

“Workshop “Program of Measure under the Water Framework Directive”

20 – 22 June 2016

ECRAN 62432

Economic analysis – Environmental and Resource cost, Affordability



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Structure of the presentation

- Economic evaluation
- Definitions
- Estimation of the environmental costs
- Financial analysis
- Financing of the services



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Economic valuation of water use

- 1) **Water is an economic good** - there is a temporal and spatially defined demand for water of a certain quantity and quality and water can be used in alternative ways, i.e. there is scarcity, the core of any economic analysis
- 2) Water as an economic good **has both an economic value and an opportunity cost**
- 3) **Environmental costs are distinguished separately from the resource costs**- important differences exist in terms of water quantity and water quality management issues
- 4) Environmental costs refer to all physical environmental damage costs related to the chemical and ecological status of a water body or river basin
- 5) Physical environmental damage is measured in practice as the **difference between the baseline state of a water body or river basin and its good ecological status** as defined in the WFD.



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Environmental and Resource Costs

Environmental costs: Costs of damage that water uses impose on the environment and ecosystems and those who use the environment (e.g. a reduction in the ecological quality of aquatic ecosystems; salinization and degradation of productive soils).

Resource costs: Costs of foregone opportunities which other uses suffer due to the depletion of the resource beyond its natural rate of recharge or recovery (e.g. linked to the over-abstraction of groundwater).



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Source: **WATECO glossary**
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Environmental cost: definitions

Environmental costs: **the total economic costs (welfare loss) of the physical environmental damage to a water system (water body or river basin)** as a result of the chemical and/or ecological state of the water system.

The physical environmental damage is measured through the difference between a water body or river basin's current and good chemical and/or ecological state.

The total economic costs include possible benefits foregone (opportunity costs), such as loss of the economic benefits derived from, for example, recreational opportunities or wildlife habitat and biodiversity conservation.

The environmental costs also include the (indirect) impacts of the physical environmental damage on various relevant water uses.

Not all costs are always clearly visible. For example, environmental and resource costs!!!



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Other definitions

Environmental costs represent the costs of damage that water uses impose on the environment and ecosystems and those who use the environment.

This loss in welfare may encompass lost production or consumption opportunities as well as non-use values (such as the value produced by contemplating a clean lake at dusk), which are harder to quantify.

Environmental costs generally fall under external costs (cf. WATECO-Guidance).

Damage: Physical deterioration or degradation of the physical environment or detrimental impact of human activities on the environment and those who use the environment.

Damage cost: Welfare loss associated with the deterioration or degradation of the physical environment.

The **monetary value of the damage** incurred to the environment and ecosystems as a result of water use, such as a reduction in the ecological quality of an aquatic ecosystem or the of agricultural land.



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Calculation of Environmental cost (1)

Environmental costs are estimated on the basis of the costs of the programme of measures to achieve good water status

Any assessment of environmental costs or benefits starts is based on EIA.

Requirements: information, knowledge, expertise.

Steps in the assessment of the environmental costs associated with water use:

- identify the significant pressure
- assess the impact of this pressure
- identify and, if possible, quantify the nature and extent of the damage involved, both on the water environment and other water users.

Damage – the difference between the reference situation and target level and the corresponding effect on the provision and quality of the goods and services involved (DPSIR).



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Calculation of Environmental cost (2)

The economic value of environmental costs or benefits is often referred to as **environmental values**.

It can be measured based on the **identification of the goods and services** (functions) impaired by the pressure involved (e.g. water used for drinking water production, irrigation, food processing, recreation, wildlife habitat etc.).

It can be estimated **using direct or indirect market and non-market based valuation techniques**.

Economic values are derived from existing market prices for inputs (production values) or outputs (consumption values)

Examples:

- the economic value of fish, which is sold on a fish market or
- the costs of replacing impaired environmental riparian functions such as nutrient retention.

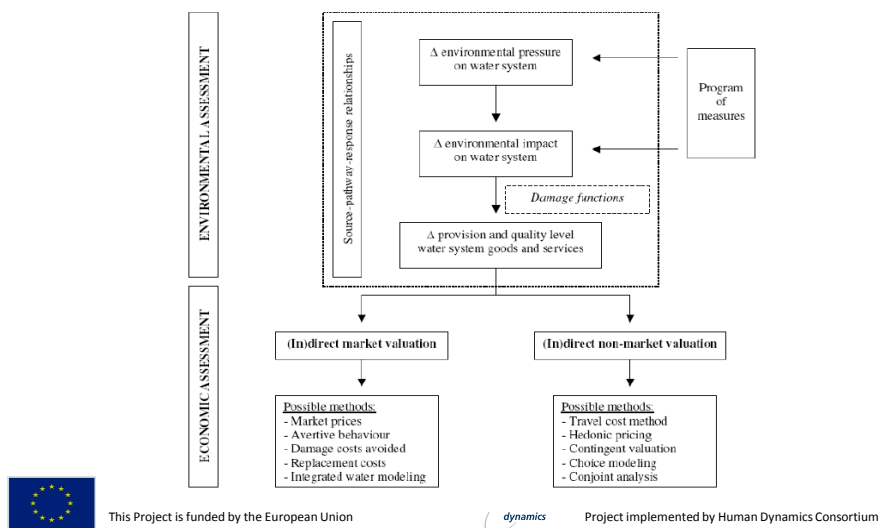


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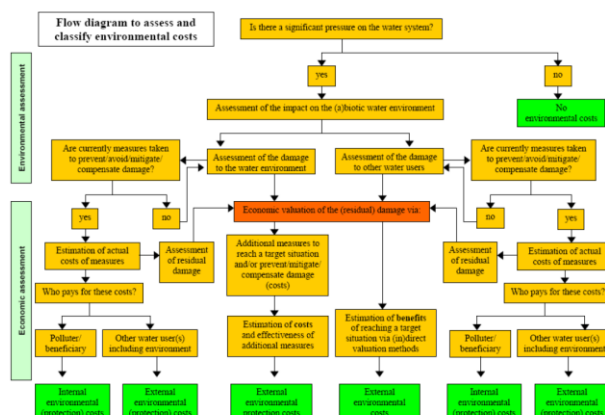


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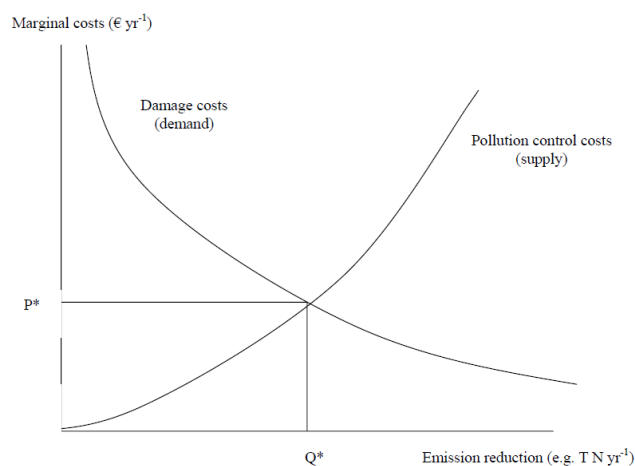
Economic valuation of environmental costs and benefits



Assessing Environmental cost



Basic economics of pollution control



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Overview of German water valuation studies

Study	Object	Methodology	Result (examples)
Holm-Müller (1991)	Environmental quality (e.g. drinking water, surface water)	Contingent valuation	Improvement of 1 quality class (€/household*a): 48 (surface water) 24 (drinking water)
Hampicke, Schäfer (1994)	Isar estuary floodplains	Market prices (timber), contingent valuation	500 to 650 €/ha*a
Jung (1996)	Environmental quality (e.g. drinking water)	Contingent valuation	
Schönabäck (1997)	Danube floodplains, national park	Travel costs, Contingent valuation	Value of national park (11.500 ha): 8,3 billion €
Waibel, Fleischer (1999)	Costs and benefits of agricultural pesticides	Market prices (drinking water), Contingent valuation (biodiversity)	Drinking water supply: 65,9 Mio € p.a. for Germany (51% of total external cost)
Mutlke (2001)	Quality of water bodies for recreation	Contingent valuation	Improvement of 1 class: 30 – 43 €, 2 classes: 34 – 53 € / household*a
Wronka (to be published)	Biodiversity, drinking water	Contingent valuation	Improvement of drinking water quality: 22 - 75 €/household*a
Meyerhoff, Dehnhardt (2002)	Elbe floodplains (biodiversity, nutrient retention)	Contingent valuation, market prices (nutrients)	Area of 10.000 to 15.000 ha: net present value 850 - 1.080 Mio € (details see below)

Source: German Ministry for the Environment



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Sustainability of financing system

- The system can be characterised as sustainable if it is able to:
 - To finance recurrent and capital costs;
 - To leverage other forms of financing.
- Tariff policies:
 - **Affordable** to all, including the poorest;
 - Ensuring the financial sustainability of service providers;
 - Provide appropriate incentives.
- Predictable public subsidies to facilitate investment (planning)



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Affordability

- There is no EU wide affordability level established
- It is not expected that EC will develop a methodology which would fit for all
- It is a political decision to establish the affordability
- Assessing affordability of water services is part of the wider assessment of disproportionate costs of the Programme of Measures
- At this stage for the countries in the region most important is affordability in household sector



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Making water affordable

- Water shall remain affordable even in case of realising ambitious investment programmes related to implementation of EU water sector requirements
- Affordability is addressed in different ways in different countries. This includes:
 - Social tariffs,
 - Disconnection ban on water companies,
 - Reduced VAT rates,
 - Progressive block tariffs,
 - Social Fund for Water,
 - Solidarity Fund in France, etc.



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Affordability and cost recovery

- Notion of sustainable cost recovery instead of full cost recovery
- In most of countries full cost recovery can be achieved only in the future
- Each new investment has to achieve at least sustainable cost recovery which includes first of all recovery of operational and maintenance costs
- Investment costs to the cost recovery mechanism shall be added **when affordability limits allow**



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Cost benefit analysis

- Main elements of the cost benefit analysis (CBA) to be developed for EU financed projects:
 - Presentation of the socio-economic context and definition of objectives
 - Identification of the project
 - Feasibility of the project with demand and option analysis
 - Financial analysis
 - Economic analysis
 - Sensitivity and risk assessment



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Financial analysis

- Focussed on financial analysis as the most important part for the cost recovery topic:
 - Financial profitability of the investment (NPV, IRR)
 - Determination of contribution from the Funds
 - Financial sustainability of the project
 - Aspects of loan financing
 - PPP and cost-recovery
 - **Impact of affordability level.**
- Where affordability is important aspect, requirement for minimum-cost recovery should enable covering at least the operating, maintenance and replacement costs



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Financing of water services

- 3 T model:
 - Tariffs - revenues from service users;
 - Taxes - national taxpayers' money provided for subsidies in water sector;
 - Transfers - foreign taxpayers' money – IPA and other assistance.
- Cost recovery system depends on volume and interaction of three T sources
- Stable financial system requires appropriate balanced mix of all sources



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CBA and affordability

- **Affordability levels** shall be established to guide cost recovery calculations
- It is important to focus on recovery of operational and maintenance costs before full cost recovery can be achieved (sustainable cost recovery versus full cost recovery)
- CBA assessment from the authorities side can be simplified by selecting most important parameters providing information regarding financial viability of the project.



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Highlights (1)

- It is important to focus on sustainable cost recovery ensuring operation of developed infrastructure in first phase of realisation of investment programmes
- Environment and resource costs shall be added later when affordability allows
- Cost recovery through tariffs has to be considered together with other potential sources of financing
- Mix of sources may allow to regulate cost recovery not exceeding affordability limits



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Highlights (2)

- Increase in water price because of cost recovery tariffs may be bigger incentive compared to artificially low tariffs combined with economic instruments to provide incentive for water savings
- Household affordability is important part of cost recovery system and shall be established at national level



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Thank you!



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