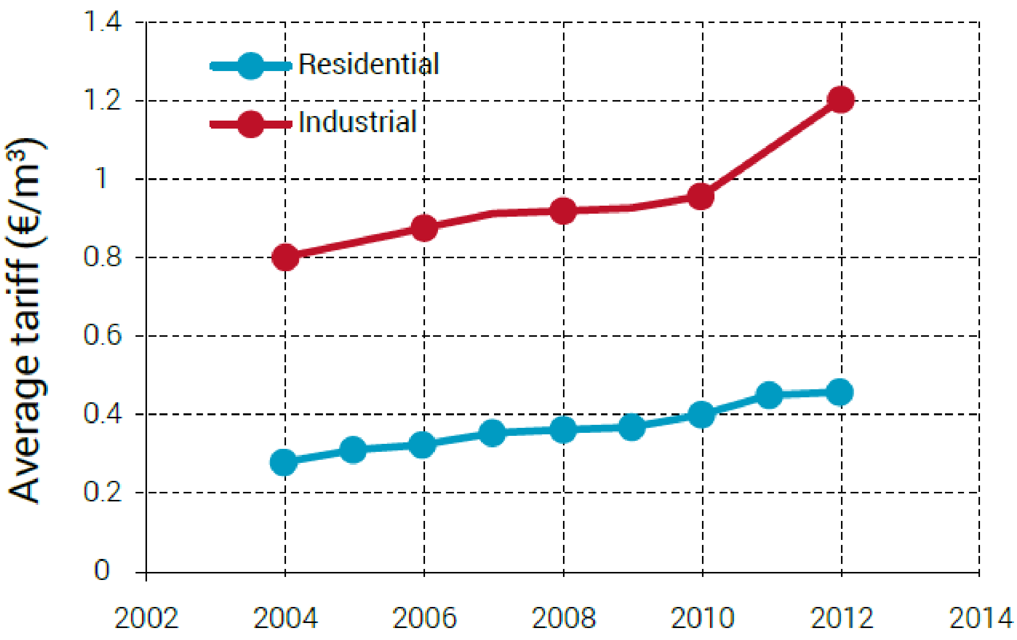


Figure 9.4.7. Evolution of average tariff in Serbia (Source: WBG & IAWD - Serbia, 2015)

The RBMPs for Sava detail several measures in order to achieve sustainable water management. Nevertheless no data are provided, neither identified in the supplementary materials in order to perform a detailed quantitative assessment of the measures and a thorough cost-effectiveness and derogation analysis.

In the Slovenian RBMP (2011, 2016) are included several basic and supplementary measures. Nevertheless no indication is provided on whether the programme of measures has been coordinated with other Member States or with third countries. However, there is indication in other documents that the PoM has been coordinated during regular meetings of the bilateral commissions with neighbouring Member States and third countries. There is also an indication of international co-ordination of the Joint Programme of Measures (JPM) for the Danube River Basin District Management Plan. The JPM represents more than a joint list of national measures, since the effects of national measures on the Danube basin-wide scale is also estimated and presented.

The scope of the application of the measures varies a lot and depends on a specific measure. The RBMP specifies the relevant authorities and other stakeholders responsible for the implementation of measures. Costs of measures have been identified for different types of measures (€2376 million for the period 2010 – 2015 period), while the cost for supplementary measures is identified at €40.8 million (valid for the 2011-2015 period). The budget for basic measures is provided from the State Water Fund and other state budgets, from municipalities' budgets, EU Cohesion and Structural funds. Around 20% of the budget will have to be provided from individual sources (for individual waste water treatment plants). The budget for supplementary measures is provided from the State Water Fund and other State budgets (74%), the rest are the resources from the water rights owners. The RBMP clearly states that the Ministry for Environment and Spatial Planning will obtain some more resources from Climate Change Fund and some other EU sources to reduce the Ministry's share. Economic analysis was not prepared for all identified water services and data availability put limitations on our economic analysis.

Financial costs (operating and maintenance costs, investment costs, administrative costs) and subsidies are included into cost recovery calculation. Cross-subsidies are not permitted in Slovenia. Price differentiation for services within the provision of public services is prohibited by national legislation. Environmental and resource costs are not estimated but they are partially internalised through payments of water pollution levies. Those payments are included in water services, which are grouped into 5 sectors: agriculture, industry, energy, public services (households), and other activities. Some activities that affect the status of waters and cause natural resource costs of water and environmental costs are still not contributing to the payment of these costs (e.g. diffuse sources of pollution from agriculture). The polluter pays principle is reported, but its full implementation is not in place as there is no adequate contribution of all water uses to cost recovery of water services and environmental and resource costs haven't been assessed. However national legislation includes the cost recovery principle and an environmental tax is applied.

It is mentioned that none of the selling prices cover whole production price, so contribution to cost recovery is lower than 100%. At the same time Slovenian authorities confirm the use of subsidies for water providers, but no justification in respect of the application of flexibility provisions and provisions of Article 9.4 is provided. The Slovenian authorities claim that the water pricing policy gives incentives for efficient water use. The RBMP also states that water pricing policy provides incentives for efficient use of water resources. However, it is not reflected in the RBMPs, where no information is provided concerning implementation of, for example, metering, volumetric charging or efficiency promoting tariffs.

Overall the RBMP does not provide any information on cost effectiveness analysis undertaken during the development of the programme of measures, neither adequate data are provided so as to complete the assessment. In the light of data limitations, no analysis can be completed neither robust conclusions can be put forward. In any case the assessment of achieving full cost recovery in Slovenia indicated that prices have to increase considerably to account for the full costs of water use. In socio-economic terms this might trigger significant affordability and competitiveness pressures on water users (particularly with regards to households and agriculture).

In the case of Croatia and Serbia the RBMPs do not provide information on the implementation of economic measures or on the extent of incentive water pricing policy across sectors. Neither do they provide details on whether current policies provide adequate incentives for users to use water resource efficiently. The RBMPs provide initial information on cost recovery for municipal water supply and wastewater treatment for households and enterprises. The results are, however, incomplete due to challenges related to collection of information from the municipal water service providers.

The information that we have been able to retrieve regards only the investment costs for water supply and wastewater for Serbia and Slovenia. Slovenia has reported an investment cost of 1.1 billion Euro for the period 2010-2015 for wastewater collection and treatment and for water supply. Nevertheless, it is not reported how this investment is financed. Also this cost is for the entire Danube region and therefore no cost-benefit assessment can be made at the level or the Sava river basin. The same applies for the reported investment costs for Serbia which amount to 1.8 billion and 900 million Euro targeting demand and supply of water respectively. Total figures are not significant when cosnidering allocation among different users and services and the investment costs can be beared nevertheless lack of information on how these costs are allocated does not allow for affordability analysis.

4. Final remarks

The sustainable management of water necessitates efficient market prices that incorporate the full costs and benefits from water use. The social survey and choice experiment developed for the understanding of the value people put on water ecosystems indicated that indeed agent appreciate the services and goods provided by the rivers. Nevertheless, the statistical significance of the findings indicated that more research should be done into the direction of establishing a robust estimation on the willingness to pay for water related ecosystem services. Under a related interpretation the findings might indicate affordability issues in the selected case studies. Efforts were made in order to assess these affordability issues in the selected case studies through the analysis of cost recovery in each case and the cost –benefit and cost-effectiveness assessment of the socio-economic measures for achieving full cost recovery. The efforts had to overcome significant data limitations and non-clear description of the measures included in the RBMPs of the selected case studies. This lack of information and quantitative data limits the cost-benefit insights but also indicates the areas where policy efforts and recommendations need to put focus on. Indicative recommendations include:

- Demand for greater transparency and detailed information on the measures and the investments planned by the member states in order to achieve the goals of the WFD
- Detailed analysis and breakdown of the cost estimations including analysis of administration and management costs, operation costs and discount rates
- Setting of a harmonised cost-benefit and cost-effectiveness assessment methodology across member states that enables comparability and transferability of results and policy implications after considering case-specific particularities

5. Integration with other WPs

The work reporded here interacts with WP10 and feeds the policy analysis in WP12

6. References

Ayer, H. W., and P. G. Hoyt (1981), Crop-water production functions: Economic implications for Arizona, Agric. Exp. Stn. Tech. Bull. 242, Coll. of Agric., Univ. of Ariz., Tucson.

Ayer, H. W., M. B. Lynham, P. G. Hoyt, and T. S. Longley (1983a), Cropwater production functions: Economic implications for potatoes and dry beans grown in Idaho, Econ. Res. Staff Rep. AGES-830302, U.S. Dep. of Agric., Washington, D. C.

Ayer, H. W., J. Prentzel, P. G. Hoyt, and D. Miller (1983b), Crop-water production functions and economic implications for Washington, Econ. Res. Staff Rep. AGES-830314, U.S. Dep. of Agric., Washington, D. C.

Ahmad, J., B. Goldar and S. Misra, "Value of Arsenic-Free Drinking Water to Rural Households in Bangladesh", Journal of Environmental Management 74, 173-185, 2005

Basili, M, M. Di Matteo and S. Ferrini, "Analysing Demand for Environmental Quality: A Willingness to Pay/Accept Study in the Province of Siena (Italy)", Waste Management (Article in Press), 2005.

Bateman, I.J., Cole, M., Cooper, P., Georgiou, S., Hadley, D. and G.L. Poe, "On Visible Choice Sets and Scope Sensitivity", Journal of Environmental Economics and Management, 47, 71-93 , 2004.

Brouwer, R. and I.J. Bateman, "Temporal Stability and Transferability of Models of Willingness to Pay for Flood Control and Wetland Conservation", Water Resources Research vol. 41, no.3, W03017 , 2005.

Day, B. and S. Mourato, "Valuing River Water Quality in China," in the Valuing the Environment in Developing Countries: Case Studies, edited by David Pearce, Corin Pearce, and Charles Palmer, Cheltenham, UK and Northampton, MA, USA: Edward Elgar , 2002 .

Defra (2015). Assessing affordability of measures to meet Water Framework Directive requirements in England. Defra

Farber, S. and B. Griner, "Valuing Watershed Quality Improvements Using Conjoint Analysis", Ecological Economics 34, 63-76 , 2000.

Forster, Bruce A., "Economic Impact of Acid Deposition in the Canadian Aquatic Sector" in Acid Deposition, edited by D.F. Adams and W.W. Page., New York: Plenum Publishers, 1985

Georgiou, S. I. Bateman, M. Cole, and D. Hadley, "Contingent Ranking and Valuation of River Water Quality Improvements: Testing for Scope, Sensitivity, Ordering and Distance Decay Effects", CSERGE Working Paper GEC 2000-18, UK Economic and Social Research Centre , 2000.

Green, C., S. Tunstall, M. Herring and J. Sawyer, "Customer preference and willingness to pay for selected water and sewerage services", Report to the Office for Water Services , 1993.

Green, C.H. and S.M. Tunstall, "The Evaluation of River Quality Improvements by the Contingent Valuation Method", Applied Economics 23, 1135-1146. , 1991.

Groom, B., Koundouri, P., Panipoulou, K., and T., Pantelides, 2007. Discounting the Distant Future: How much does model selection affect the certainty equivalent rate? Journal of Applied Econometrics, 22:641-656.

Frank, M. D., and B. R. Beattie (1979), The economic value of irrigation water in the western United States: An application of ridge regression, Tech. Rep. 99, Tex. Water Resour. Inst., Tex. A&M Univ., College Station.

Hanley, N., "The Economics of Nitrate Pollution in the UK", Hanley, N.D. Farming and the Countryside: An Economic Analysis of External Costs and Benefits, CAB, Oxford. , 1991.

Hexem, R. W., and E. O. Heady (1978), Water Production Functions for Irrigated Agriculture, Iowa State Univ. Press, Ames

Hoyt, P. G. (1982), Crop-water production functions and economic implications for the Texas High Plains region, Econ. Res. Serv. Staff Rep. AGES-820405, U.S. Dep. of Agric., Washington, D. C.

Hoyt, P. G. (1984), Crop-water production functions: Economic implications for Colorado, Econ. Res. Serv. Staff Rep. AGES-840427, U.S. Dep.of Agric., Washington, D. C

Jordan, J.L., and A.H. Elnagheeb, "Willingness to Pay for Improvements in Drinking Water Quality.", Water Resources Research 29, no. 2, 237-245. , 1993

Koundouri, P., Pashardes, P., Swanson, T., and Xepapadeas, A., 2003. “Economics of Water Management in Developing Countries: Problems, Principles and Policies”. Edward-Elgar Publishing, Cheltenham, U.K. ISBN: 184376122X

Koundouri P. ed, 2009, The Use of Economic Valuation in Environmental Policy: Providing Research Support for the Implementation of EU Water Policy under AquaStressRoutledge, Taylor and Francis Group, 2009

Koundouri P. ed., 2008, Coping with Water Deficiency: From Research to Policy Making, Springer Publishing, 2008.

Koundouri P. ed., 2010, Water Resources Allocation: Policy and Socioeconomic Issues in Cyprus, Springer Publishing, 2010

Kelley, S., and H. Ayer (1982), Water conservation alternatives for California agriculture: A microeconomic analysis, Econ. Res. Serv. Staff Rep. AGES-820417, U.S. Dep. of Agric., Washington, D. C.

Lindhjem, H., "Willingness to Pay for Improved Water Quality of Steinsfjorden - Betalingsvillighet for en bedret vannkvalitet i Steinsfjorden", The University of Oslo (UiO) , 1998.

Miliadou, D., "The Economic Valuation of Wetlands", Master of Science thesis in Ecological Economics, University of Edinburgh , 1997.

Mitchell, R.C and R.T. Carson, "Willingness to Pay for National Freshwater Quality Improvements.", Resources for the Future, Washington, D.C. 1984. , 1984.

Moore, M. and Negri, D. (1992) A multicrop production model of irrigated agriculture, applied to water allocation policy of the bureau of reclamation, Journal of Agricultural and Resource Economics, 17, 29–43.

Moore, C. V., J. H. Snyder, and P. Sun (1974), Effects of Colorado River water quality and supply on irrigated agriculture, Water Resour. Res.,10(2), 137–144.

Nieswiadomy, M. (1985), The demand for irrigation water in the High Plains of Texas, 1957– 80, Am. J. Agric. Econ., 67(3), 619– 626.

Ogg, C. W., and N. R. Gollehon (1989), Western irrigation response to pumping costs: A water demand analysis using climatic regions, Water Resour. Res., 25(5), 767– 773.

Ofwat (2011a): Ofwat's response to the Hills Fuel Poverty Review call for evidence. Available at http://www.ofwat.gov.uk/publications/ofwatsubmissions/res_ofw201107hillfuelpoverty.pdf

Ofwat (2011b): Affordability and debt 2009-10 - Supporting information. Available at http://www.ofwat.gov.uk/future/customers/metering/affordability/pap_tec201105affsup.pdf

Ozdemiroglu, E., J. Newcombe, S. Mourato, G. Atkinson and Y. deGaris, "The Value of a Tidier Thames: WTP to Reduce Sewage Overflows", Applied Environmental Economics Conference, The Royal Society , 2004.

Poe, G.L., and R.C. Bishop, "Measuring the Benefits of Groundwater Protection from Agricultural Contamination: Results from a Two-Stage Contingent Valuation Study", University of Wisconsin-Madison Agricultural Economics Staff Paper No. 341, 1992.

Scheierling, S. M., J. B. Loomis, and R. A. Young (2006), Irrigation water demand: A meta-analysis of price elasticities, *Water Resources. 4.*

7. Appendix

Social Survey for Sava – Slovenia; Applied in English

Part A: General Attitudes and Activities

1. **How would you describe today the general environmental condition in the Sava area?**

- ☐ Very Good
- ☐ Good
- ☐ Moderate
- ☐ Bad
- ☐ Very Bad

2. **Do you ever visit Sava River?**

- ☐ Yes
- ☐ No

3. **If yes, how many times per year?**

   ----

4. **Which activities do you undertake when visiting Sava River?**

Part B: Valuation Scenario

Please read the definitions below and select one of the options (A, B, No change) provided in the next tables. The price represents the cost over and above the household's current water bill (annual payment, infinite) that needs to be made so as to finance the preferred option. Your choices, along with those of others will be used to inform the development of policies by government agencies. As a result, please chose carefully as your preferred choices might result in the actual implementation of a described policy (only one can be implemented) and thus absorb part of your household income as per the suggested price. Each choice should be made independently from previous choices. The amount of money you are asked to pay does not add up.

Water quality: refers to biological and physio-chemical conditions. The following definitions are used in the table.

- Poor: not suitable for drinking, fishing, swimming or boating
- Moderate: Suitable for boating and fishing, not for swimming or drinking
- Good: suitable for boating, fishing and swimming, not for drinking
- High: Suitable for boating, fishing, swimming, and drinking

Flood regulation and soil erosion is a measure of vulnerability to erosion and flooding as percentage of areas and economic activity affected. The following definitions are used in the table.

- Poor: High occurrence of flooding and erosion (51% or more of population/economic activity affected)

- Moderate: Moderate occurrence of flooding and erosion (26-50% of population/economic activity being vulnerable to erosion and flooding)
- Good: Low occurrence of flooding and erosion (11-24% of population/economic activity being vulnerable to erosion and flooding)
- High: Very low occurrence of flooding and erosion (0-10% of population/economic activity being vulnerable to erosion and flooding)

Recreational activities measure of the number of recreational activities that can be undertaken on site. The following definitions are used in the table.

- Poor: Less than two of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating
- Moderate: At least two of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating
- Good: At least three of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating
- High: At least four of the following activities: walking, biking, swimming, fishing, bird watching, barbecuing, boating

Biodiversity measures the number of plant and animal species that can be found in and around the river. The following definitions are used in the table.

- Poor: 25% of the maximum potential number of plant and animal species that can inhabit the area is actually present
- Moderate: 50% of the maximum potential number of plant and animal species that can inhabit the area is actually present
- Good: 75% of the maximum potential number of plant and animal species that can inhabit the area is actually present
- High: 100% of the maximum potential number of plant and animal species that can inhabit the area is actually present

Block 1

	Option A	Option B	No change
Water quality	high	poor	good
Flood regulation and soil erosion	poor	high	good
Recreation	good	high	high
Biodiversity	moderate	good	high
Price	50	25	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	good	high	good
Flood regulation and soil erosion	high	poor	good
Recreation	poor	moderate	high
Biodiversity	moderate	poor	high
Price	10	10	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	high	good	good
Flood regulation and soil erosion	poor	high	good
Recreation	poor	moderate	high
Biodiversity	high	poor	high
Price	25	75	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	high	good	good
Flood regulation and soil erosion	high	high	good
Recreation	moderate	good	high
Biodiversity	moderate	poor	high
Price	10	25	
Which option would you prefer? (circle one)	A	B	Neither A or B

Block 2

	Option A	Option B	No change
Water quality	poor	high	good
Flood regulation and soil erosion	high	poor	good
Recreation	good	good	high
Biodiversity	moderate	good	high
Price	10	10	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	poor	high	good
Flood regulation and soil erosion	high	good	good
Recreation	moderate	poor	high
Biodiversity	high	poor	high
Price	10	10	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	high	high	good
Flood regulation and soil erosion	moderate	good	good
Recreation	high	moderate	high
Biodiversity	good	high	high
Price	75	75	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	high	high	good
Flood regulation and soil erosion	high	good	good
Recreation	high	good	high
Biodiversity	high	good	high
Price	75	50	
Which option would you prefer? (circle one)	A	B	Neither A or B

Block 3

	Option A	**Option B**	**No change**
Water quality	high	high	good
Flood regulation and soil erosion	good	high	good
Recreation	good	high	high
Biodiversity	moderate	poor	high
Price	50	25	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	**Option B**	**No change**
Water quality	high	moderate	good
Flood regulation and soil erosion	high	high	good
Recreation	good	moderate	high
Biodiversity	high	poor	high
Price	25	10	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	**Option B**	**No change**
Water quality	good	moderate	good
Flood regulation and soil erosion	high	high	good
Recreation	moderate	good	high
Biodiversity	good	high	high
Price	25	25	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	**Option B**	**No change**
Water quality	good	moderate	good
Flood regulation and soil erosion	high	high	good
Recreation	high	high	high
Biodiversity	high	moderate	high
Price	75	50	
Which option would you prefer? (circle one)	A	B	Neither A or B

Block 4

	Option A	Option B	No change
Water quality	moderate	high	good
Flood regulation and soil erosion	high	moderate	good
Recreation	moderate	good	high
Biodiversity	moderate	poor	high
Price	50	10	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	high	moderate	good
Flood regulation and soil erosion	moderate	high	good
Recreation	moderate	poor	high
Biodiversity	moderate	good	high
Price	10	10	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	high	high	good
Flood regulation and soil erosion	moderate	poor	good
Recreation	poor	high	high
Biodiversity	high	moderate	high
Price	10	50	
Which option would you prefer? (circle one)	A	B	Neither A or B

	Option A	Option B	No change
Water quality	high	good	good
Flood regulation and soil erosion	moderate	high	good
Recreation	high	moderate	high
Biodiversity	good	poor	high
Price	25	75	
Which option would you prefer? (circle one)	A	B	Neither A or B

Part C: Socioeconomic characteristics

5. **Gender**
- ☐ Male
- ☐ Female

6. **Age**

----

7. **Number of Household members**

----

8. **Number of Children**

----

9. **Educational level**
- ☐ Without a school degree
- ☐ Primary School
- ☐ High School
- ☐ University
- ☐ Post-graduate
- ☐ Other, please specify:

----

10. **Occupation**
- ☐ Full-time employed
- ☐ Part-time employed
- ☐ Student
- ☐ Retired
- ☐ Unemployed
- ☐ Other

11. **Your occupation is related to :**
- ☐ Agricultural sector
- ☐ Industrial sector
- ☐ Energy production
- ☐ Tourism
- ☐ None of the above

12. **Do you have a residence in the Sava area?**
- ☐ Yes
- ☐ No

13. If yes, what describes it best?

- ☐ Main residence
- ☐ Second residence

14. If yes is this owned or rented?

- ☐ Owned
- ☐ Rented

15. Monthly household income after tax

- ☐ Less than € 300
- ☐ € 301-500
- ☐ € 501-700
- ☐ € 701-900
- ☐ € 901-1200
- ☐ € 1201-1500
- ☐ € 1501-1700
- ☐ € 1701-2000
- ☐ Above € 2000
- ☐ Don't know

16. Town of Residence

----

17. Are you a member of an environmental organization?

- ☐ Yes
- ☐ No

Social Survey Sava-Croatia; Applied in Croatian

Dio A: Opći stavovi i aktivnosti

1. **Kako biste opisali današnje opće stanje okoliša na području Savskog sliva?**
- ☐ Vrlo dobro
- ☐ Dobro
- ☐ Osrednje
- ☐ Loše
- ☐ Vrlo loše

2. **Da li ste ikada posjetili rijeku Savu**
- ☐ Da
- ☐ Ne

3. **Ako da, koliko puta godišnje?**

 ----

4. **Kojim aktivnostima se bavite prilikom posjete rijeci Savi?**

Dio B: Vrednovanje Scenarija

Molimo pročitajte definicije u nastavku i odaberite jednu od opcija (A, B, Nema promjene) koja je navedena u sljedećim tablicama. Cijena predstavlja opciju (scenarij) da li bi eventualno bili spremni godišnje izdvojiti nešto više za račun za vodnu naknadu kućanstva za implementaciju željene opcije. Molimo da pažljivo napravite izbor jer bi ovi rezultati mogli biti baza za izradu novih planova upravljanja. Postoji nekoliko opcija (scenarija). Izbor svake naredne opcije treba biti neovisan od izbora u prethodnim opcijama. Ukoliko bi bili spremni izdvojiti nešto novca za vodnu naknadu u jednoj opciji i u nekoj narednoj opciji, samo jedan iznos će biti relevantan, odnosno iznosi se neće zbrajati.

Kvaliteta vode: odnosi se na fizikalno-kemijska I biološka svojstva vode. Sljedeće definicije su upotrijebljene u tablici.

- Loša: voda nije pogodna za piće, ribolov, kupanje ili vožnju čamcem
- Srednja: voda je pogodna za vožnju čamcem i ribolov, ali ne za kupanje ili piće
- Dobra: voda je pogodna za vožnju čamcem, ribolov i plivanje, ali nije pogodna za piće
- Visoka: voda je pogodna za vožnju čamcem, ribolov, plivanje i piće

Regulacija vodotoka i erozija tla su mjerilo ranjivosti na eroziju i poplavu te su izraženi kao postotak pogođenog područja odnosno da li utječu na ekonomske aktivnosti pogođenog područja. Sljedeće definicije su upotrijebljene u tablici.

- Loša: Visoka pojavnost poplava i erozije (utječe na više od 51% populacije/ekonomskih aktivnosti)
- Srednja: Srednja pojavnost poplava i erozije (utječe na 26-50% populacije / odnosno ekonomskih aktivnosti koje su postale ranjive ukoliko dođe do pojave poplava ili erozije)

- Dobra: Niska pojavnost poplava i erozije (utječe na 11-24% populacije / odnosno ekonomskih aktivnosti koje su postale ranjive ukoliko dođe do pojave poplava ili erozije)
- Visoka: Vrlo niska pojavnost poplava i erozije (utječe na 0-10% populacije / odnosno ekonomskih aktivnosti koje su postale ranjive ukoliko dođe do pojave poplava ili erozije)

Rekreacijske aktivnosti mjere broj rekreativnih aktivnosti koje se mogu poduzeti na licu mjesta.Sljedeće definicije su upotrijebljene u tablici.

- Loša: Manje od dvije aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem
- Srednja: Najmanje dvije aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem
- Dobra: Najmanje tri aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem
- Visoka: Najmanje četiri aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem

Biološka raznolikost mjeri broj biljnih i životinjskih vrsta koje se mogu naći u rijeci i oko rijeke. Sljedeće definicije su upotrijebljene u tablici.

- Loša: 25% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan
- Srednja: 50% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan
- Dobra: 75% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan
- Visoka: 100% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan

Blok 1

	Opcija A	Opcija B	Nema promjene
Kvaliteta vode	dobra	loša	dobra
Regulacija poplava i erozija tla	visoka	srednja	dobra
Rekreacija	loša	srednja	dobra
Biološka raznolikost	visoka	visoka	dobra
Cijena	10€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Option A	Opcija B	Nema promjene
Kvaliteta vode	loša	visoka	dobra
Regulacija poplava i erozija tla	dobra	visoka	dobra
Rekreacija	visoka	dobra	dobra
Biološka raznolikost	dobra	srednja	dobra
Cijena	10€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	Nema promjene
Kvaliteta vode	visoka	srednja	dobra
Regulacija poplava i erozija tla	visoka	loša	dobra
Rekreacija	visoka	dobra	dobra
Biološka raznolikost	dobra	visoka	dobra
Cijena	25€/godine	50€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	Nema promjene
Kvaliteta vode	visoka	srednja	dobra
Regulacija poplava i erozija tla	loša	visoka	dobra
Rekreacija	loša	visoka	dobra

Biološka raznolikost	srednja	dobra	dobra
Cijena	10€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Blok 2

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	visoka	visoka	dobra
Regulacija poplava i erozija tla	srednja	dobra	dobra
Rekreacija	dobra	loša	dobra
Biološka raznolikost	loša	srednja	dobra
Cijena	75€/godine	75€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	dobra	dobra	dobra
Regulacija poplava i erozija tla	srednja	dobra	dobra
Rekreacija	visoka	loša	dobra
Biološka raznolikost	loša	visoka	dobra
Cijena	50€/godine	75€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	srednja	loša	dobra
Regulacija poplava i erozija tla	loša	visoka	dobra
Rekreacija	visoka	srednja	dobra
Biološka raznolikost	dobra	srednja	dobra
Cijena	50€/godine	75€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**

Kvaliteta vode	visoka	loša	dobra
Regulacija poplava i erozija tla	loša	visoka	dobra
Rekreacija	srednja	dobra	dobra
Biološka raznolikost	srednja	loša	dobra
Cijena	50€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Blok 3

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	dobra	visoka	dobra
Regulacija poplava i erozija tla	visoka	loša	dobra
Rekreacija	srednja	srednja	dobra
Biološka raznolikost	visoka	loša	dobra
Cijena	75€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	srednja	srednja	dobra
Regulacija poplava i erozija tla	dobra	visoka	dobra
Rekreacija	visoka	loša	dobra
Biološka raznolikost	srednja	loša	dobra
Cijena	25€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	visoka	dobra	dobra
Regulacija poplava i erozija tla	dobra	visoka	dobra
Rekreacija	dobra	srednja	dobra
Biološka raznolikost	dobra	visoka	dobra
Cijena	75€/godine	25€/godine	0€/godine

Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	srednja	dobra	dobra
Regulacija poplava i erozija tla	srednja	loša	dobra
Rekreacija	dobra	visoka	dobra
Biološka raznolikost	visoka	loša	dobra
Cijena	10€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Blok 4

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	dobra	visoka	dobra
Regulacija poplava i erozija tla	visoka	loša	dobra
Rekreacija	srednja	srednja	dobra
Biološka raznolikost	visoka	loša	dobra
Cijena	75€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	srednja	srednja	dobra
Regulacija poplava i erozija tla	dobra	visoka	dobra
Rekreacija	visoka	loša	dobra
Biološka raznolikost	srednja	loša	dobra
Cijena	25€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	visoka	dobra	dobra
Regulacija poplava i erozija tla	dobra	visoka	dobra

Rekreacija	dobra	srednja	dobra
Biološka raznolikost	dobra	visoka	dobra
Cijena	75€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	**Opcija B**	**Nema promjene**
Kvaliteta vode	srednja	dobra	dobra
Regulacija poplava i erozija tla	srednja	loša	dobra
Rekreacija	dobra	visoka	dobra
Biološka raznolikost	visoka	loša	dobra
Cijena	10€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Dio C: Sociodemografske karakteristike

5. **Spol**

☐ Muški
☐ Ženski

6. **Dob**

----

7. **Broj članova kućanstva**

----

8. **Broj djece u vašem kućanstvu**

----

9. **Razina obrazovanja**

☐ Bez školske spreme
☐ Osnovna škola
☐ Srednja škola
☐ Fakultet
☐ Poslijediplomski studij
☐ Nešto drugo, molimo naznačite:

----

10. **Zaposlenje**

- Puno radno vrijeme
- Pola radnog vremena
- Student
- Umirovljenik
- Nezaposlen
- Nešto drugo

11. Zaposlenje se odnosi na:

- Sektor poljoprivrede
- Sektor industrije
- Sektor proizvodnje energije
- Zaposlenje u turizmu
- Ništa od navedenog

12. Da li živite u području sliva rijeke Save?

- Da
- Ne

13. Ako da, što najbolje opisuje vaše mjesto življenja?

- Mjesto prebivališta
- Mjesto povremenog boravišta

14. Ako da, da li živite u vlastitom stanu/kući ili iznajmljujete?

- Vlasništvo
- Iznajmljivanje

15. Mjesečna neto primanja vašeg kućanstva (izraženo u Eurima)

- Manje od € 300
- € 301-500
- € 501-700
- € 701-900
- € 901-1200
- € 1201-1500
- € 1501-1700
- € 1701-2000
- Više od € 2000
- Ne znam

16. Grad u kojem živite (molimo upišite)

----

17. Da li ste član organizacije koja se bavi zaštitom okoliša?

- Da

- Ne

Social Survey Sava-Serbia; Applied in Serbian

Dio A: Opći stavovi i aktivnosti

1. **Kako biste opisali današnje opće stanje okoliša na području Savskog sliva?**

- ☐ Vrlo dobro
- ☐ Dobro
- ☐ Osrednje
- ☐ Loše
- ☐ Vrlo loše

2. **Da li ste ikada posjetili rijeku Savu**

- ☐ Da
- ☐ Ne

3. **Ako da, koliko puta godišnje?**

   ----

4. **Kojim aktivnostima se bavite prilikom posjete rijeci Savi?**

Dio B: Vrednovanje Scenarija

Molimo pročitajte definicije u nastavku i odaberite jednu od opcija (A, B, Nema promjene) koja je navedena u sljedećim tablicama. Cijena predstavlja opciju (scenarij) da li bi eventualno bili spremni godišnje izdvojiti nešto više za račun za vodnu naknadu kućanstva za implementaciju željene opcije. Molimo da pažljivo napravite izbor jer bi ovi rezultati mogli biti baza za izradu novih planova upravljanja. Postoji nekoliko opcija (scenarija). Izbor svake naredne opcije treba biti neovisan od izbora u prethodnim opcijama. Ukoliko bi bili spremni izdvojiti nešto novca za vodnu naknadu u jednoj opciji i u nekoj narednoj opciji, samo jedan iznos će biti relevantan, odnosno iznosi se neće zbrajati.

Kvaliteta vode: odnosi se na fizikalno-kemijska I biološka svojstva vode. Sljedeće definicije su upotrijebljene u tablici.

- Loša: voda nije pogodna za piće, ribolov, kupanje ili vožnju čamcem
- Srednja: voda je pogodna za vožnju čamcem i ribolov, ali ne za kupanje ili piće
- Dobra: voda je pogodna za vožnju čamcem, ribolov i plivanje, ali nije pogodna za piće
- Visoka: voda je pogodna za vožnju čamcem, ribolov, plivanje i piće

Regulacija vodotoka i erozija tla su mjerilo ranjivosti na eroziju i poplavu te su izraženi kao postotak pogođenog područja odnosno da li utječu na ekonomske aktivnosti pogođenog područja. Sljedeće definicije su upotrijebljene u tablici.

- Loša: Visoka pojavnost poplava i erozije (utječe na više od 51% populacije/ekonomskih aktivnosti)
- Srednja: Srednja pojavnost poplava i erozije (utječe na 26-50% populacije / odnosno ekonomskih aktivnosti koje su postale ranjive ukoliko dođe do pojave poplava ili erozije)

- Dobra: Niska pojavnost poplava i erozije (utječe na 11-24% populacije / odnosno ekonomskih aktivnosti koje su postale ranjive ukoliko dođe do pojave poplava ili erozije)
- Visoka: Vrlo niska pojavnost poplava i erozije (utječe na 0-10% populacije / odnosno ekonomskih aktivnosti koje su postale ranjive ukoliko dođe do pojave poplava ili erozije)

Rekreacijske aktivnosti mjere broj rekreativnih aktivnosti koje se mogu poduzeti na licu mjesta.Sljedeće definicije su upotrijebljene u tablici.

- Loša: Manje od dvije aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem
- Srednja: Najmanje dvije aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem
- Dobra: Najmanje tri aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem
- Visoka: Najmanje četiri aktivnosti: šetnja, vožnja biciklom, plivanje, ribolov, promatranje ptica, priprema roštilja, vožnja čamcem

Biološka raznolikost mjeri broj biljnih i životinjskih vrsta koje se mogu naći u rijeci i oko rijeke. Sljedeće definicije su upotrijebljene u tablici.

- Loša: 25% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan
- Srednja: 50% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan
- Dobra: 75% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan
- Visoka: 100% od najvećeg mogućeg broja biljnih i životinjskih vrsta koje mogu nastaniti na tom području je zapravo prisutan

Blok 1

	Opcija A	Opcija B	No change
Kvaliteta vode	Dobra	Dobra	Srednja
Regulacija poplava i erozija tla	Srednja	Dobra	Dobra
Rekreacija	Srednja	Visoka	Srednja
Biološka raznolikost	Loša	Loša	Srednja
Cijena	10€/godine	75€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Loša	Visoka	Srednja
Regulacija poplava i erozija tla	Visoka	Srednja	Dobra
Rekreacija	Visoka	Srednja	Srednja
Biološka raznolikost	Loša	Visoka	Srednja
Cijena	75€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Dobra	Loša	Srednja
Regulacija poplava i erozija tla	Srednja	Visoka	Dobra
Rekreacija	Loša	Dobra	Srednja
Biološka raznolikost	Srednja	Loša	Srednja
Cijena	25€/godine	50€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Srednja	Srednja
Regulacija poplava i erozija tla	Loša	Srednja	Dobra
Rekreacija	Srednja	Visoka	Srednja
Biološka raznolikost	Dobra	Dobra	Srednja
Cijena	25€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Blok 2

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Visoka	Srednja
Regulacija poplava i erozija tla	Visoka	Dobra	Dobra
Rekreacija	Srednja	Dobra	Srednja
Biološka raznolikost	Visoka	Dobra	Srednja
Cijena	25€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Dobra	Srednja	Srednja
Regulacija poplava i erozija tla	Visoka	Visoka	Dobra
Rekreacija	Dobra	Loša	Srednja
Biološka raznolikost	Srednja	Visoka	Srednja
Cijena	50€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Loša	Srednja
Regulacija poplava i erozija tla	Loša	Visoka	Dobra
Rekreacija	Visoka	Srednja	Srednja
Biološka raznolikost	Visoka	good	Srednja
Cijena	25€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Loša	Srednja
Regulacija poplava i erozija tla	Srednja	Dobra	Dobra
Rekreacija	Srednja	Loša	Srednja
Biološka raznolikost	Visoka	Dobra	Srednja
Cijena	75€/godine	50€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Blok 3

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Loša	Srednja
Regulacija poplava i erozija tla	Visoka	Dobra	Dobra
Rekreacija	Dobra	Visoka	Srednja
Biološka raznolikost	Srednja	Visoka	Srednja
Cijena	10€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Dobra	Srednja
Regulacija poplava i erozija tla	Visoka	Loša	Dobra
Rekreacija	Visoka	Srednja	Srednja
Biološka raznolikost	Loša	Srednja	Srednja
Cijena	10€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Loša	Dobra	Srednja
Regulacija poplava i erozija tla	Loša	Visoka	Dobra
Rekreacija	Visoka	Loša	Srednja
Biološka raznolikost	Srednja	Srednja	Srednja
Cijena	10€/godine	50€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Srednja	Srednja	Srednja
Regulacija poplava i erozija tla	Loša	Visoka	Dobra
Rekreacija	Dobra	Srednja	Srednja
Biološka raznolikost	Visoka	Loša	Srednja
Cijena	10€/godine	75€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Blok 4

	Opcija A	Opcija B	No change
Kvaliteta vode	Srednja	Visoka	Srednja
Regulacija poplava i erozija tla	Loša	Dobra	Dobra
Rekreacija	Visoka	Visoka	Srednja
Biološka raznolikost	Loša	Srednja	Srednja
Cijena	50€/godine	75€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Dobra	Srednja
Regulacija poplava i erozija tla	Loša	Dobra	Dobra
Rekreacija	Loša	Dobra	Srednja
Biološka raznolikost	Loša	Visoka	Srednja
Cijena	10€/godine	10€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Visoka	Dobra	Srednja
Regulacija poplava i erozija tla	Visoka	Visoka	Dobra
Rekreacija	Loša	Visoka	Srednja
Biološka raznolikost	Visoka	Dobra	Srednja
Cijena	75€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

	Opcija A	Opcija B	No change
Kvaliteta vode	Dobra	Loša	Srednja
Regulacija poplava i erozija tla	Dobra	Srednja	Dobra
Rekreacija	Srednja	Dobra	Srednja
Biološka raznolikost	Dobra	Srednja	Srednja
Cijena	50€/godine	25€/godine	0€/godine
Koju opciju preferirate (molimo da zaokružite jednu)	A	B	Niti A niti B

Dio C: Sociodemografske karakteristike

5. **Spol**

☐ Muški
☐ Ženski

6. **Dob**

----

7. **Broj članova kućanstva**

----

8. **Broj djece u vašem kućanstvu**

----

9. **Razina obrazovanja**

☐ Bez školske spreme
☐ Osnovna škola
☐ Srednja škola
☐ Fakultet
☐ Poslijediplomski studij
☐ Nešto drugo, molimo naznačite:
----

10. **Zaposlenje**

☐ Puno radno vrijeme
☐ Pola radnog vremena
☐ Student
☐ Umirovljenik
☐ Nezaposlen
☐ Nešto drugo

11. **Zaposlenje se odnosi na:**

☐ Sektor poljoprivrede
☐ Sektor industrije
☐ Sektor proizvodnje energije
☐ Zaposlenje u turizmu
☐ Ništa od navedenog

12. **Da li živite u području sliva rijeke Save?**

☐ Da
☐ Ne

13. Ako da, što najbolje opisuje vaše mjesto življenja?

- ☐ Mjesto prebivališta
- ☐ Mjesto povremenog boravišta

14. Ako da, da li živite u vlastitom stanu/kući ili iznajmljujete?

- ☐ Vlasništvo
- ☐ Iznajmljivanje

15. Mjesečna neto primanja vašeg kućanstva (izraženo u Eurima)

- ☐ Manje od € 300
- ☐ € 301-500
- ☐ € 501-700
- ☐ € 701-900
- ☐ € 901-1200
- ☐ € 1201-1500
- ☐ € 1501-1700
- ☐ € 1701-2000
- ☐ Više od € 2000
- ☐ Ne znam

16. Grad u kojem živite (molimo upišite)

----

17. Da li ste član organizacije koja se bavi zaštitom okoliša?

- ☐ Da
- ☐ Ne

Social Survey Evrotas – Greece; Applied in Greek

Κοινωνική Έρευνα για τον ποταμό Ευρώτα

Μέρος Α: Γενικές στάσεις και δραστηριότητες

1. **Πως θα περιγράφατε σήμερα τη γενικότερη περιβαλλοντική κατάσταση του ποταμού Ευρώτα;**

- Πολύ καλή
- Καλή
- Μέτρια
- Κακή
- Πολύ κακή

2. **Επισκέπτεστε τον ποταμό Ευρώτα;**

- Ναι
- Όχι

3. **Αν ναι, πόσες φορές το χρόνο;**

----

4. **Αν ναι, τι δραστηριότητες κάνετε όταν επισκέπτεστε τον ποταμό Ευρώτα;**

Μέρος Β: Σενάριο Αξιολόγησης

Στους ακόλουθους πίνακες, οι επιλογές «Επιλογή Α» «Επιλογή Β», «Καμία αλλαγή από την παρούσα κατάσταση» αντιπροσωπεύουν διαφορετικούς συνδιασμούς της ποιότητας παροχών του οικοσυστήματος του ποταμού (π.χ. Ποιότητα νερού, Ρύθμιση πλημμυρών και μείωση της διάβρωσης του εδάφους, δραστηριότητες αναψυχής, βιοποικιλότητα). Κάθε επιλογή συνοδεύεται από μία τιμή στην τελευταία γραμμή του πίνακα. Η τιμή αυτή αντιπροσωπεύει την ετήσια δαπάνη σε Ευρώ την οποία προτίθεστε να πληρώσετε επιπλέον στον λογαριασμό ύδρευσης του νοικοκυριού σας, ώστε να λαμβάνετε τις παροχές οικοσυστήματος της επιλογής σας. Παρακαλείσθε να επιλέξετε ανάμεσα σε «Επιλογή Α» «Επιλογή Β», «Καμία αλλαγή από την παρούσα κατάσταση». Κάθε πίνακας είναι ανεξάρτητος και γι αυτό θα πρέπει να επιλέξετε ανεξάρτητα.

Επεξήγηση των όρων που χρησιμοποιούνται:

Ποιότητα νερού: αναφέρεται στην ποιότητα του νερού για τις ακόλουθες χρήσεις: πόση, ψάρεμα, κολύμπι ή βαρκάδα. Κυμαίνεται από Ελλιπής: Ακατάλληλο για κάθε χρήση εως Υψηλή: Κατάλληλο για όλες τις χρήσεις.

Ρύθμιση των πλημμυρών και μείωση της διάβρωσης του εδάφους αναφέρεται στον κίνδυνο έκθεσης σε πλημμύρα και στον κίνδυνο διάβρωσης του εδάφους για την τοπική κοινωνία και την οικονομική δραστηριότητα. Κυμαίνεται από Ελλιπής: επηρεάζεται πάνω από το 51% του πληθυσμού/οικονομικής δραστηριότητας έως Υψηλή: επηρεάζεται λιγότερο από το 10% του πληθυσμού/οικονομικής δραστηριότητας.

Δραστηριότητες αναψυχής: αναφέρεται στον αριθμό των αντίστοιχων δραστηριοτήτων που πραγματοποιούνται στην ύπαιθρο: πεζοπορία, ποδηλασία, κολύμβηση, ψάρεμα, παρακολούθηση πουλιών, μπάρμπεκιου, βαρκάδα. Κυμαίνεται από Ελλιπής: Λιγότερες από δύο από τις παραπάνω δραστηριότητες, έως Υψηλή: Τουλάχιστον τέσσερις από τις παραπάνω δραστηριότητες

Βιοποικιλότητα μετράει τον αριθμό των φυτικών και ζωικών ειδών που βρίσκονται μέσα και γύρω από τον ποταμό. Κυμαίνεται από Ελλιπής: 25% του μέγιστου δυνατού αριθμού φυτικών και ζωικών ειδών που θα μπορούσε να κατοικήσει στην περιοχή είναι στην πραγματικότητα παρόν έως Υψηλή: 100% του μέγιστου δυνατού αριθμού φυτικών και ζωικών ειδών που θα μπορούσε να κατοικήσει στην περιοχή είναι στην πραγματικότητα παρόν.

Παρακαλώ διαβάστε τους παρακάτω ορισμούς και διαλέξτε μία από τις επιλογές που δίνονται στους πίνακες που ακολουθούν. Η τελική τιμή αντιπροσωπεύει την απαιτούμενη δαπάνη πέραν του τρέχοντος λογαριασμού νερού του νοικοκυριού σας (ετήσια πληρωμή, επ' αόριστον), προκειμένου να χρηματοδοτηθεί η επιλογή της προτίμησής σας. Οι επιλογές σας θα χρησιμοποιηθούν στη διαμόρφωση πολιτικών από τις κρατικές υπηρεσίες. Γι αυτό, επιλέξτε προσεκτικά, καθώς η απάντησή σας μπορεί να καθορίσει την εφαρμογή της τελικής πολιτικής (μόνο μία μπορεί να εφαρμοστεί) και επομένως, να απορροφήσει μέρος του εισοδήματός σας, σύμφωνα με την προτεινόμενη δαπάνη. Κάθε επιλογή πρέπει να γίνεται ανεξάρτητα από τις προηγούμενες. Το χρηματικό ποσό που σας ζητείται να πληρώσετε, δεν αθροίζεται.

Ποιότητα νερού: αναφέρεται στις βιολογικές και φυσικο-χημικές συνθήκες. Στους αντίστοιχους πίνακες, χρησιμοποιούνται οι παρακάτω ορισμοί.

- Ελλιπής: Ακατάλληλο για πόση, ψάρεμα, κολύμπι ή βαρκάδα
- Μέτρια: Κατάλληλο για ψάρεμα και βαρκάδα, ακατάλληλο για πόση και κολύμπι
- Καλή: Κατάλληλο για ψάρεμα, βαρκάδα και κολύμπι, ακατάλληλο για πόση
- Υψηλή: Κατάλληλο για πόση, ψάρεμα, κολύμπι ή βαρκάδα

Η **ρύθμιση των πλημμυρών και της διάβρωσης του εδάφους** αποτελεί ένα αντίστοιχο μέτρο ευαισθησίας, εκφρασμένο ως ποσοστό (%) των περιοχών και των οικονομικών δραστηριοτήτων που επηρεάζονται από την διάβρωση και τις πλημμύρες. Στους αντίστοιχους πίνακες, χρησιμοποιούνται οι παρακάτω ορισμοί.

- Ελλιπής: Εκτεταμένα φαινόμενα πλημμυρών και διάβρωσης (επηρεάζεται πάνω από το 51% του πληθυσμού/οικονομικής δραστηριότητας)
- Μέτρια: Αρκετά φαινόμενα πλημμυρών και διάβρωσης (επηρεάζεται το 26-50% του πληθυσμού/οικονομικής δραστηριότητας)
- Καλή: Λίγα φαινόμενα πλημμυρών και διάβρωσης (επηρεάζεται το 11-24% του πληθυσμού/οικονομικής δραστηριότητας)
- Υψηλή: Ελάχιστα φαινόμενα πλημμυρών και διάβρωσης (επηρεάζεται το 0-10% του πληθυσμού/οικονομικής δραστηριότητας)

Οι **δραστηριότητες αναψυχής** εκφράζονται με τον αριθμό των αντίστοιχων δραστηριοτήτων που πραγματοποιούνται στην ύπαιθρο: πεζοπορία, ποδηλασία, κολύμβηση, ψάρεμα, παρακολούθηση πουλιών, μπάρμπεκιου, βαρκάδα. Στους πίνακες, χρησιμοποιούνται οι παρακάτω ορισμοί.

- Ελλιπής: Λιγότερες από δύο από τις παραπάνω δραστηριότητες
- Μέτρια: Τουλάχιστον δύο από τις παραπάνω δραστηριότητες
- Καλή: Τουλάχιστον τρεις από τις παραπάνω δραστηριότητες
- Υψηλή: Τουλάχιστον τέσσερις από τις παραπάνω δραστηριότητες

Η **βιοποικιλότητα** μετράει τον αριθμό των φυτικών και ζωικών ειδών που βρίσκονται μέσα και γύρω από τον ποταμό. Στους αντίστοιχους πίνακες, χρησιμοποιούνται οι παρακάτω ορισμοί.

- Ελλιπής: 25% του μέγιστου δυνατού αριθμού φυτικών και ζωικών ειδών που θα μπορούσε να κατοικήσει στην περιοχή είναι στην πραγματικότητα παρόν
- Μέτρια: 50% του μέγιστου δυνατού αριθμού φυτικών και ζωικών ειδών που θα μπορούσε να κατοικήσει στην περιοχή είναι στην πραγματικότητα παρόν
- Καλή: 75% του μέγιστου δυνατού αριθμού φυτικών και ζωικών ειδών που θα μπορούσε να κατοικήσει στην περιοχή είναι στην πραγματικότητα παρόν
- Υψηλή: 100% του μέγιστου δυνατού αριθμού φυτικών και ζωικών ειδών που θα μπορούσε να κατοικήσει στην περιοχή είναι στην πραγματικότητα παρόν

Γκρουπ 1

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	ελλιπής	καλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	υψηλή	καλή	μέτρια
Αναψυχή	ελλιπής	υψηλή	μέτρια
Βιοποικιλότητα	υψηλή	υψηλή	καλή
Τιμή	10€/έτος	10€/έτος	0€/έτος
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	καλή	υψηλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	μέτρια	ελλιπής	μέτρια
Αναψυχή	καλή	ελλιπής	μέτρια
Βιοποικιλότητα	ελλιπής	υψηλή	καλή
Τιμή	10	10	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	καλή	ελλιπής	μέτρια

Ρύθμιση πλημμυρών και διάβρωση εδάφους	ελλιπής	καλή	μέτρια
Αναψυχή	καλή	υψηλή	μέτρια
Βιοποικιλότητα	μέτρια	υψηλή	καλή
Τιμή	10	25	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	υψηλή	μέτρια	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	καλή	υψηλή	μέτρια
Αναψυχή	υψηλή	μέτρια	μέτρια
Βιοποικιλότητα	καλή	ελλιπής	καλή
Τιμή	75	50	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

Γκρουπ 2

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	μέτρια	υψηλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	υψηλή	καλή	μέτρια
Αναψυχή	καλή	μέτρια	μέτρια
Βιοποικιλότητα	υψηλή	μέτρια	καλή
Τιμή	50€/έτος	25€/έτος	0€/έτος
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	μέτρια	υψηλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	ελλιπής	υψηλή	μέτρια
Αναψυχή	μέτρια	καλή	μέτρια
Βιοποικιλότητα	υψηλή	καλή	καλή

Τιμή	25	10	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή A	**Επιλογή B**	**Καμία αλλαγή**
Ποιότητα νερού	μέτρια	υψηλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	ελλιπής	μέτρια	μέτρια
Αναψυχή	καλή	μέτρια	μέτρια
Βιοποικιλότητα	καλή	υψηλή	καλή
Τιμή	75	75	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή A	**Επιλογή B**	**Καμία αλλαγή**
Ποιότητα νερού	υψηλή	ελλιπής	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	μέτρια	υψηλή	μέτρια
Αναψυχή	ελλιπής	μέτρια	μέτρια
Βιοποικιλότητα	ελλιπής	μέτρια	καλή
Τιμή	10	50	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

Γκρουπ 3

	Επιλογή A	**Επιλογή B**	**Καμία αλλαγή**
Ποιότητα νερού	καλή	ελλιπής	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	ελλιπής	μέτρια	μέτρια
Αναψυχή	ελλιπής	υψηλή	μέτρια
Βιοποικιλότητα	καλή	μέτρια	καλή
Τιμή	50	25	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή A	**Επιλογή B**	**Καμία αλλαγή**
Ποιότητα νερού	μέτρια	υψηλή	μέτρια

Ρύθμιση πλημμυρών και διάβρωση εδάφους	υψηλή	μέτρια	μέτρια
Αναψυχή	υψηλή	ελλιπής	μέτρια
Βιοποικιλότητα	μέτρια	υψηλή	καλή
Τιμή	50	50	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή A	**Επιλογή B**	**Καμία αλλαγή**
Ποιότητα νερού	υψηλή	ελλιπής	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	υψηλή	καλή	μέτρια
Αναψυχή	καλή	μέτρια	μέτρια
Βιοποικιλότητα	υψηλή	ελλιπής	καλή
Τιμή	25	10	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή A	**Επιλογή B**	**Καμία αλλαγή**
Ποιότητα νερού	υψηλή	υψηλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	ελλιπής	μέτρια	μέτρια
Αναψυχή	υψηλή	καλή	μέτρια
Βιοποικιλότητα	ελλιπής	ελλιπής	καλή
Τιμή	10	75	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

Γκρουπ 4

	Επιλογή A	**Επιλογή B**	**Καμία αλλαγή**
Ποιότητα νερού	ελλιπής	μέτρια	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	ελλιπής	υψηλή	μέτρια
Αναψυχή	καλή	ελλιπής	μέτρια
Βιοποικιλότητα	μέτρια	μέτρια	καλή
Τιμή	25	25	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	A	B	Καμία

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	ελλιπής	μέτρια	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	ελλιπής	καλή	μέτρια
Αναψυχή	υψηλή	καλή	μέτρια
Βιοποικιλότητα	μέτρια	υψηλή	καλή
Τιμή	25	10	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	Α	Β	Καμία

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	υψηλή	καλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	υψηλή	υψηλή	μέτρια
Αναψυχή	μέτρια	μέτρια	μέτρια
Βιοποικιλότητα	υψηλή	υψηλή	καλή
Τιμή	75	10	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	Α	Β	Καμία

	Επιλογή Α	**Επιλογή Β**	**Καμία αλλαγή**
Ποιότητα νερού	καλή	υψηλή	μέτρια
Ρύθμιση πλημμυρών και διάβρωση εδάφους	καλή	ελλιπής	μέτρια
Αναψυχή	ελλιπής	υψηλή	μέτρια
Βιοποικιλότητα	καλή	υψηλή	καλή
Τιμή	10	75	
Ποια επιλογή προτιμάτε; (κυκλώστε μία)	Α	Β	Καμία

Μέρος Γ: Κοινωνικο-οικονομικά χαρακτηριστικά

5. **Φύλο**
   - ☐ Άνδρας
   - ☐ Γυναίκα

6. **Ηλικία**

   ----

7. **Αριθμός ατόμων στο νοικοκυριό**

----

8. Αριθμός παιδιών

----

9. Εκπαιδευτικό επίπεδο

- ☐ Καμία σχολική εκπαίδευση
- ☐ Πρωτοβάθμια εκπαίδευση
- ☐ Δευτεροβάθμια εκπαίδευση
- ☐ Πανεπιστημιακή εκπαίδευση
- ☐ Μεταπτυχιακό δίπλωμα
- ☐ Άλλο, παρακαλώ διευκρινίστε:

----

10. Επαγγελματική απασχόληση

- ☐ Πλήρης απασχόληση
- ☐ Μερική απασχόληση
- ☐ Φοιτητής
- ☐ Συνταξιούχος
- ☐ Άνεργος
- ☐ Άλλο

11. Η εργασία σας σχετίζεται με:

- ☐ Γεωργικό τομέα
- ☐ Βιομηχανικό τομέα
- ☐ Παραγωγή ενέργειας
- ☐ Τουρισμό
- ☐ Τίποτα από τα παραπάνω

12. Έχετε κάποια κατοικία στην περιοχή του Ευρώτα;

- ☐ Ναι
- ☐ Όχι

13. Αν ναι, πως θα την περιγράφατε;

- ☐ Πρώτη κατοικία
- ☐ Δεύτερη κατοικία

14. Αν ναι, σας ανήκει ή την ενοικιάζεται;

- ☐ Ιδιόκτητη
- ☐ Ενοίκιο

15. Διαθέσιμο μηνιαίο εισόδημα νοικοκυριού (μετά από φόρους)

- ☐ Λιγότερο από € 300
- ☐ € 301-500
- ☐ € 501-700
- ☐ € 701-900
- ☐ € 901-1200
- ☐ € 1201-1500

- € 1501-1700
- € 1701-2000
- Πάνω από € 2000
- Δεν γνωρίζω

16. Πόλη κατοικίας

----

17. Είστε μέλος κάποιας περιβαλλοντικής οργάνωσης;

- Ναι
- Όχι