



Republic of Turkey  
The Ministry of  
Forestry and Water  
Affairs

**T.R.**  
**MINISTRY OF FORESTRY AND WATER AFFAIRS**




**TAIEX / ECRAN**  
**Multi-Beneficiary Workshop**  
**Program of Measure under the WFD**

**Economic Analysis**


**Tirana- 20-22 June 2016**

Alev ADIGÜZEL  
Ministry of Forestry and Water Affairs  
TURKEY

1




Republic of Turkey  
The Ministry of  
Forestry and Water  
Affairs




**OUTLINE**

- Special Provision Studies
- River Basin Protection Action Plans
- Büyükmenderes Draft RBMP
- River Basin Management Plans

2



Republic of Turkey  
The Ministry of  
Environment, Urbanization  
and Climate Change



GENERAL DIRECTORATE OF REGIONAL WATER SUPPLY

## Special Provision Studies

3



Republic of Turkey  
The Ministry of  
Environment, Urbanization  
and Climate Change

## Special Provisions



GENERAL DIRECTORATE OF REGIONAL WATER SUPPLY

### SPECIAL PROVISION STUDIES IN TURKEY



**We are determining Special Provisions to protect Drinking Water Basins, 5 of them are completed and published.**



Republic of Turkey  
The Ministry of  
Environment, Urbanization  
and Climate Change



GENERAL DIRECTORATE OF REGIONAL WATER MANAGEMENT

## River Basin Protection Action Plans

5



Republic of Turkey  
The Ministry of  
Environment, Urbanization  
and Climate Change

## River Basin Protection Action Plans



GENERAL DIRECTORATE OF REGIONAL WATER MANAGEMENT



Basin Protection Action Plans are completed in 2013 for 25 river basin.





## River Basin Protection Action Plans



### Purpose

- Investigation of the;
  - water resources potential,
  - point and diffuse pollution sources
  - existing water quality
- Making of more economically viable, sustainable and efficient plans in the short, medium and long term

### Actions

- Analysis of the pressures and impacts, characterization of the existing status
- Listing the measures to achieve good water status
- Planning urban WWTPs, joint treatment possibilities, rehabilitation needs
- Scheduling the activities of all responsible institutions and agencies

7



## River Basin Protection Action Plans Activities



**Activity 1** Municipal waste water management - Construction of WWTPs

**Activity 2** Industrial waste water management

**Activity 3** Solid waste management

**Activity 4** Control of diffuse pollution from agriculture

**Activity 5** Afforestation and combating with soil erosion

**Activity 6** Sludge management

**Activity 7** Special Provisions to protect Drinking Water Basins

**Activity 8** Flood management

**Activity 9** Drought management

**Activity 10** Monitoring, inventory and Water Information System studies

**Activity 11** Water infrastructures

**Activity 12** Re-use of treated waste water

**Activity 13** Control of the effect of climate change to water sources

**Activity 14** Sectoral water allocation plans

**Activity 15** Solutions for the hot points



8



## River Basin Protection Action Plans Economic Analysis



### Tariffs


Existing tariffs legislation was reviewed and suggestions are made.

Existing tariffs legislation comprises procedures and principles regarding the determination of the full cost based tariffs related to the;


- Infrastructures for the collection, treatment and discharge of municipal and industrial waste water
- Operation, repair and maintenance of the waste water systems,
- Collection, transportation and recycling of domestic solid waste, construction, operation, closing and monitoring of disposal plants.

**Important criteria:** water supply, waste water and waste management tariffs can not exceed 2-3% of household income, matches with OECD criteria.

9



## River Basin Protection Action Plans Economic Analysis



### Cost Analysis of WWTPs

- Processes of WWTPs were determined and cost analysis and feasibilities were made.
- Cost analysis were made between 3 alternative scenarios and aimed to identify the most economic one.

Feasibilities are including:

- initial investment costs
- construction, equipment, electric, automation costs (yearly basis),
- wastewater treatment costs,
- operation costs,
- collector system costs,
- rehabilitation works

10



Republic of Turkey  
The Ministry of  
Environment, Urbanization and  
Climate

GENERAL DIRECTORATE OF REGIONAL  
WATER MANAGEMENT

## Draft Büyük Menderes River Basin Management Plan

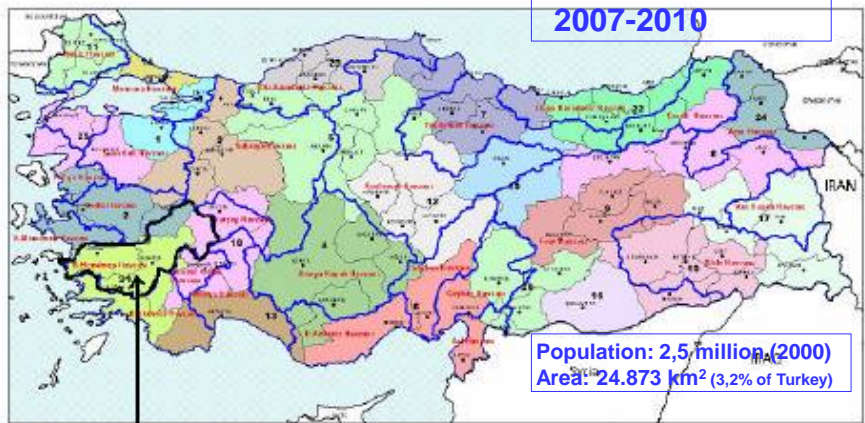
11

Republic of Turkey  
The Ministry of  
Environment, Urbanization and  
Climate

GENERAL DIRECTORATE OF REGIONAL  
WATER MANAGEMENT

## Draft Büyük Menderes River Basin Management Plan

**Twinning Project,  
2007-2010**



**Population: 2,5 million (2000)  
Area: 24.873 km<sup>2</sup> (3,2% of Turkey)**

Büyük Menderes river basin

12



Republic of Turkey  
The Ministry of  
Environment, Urbanization and Climate Change

**Draft Büyük Menderes River Basin  
Management Plan**

Because of the timeline and focus of the Project, this draft RBMP focused on the short-term deliverables for the WFD:

- Characterisation
- Significant pressures and impacts
- Economic analysis of water use

15

Republic of Turkey  
The Ministry of  
Environment, Urbanization and Climate Change

**Draft Büyük Menderes River Basin  
Management Plan**

Economic Analysis

Focus

- Water use
- Baseline scenario
- Cost recovery

Main challenges : lack of data  
(few, no, incomparable, limited data)

16





## Draft Büyük Menderes River Basin Management Plan




Overcome the challenges:


- Expert judgment
- Extrapolation
- Modelling
- Assumptions

data gap  
analysis

17



## Draft Büyük Menderes River Basin Management Plan







Water Consumptions - Municipalities

Resource of the abstracted water	Abstracted water quantity (million m <sup>3</sup> /year)	Treated water quantity (million m <sup>3</sup> /year)	Untreated water quantity (million m <sup>3</sup> /year)
1. Spring water	74,5	-	74,5
2. Lake	0,03	-	0,03
3. River	13,2	11,5	1,7
4. Dam	0,65	-	0,65
5. Groundwater	76,0	10,6	65,4
TOTAL	164,38	22,1	142,28

Water consumptions of the Municipalities which is supplied to industries and households (TURKSTAT, 2004)

18

<div>  <div> <b>Draft Büyük Menderes RBMP</b>  <b>Economic Importance of Water Use</b> </div>  </div>						
Water Use	Water Consumption	Pollution	Total production	Turn value	Employment	Number of beneficiaries
Industrial water	4,9 million m <sup>3</sup> /year (3% of Turkey)	4 million m <sup>3</sup> /year (8% of Turkey)	%26,6 of GDP		%22,4	
Tourism						
Agriculture			%13,8 of GDP		%39,7	
Domestic water use	242 million m <sup>3</sup> /year					
Energy use						
Commercial use						

<div>  <div> <b>Draft Büyük Menderes RBMP</b>  <b>Cost Recovery</b> </div>  </div>				
Water services	Payments of water users	Costs made by providers of water services	Cost recovery (%)	Cost recovery mechanism
1. Supply of surface water to agriculture (irrigation)	No fee for farmers with self service	Farmers (self service)	60	Revenues equal costs
	Farmers pay a fee to irrigation unions	1. Irrigation unions (operations & maintenance) + 2. Repayment of investment costs		Farmers pay yearly fee per hectare. 1. Fee consists of fee depending on crop per hectare 2. Fixed fee is not dependant on crop * (Fee not related to actual water use)
2. Supply of groundwater to agriculture (irrigation)	No fee for farmers with self service	1. Farmers (self service)	80	Revenues equal costs
	Farmers pay a fee to irrigation cooperative	1. Irrigation unions (operations & maintenance) + 2. Repayment of investment costs		Farmers pay yearly fee per hectare. 1. Fee consists of fee depending on crop per hectare 2. Fixed fee is not dependant on crop * (Fee not related to actual water use)
3. Supply of domestic and industrial water from surface waters and groundwater	Households and industries pay to municipality	DSI constructs dams, pipelines, treatment plants and water storage house. Municipality builds pipelines to houses.	between 50 and 100	Households and industries pay progressive fees.
4. Waste water collection and treatment for households and industries	Payments of households and industries for sewage system and treatment to municipalities	Municipalities cover the costs of sewage systems connected to treatment plants (Investments, and Operation and Maintenance)	40	Fee for connection to sewage system paid once. Sometimes fees are integrated with drinking water bills.
5. Waste water collection and treatment by industries (having own treatment facility or an OIZ treatment facility)	Factories (themselves or in an OIZ) treat their own waste water and discharge into the receiving environment, which is controlled by the ministry	Factories (themselves or in an OIZ)	45	Factories (themselves or OIZ) pay for the complete treatment according to By-Law on the Control of Water Pollution.
	Factories (themselves or in an OIZ) discharge to the municipal system after primary treatment	Factories (itself or in an OIZ) pays for part of treatment. Municipality covers costs of advanced treatment and municipal system		Factories (themselves or in an OIZ) pay for the additional treatment.



## Draft Büyük Menderes RBMP



### Measures

1. Removal of solid wastes
2. Removal of waste water
3. In-field improvement of agricultural services
4. Agricultural production planning-selection of most appropriate crop pattern
5. Use of pesticide/herbicide and fertilizer
6. Use of surface and ground water
7. Erosion and flood control
8. Geothermal waters
9. Coastal and transition waters
10. Pricing of water and wastewater
11. Educational and publication works
12. Institutional and legal arrangements - integrated water management

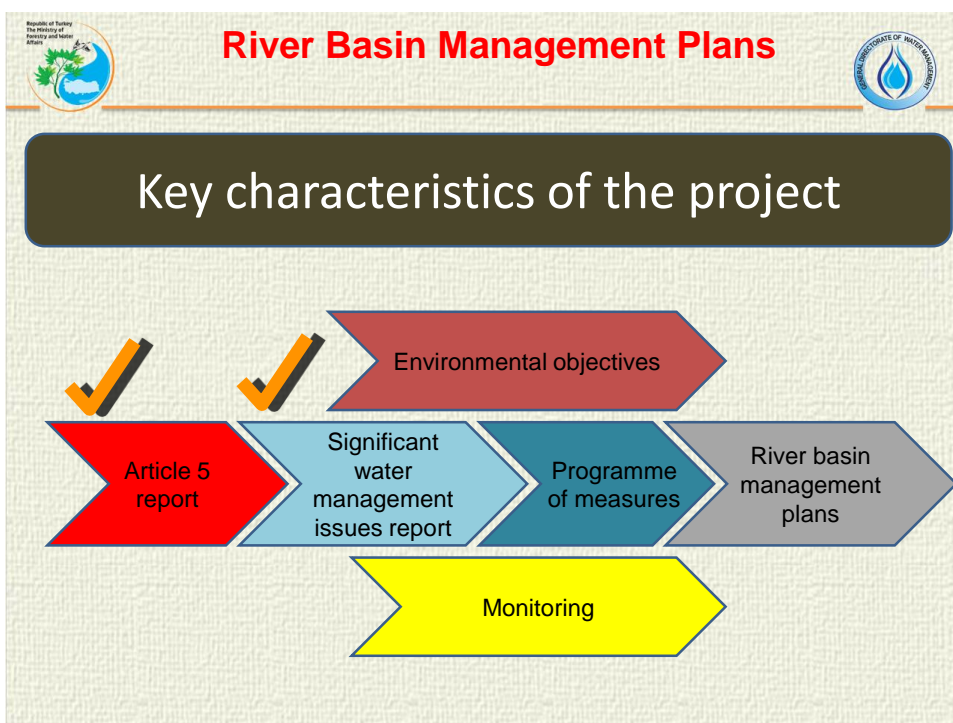
21




## RIBAMAP Project


22









## River Basin Management Plans Components





Component 1: Inception phase
Gap analysis between the plans
Actual state of the National Implementation plan for the Water Framework Directive
Establishment of working groups, appointment of river basin coordinators and trans boundary cooperation with Greece and Bulgaria
Kick-off meeting and awareness raising



## River Basin Management Plans Components



Component 2: Characterisation and significant water management issues
Characterisation report
Significant water management issues report
Public involvement
Training




## River Basin Management Plans Components

### Component 3: Monitoring

Status classification of all water bodies in:

1. Susurluk
2. Konya
3. Meriç-Ergene

Biological monitoring  
Chemical monitoring  
Hydro morphological monitoring



## River Basin Management Plans Components

### Component 4: Programme of measures and conversion of the River Basin Protection Action Plans into River Basin Management Plans

Objectives



Cost-effectiveness analysis of measures

Exemptions and derogations

Public involvement

Training and guidelines and manuals






## River Basin Management Plans Components

Component 5: Water Information Systems
Data Management System
GIS mapping
Decision Support system (Aquatool)
Training
Internships




## River Basin Management Plans Components

Component 6: Update of the National Implementation Plan for the WFD and Training Programmes
Update of the National Implementation Plan
Legal text for the transposition of the EU Acquis
Legal gap analysis
Training programs for the other 21 river basins




## River Basin Management Plans Economic Analysis




WFD Article 5 report –the so-called characterisation study, first step of the river basin management planning- regards the economic analysis. This economic characterisation study comprises three main task:

- 1) Valuation of the **importance of water for the socio-economic wealth** of the river basins.
- 2) Elaboration of the **baseline scenario**, i.e. trends in water use and analysis of its sustainability.
- 3) Assessment of current levels of **cost recovery**, therefore providing sufficient evidence to assess the compliance with the principles of efficient water use, cost recovery, polluters pay and adequate contribution of the users to the cost of the water services.



## River Basin Management Plans Economic Analysis




**Overview of the socio-economic importance of the water use and Baseline scenario (2012 - 2018 - 2024 - 2030) were completed for:**

1. Urban water use and demand projection
2. Agricultural and livestock water use and demand projection
3. Industrial water use and demand projection
4. Hydroelectric water use demand projection

**Provision of water services**

32



## River Basin Management Plans Economic Analysis



**The role of pricing and levels of cost-recovery**


In the analysis of cost recovery for water services, all services shall be considered, which is provided for households, public institutions or any economic activity: (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater, (b) waste-water collection and treatment facilities.

The role of pricing and levels of cost-recovery involve:


- An identification of water services structure, the entities providing water services, the public sector investors and the cost-recovery instruments;
- An estimation of the price/tariff currently paid by users and analysis of its structure;
- A study by water service (limited to water supply and sanitation) of the contribution of the significant water uses (at least industry, households and agriculture) to the costs of water services (including the financial, environmental and resource cost).

The level of cost recovery for water services must be calculated for a given year by dividing the annual income and the annualized cost of services.

33




## Water Services Framework in Turkey




Water service	Water uses	Providing Entity	Investing Entity	Cost Recovery Instrument
Water supply	Urban	DSI	DSI	Water users pay to the municipality according to the water consumed. DSI recovers the investment cost from the municipality
	Industry	DSI, OIZ, Industry itself	DSI, OIZ, Industry itself	Water users pay to the municipality according to the water consumed. If DSI is investment institutions, DSI recovers the investment cost from the Organized Industrial Zones or the industry itself.
	Irrigation	DSI	DSI	Water users pay to the municipality according to the water consumed. DSI recovers the investment cost from irrigation union as long-term.
Groundwater self-supply	Urban	Urban	Urban	The water users itself.
	Industry	Industry	Industry	Industry itself.
	Irrigation	Irrigation	Irrigation	Irrigation users itself.
Groundwater abstraction	Urban			
	Industry	DSI	DSI	Water users pay to the municipality according to the water consumed. If DSI is investment institutions, DSI recovers the investment cost from the Organized Industrial Zones or the industry itself.
	Irrigation	DSI	DSI	Water users pay to the municipality according to the water consumed. DSI recovers the investment cost from irrigation union as long-term.
Water distribution				
Groundwater distribution				
Sewage and wastewater treatment				

34





## River Basin Management Plans Cost Recovery of Water Services



**Costs assessment, general concepts**


The costs of water services consist of financial cost and non-financial cost (environmental and resource costs). It should be noted that at this stage of the planning process, only the financial cost shall be assessed.

Financial costs includes current costs (operation: costs incurred to keep an environmental facility running; and maintenance: costs for maintaining existing or new assets in good functioning order till the end of their useful life) and capital costs (cost of new investment expenditures for the provision of services).


For each type of infrastructure, capital costs are calculated on an annual basis as the aggregated Annual Equivalent Cost (AEC) of the investments made in the corresponding period of lifetime.

Environmental costs may be assessed as the capital costs (aggregated Annual Equivalent Cost) of the measures to be executed (in the year for which the analysis is performed), aimed at correcting an environmental status worse than the objective, when such a condition is due to a deterioration caused by the use of water and it is associated with a water service.

35




## River Basin Management Plans Economic Analysis




The subsequent step on the economic analysis for the implementation of the Directive is related to the Programme of Measures (WFD Article 11) and its economic and financial impact as an input for the justification of exemptions to the environmental objectives (WFD Article 4.4-4.7). This involves the following tasks:

- 1) Identifying potential measures for the draft Programme of Measures and assessing their costs
- 2) Cost-effectiveness analysis of the Programme of Measures: a tool aimed to identify measures technically possible to attain the environmental objectives at the lowest cost.
- 3) Identifying exemptions and derogations from the environmental objectives for specific water bodies.

36




## River Basin Management Plans Economic Analysis




### Resource Cost

The European Commission has stated that the assessment of resource cost is not mandatory, as there is a lack of consensus on the approach for its valuation.

- The WATECO Guide (Common Implementation Strategy (CIS) for the WFD) underlines that resource cost occurs only when the resource is used beyond its natural regenerative capacity, i.e., when there is a situation of overexploitation. It represents the **costs of foregone opportunities** which other uses suffer due to the depletion of the resource.
- The ECO2 Working Group points out that the resource cost only arises if alternative water use generates a higher economic value, namely, a situation of misallocation of water resources.



## River Basin Management Plans Economic Analysis



In the situation of misallocation, the way to assess the resource cost is the functioning of water markets and resulting water prices. However, water markets are not widely implemented in Turkey.

Another option is to assess the resource cost as the opportunity cost in a scenario of overexploited resources and reduction of water allocations. For Konya River Basin

This scenario of overexploited resources should be thought in terms of overexploitation of groundwater bodies, as well as of water stress situations in which environmental needs (ecological flow) are not satisfied.

The methodological approach for assessing the cost of the resource is the **marginal water product**, in a region / zone it is an observable indicator. When reducing water allocations (to confront a situation of overexploitation), the opportunity cost is equivalent to the foregone value of the activity that must end.

38





Republic of Turkey  
The Ministry of  
Environment, Urbanization  
and Climate Change

## PLANNED PROJECTS



REPUBLIC OF TURKEY  
MINISTRY OF ENVIRONMENT,  
URBANIZATION AND CLIMATE CHANGE

---

### Technical Assistance on Economic Analyses within River Basin Management Plans and Water Efficiency Aspects in 3 Pilot River Basins in Turkey

- Financing Contract with European Commission is signed under the IPA-2013 programme.
- Implementation period is 36 months and 4.500.000 Euro is reserved for this project.
- Yeşilirmak, Akarçay and Batı Akdeniz Basins will be the pilot working basins.
- Additionally it is planned to make quick scanning for Meriç-Ergene, Konya, Büyük Menderes, Susurluk Basins.
- ToR of the Project is at the stage of approval.



39



Republic of Turkey  
The Ministry of  
Environment, Urbanization  
and Climate Change

## PLANNED PROJECTS



REPUBLIC OF TURKEY  
MINISTRY OF ENVIRONMENT,  
URBANIZATION AND CLIMATE CHANGE



---

### With in the scope of the Project;

- Economical Analysis of RBMPs will be completed at EU standarts,
- Cost Recovery level covering the environmental costs and resource costs of water services at actual situation will be evaluated,
- Capacity regarding the economical principles and applications of economical tools for RBMPs will be improved,
- Program of Measures will be developed and capacity improvement actions on evaluation of costs and efficiencies will be operated,
- Technical studies on increasing the water efficiency will be done,
- Studies on reuse of wastewater in agricultural irrigation will be done,
- Studies on the management and removal of water loss and leakages in the drinking water supply systems will be done.

40





## PRIORITISATION OF MEASURES

- **Prioritisation of the Basins;**
  - according to the pollution and water quality status
- **Prioritisation of the Measures;**
  - according to the cost effectiveness

41

