# Social Science Contributions to a sustainable, integrated and adaptive water resources management

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# Role and Task of Social Sciences in Water Management

1 Scientific Problem Definition

Society

Science

4 Science-Policy Interface

2 Society and Economy as (Social Science) Research Object

3 Application and Development of Social Science Methods

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# Focus here:
# **The Economics of Water Engineering Projects**

1. Water Economics: Dealing with Water Scarcity
2. Valuation and the Inclusion of Stakeholders
3. Choosing and Implementing Instruments: Getting the Prices Right

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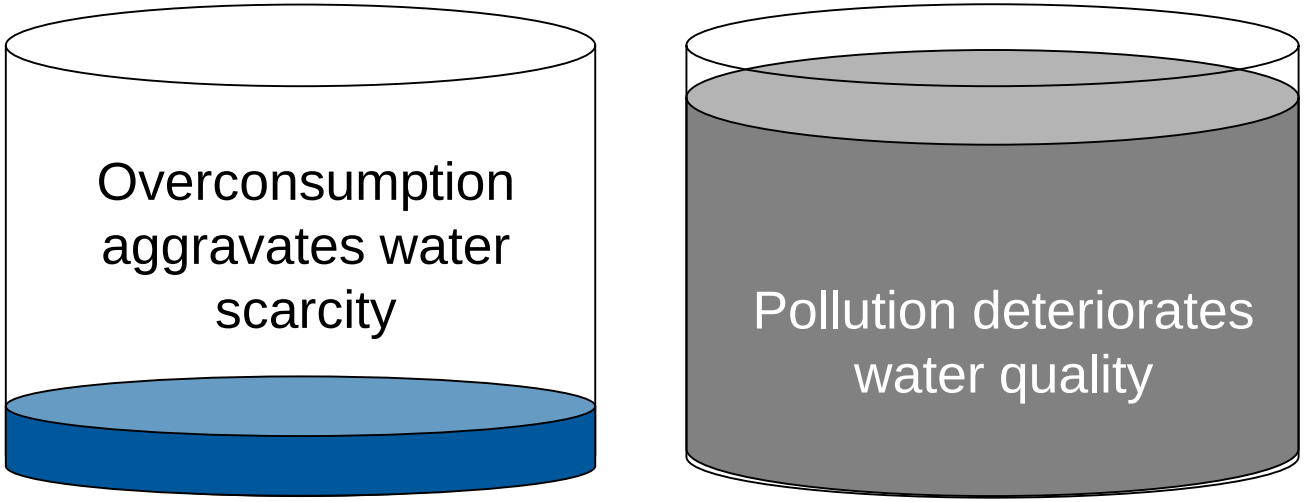
# MAJOR PROBLEMS RELATED TO WATER USE




- ➔ The economic perspective: Clean fresh water is a scarce resource !
- ➔ Scarcity is relative notion, i.e. we speak of scarcity if demand is higher than suppy

# WHY DO WE NEED ECONOMICS IN WATER MANAGEMENT?

- Economics is the science of managing scarcity
- Economics can explain why free price-driven markets fail and water-related problems occur
- Economics can contribute to the value of water
- Economics can show how management principles (prices) can be designed to meet different societal objectives and criteria

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# Economic Approach to Water-Related Projects

- **Demonstrating Water Value**:
  Make explicit the value(s) of water (sometimes in economic terms), to support decision making
- **Developing Decision Support Systems**
  Develop and improve decision-support tools and include stakeholder in decision making
- **Capturing Water Values**:
  Introduce mechanisms that incorporate values of water ecosystem services into decision making

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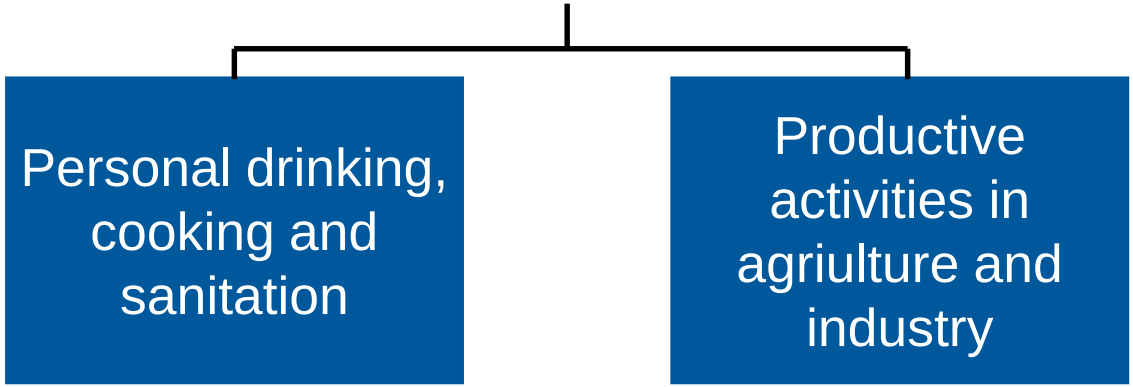
# BENEFITS OF WATER
## Commodity Benefits

Possible uses producing commodity benefits




Consumptive vs. non-consumptive uses

Young 2005, pp. 6-8

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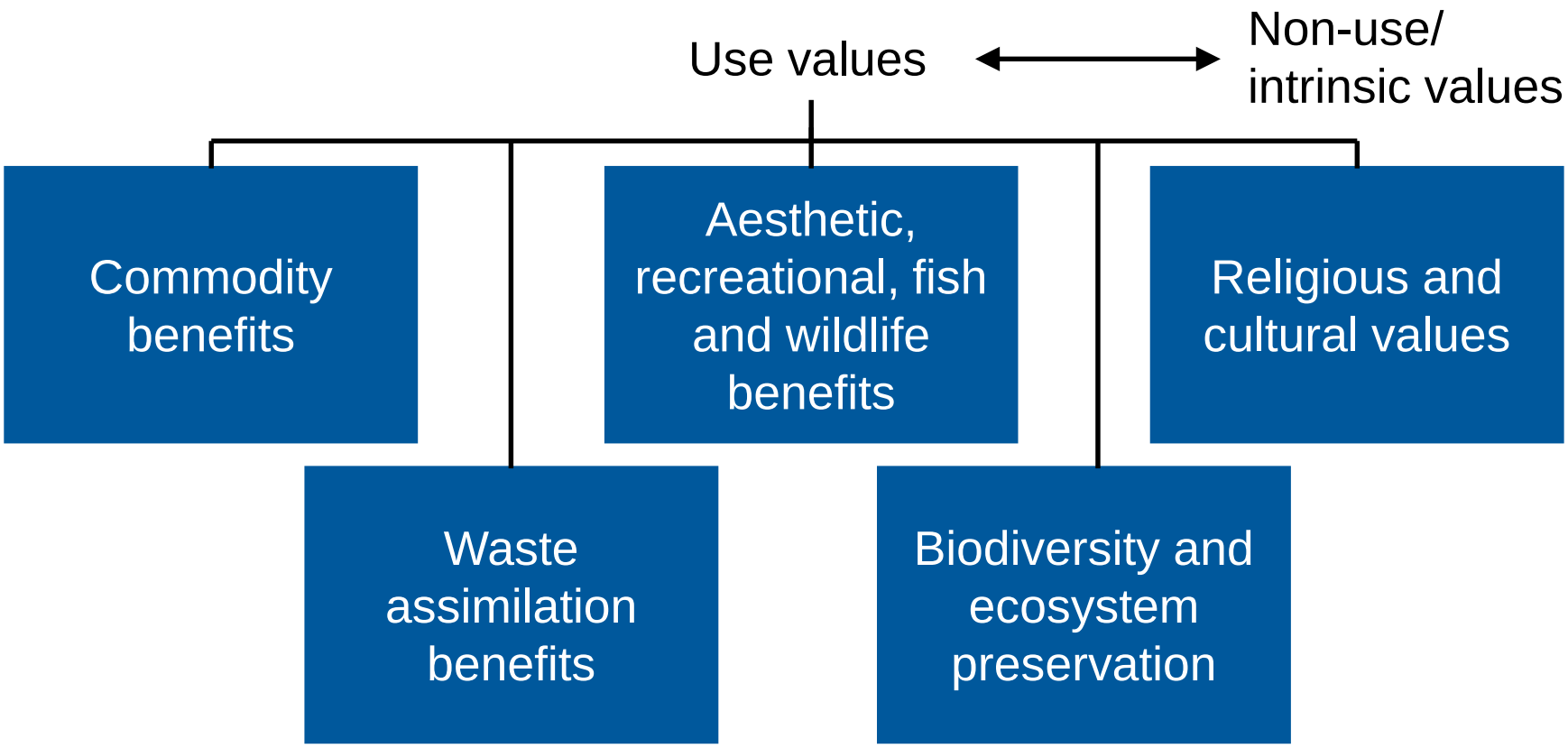
# BENEFITS OF WATER
## Further Possible Values of Different Uses




Young 2005, pp. 6-8

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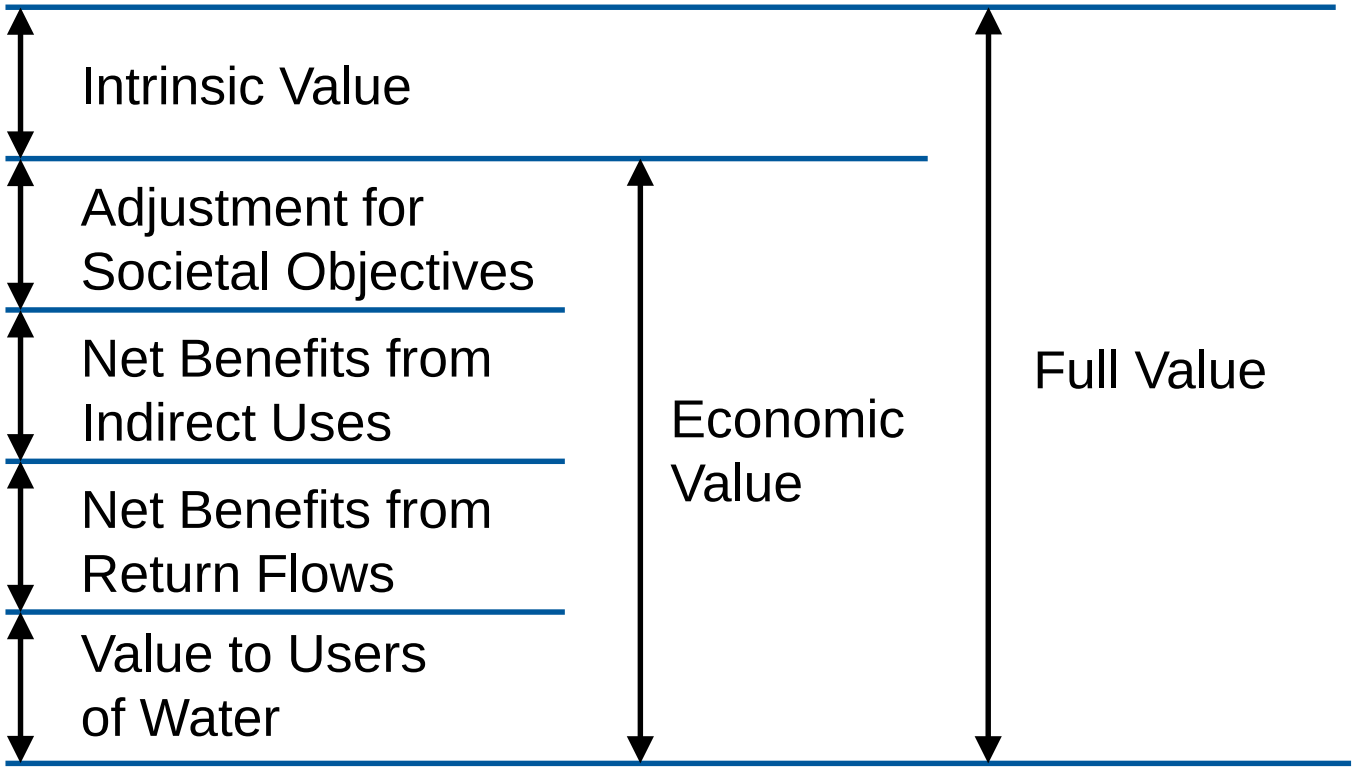
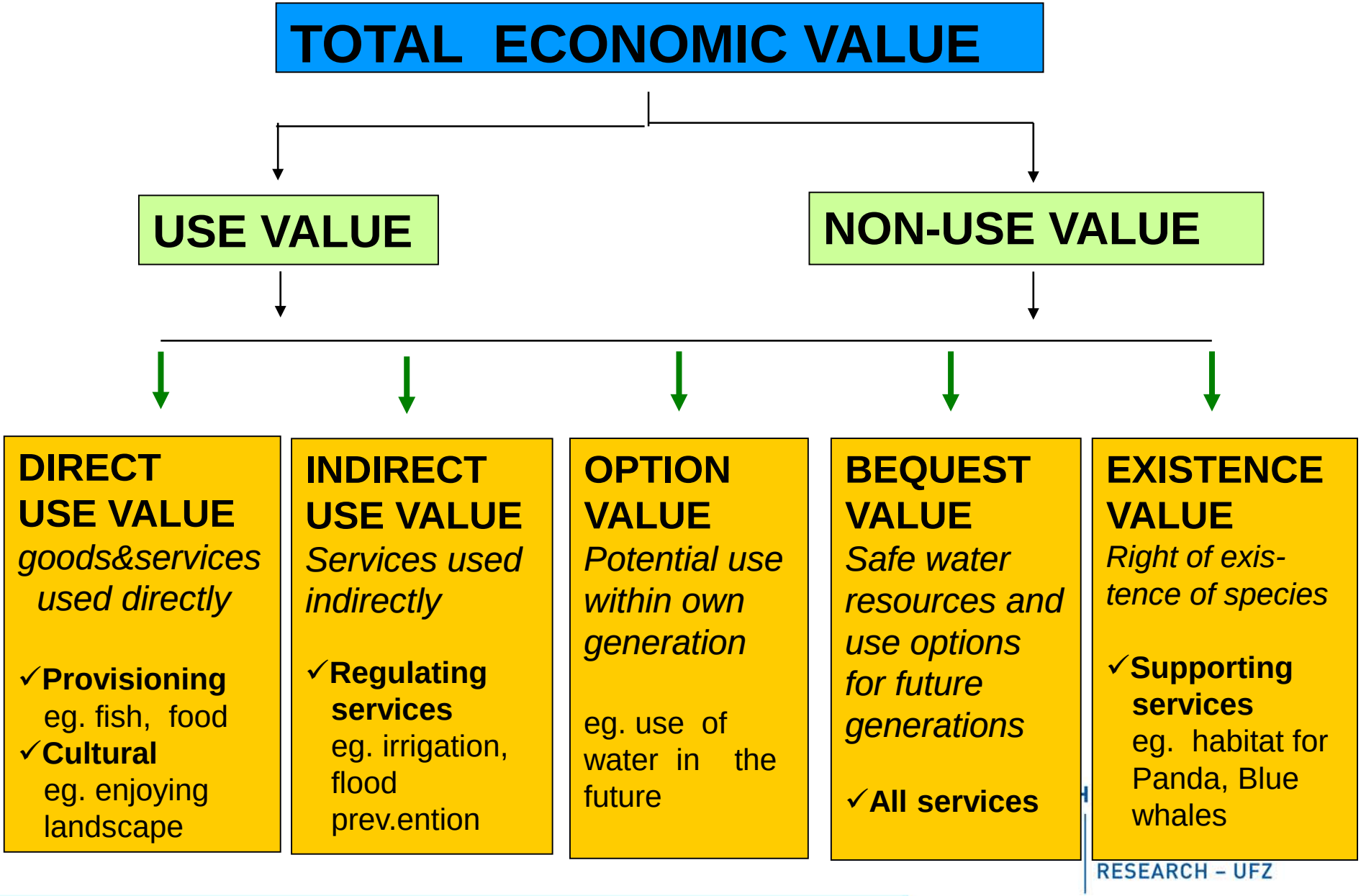
# BENEFITS OF WATER
## Full Value of a Single Use




Rogers et al. 1998, p. 12


TOTAL ECONOMIC VALUE
USE VALUE
NON-USE VALUE
DIRECT USE VALUE
goods&services used directly
✓Provisioning
eg. fish, food
✓Cultural
eg. enjoying landscape
INDIRECT USE VALUE
Services used indirectly
✓Regulating services
eg. irrigation, flood prev.ention
OPTION VALUE
Potential use within own generation
eg. use of water in the future
BEQUEST VALUE
Safe water resources and use options for future generations
✓All services
EXISTENCE VALUE
Right of exis-tence of species
✓Supporting services
eg. habitat for Panda, Blue whales

# Decision-support Tools and the Inclusion of Stakeholder

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# Valuation and Decision Support Tools

- Cost-Benefit-Analysis (CBA)
- Cost-Effectiveness-Analysis (CEA)
- Multi-Criteria-Analysis (MCA)

**Very often there is no or insufficient consideration of stakeholder interests in decision support tools**

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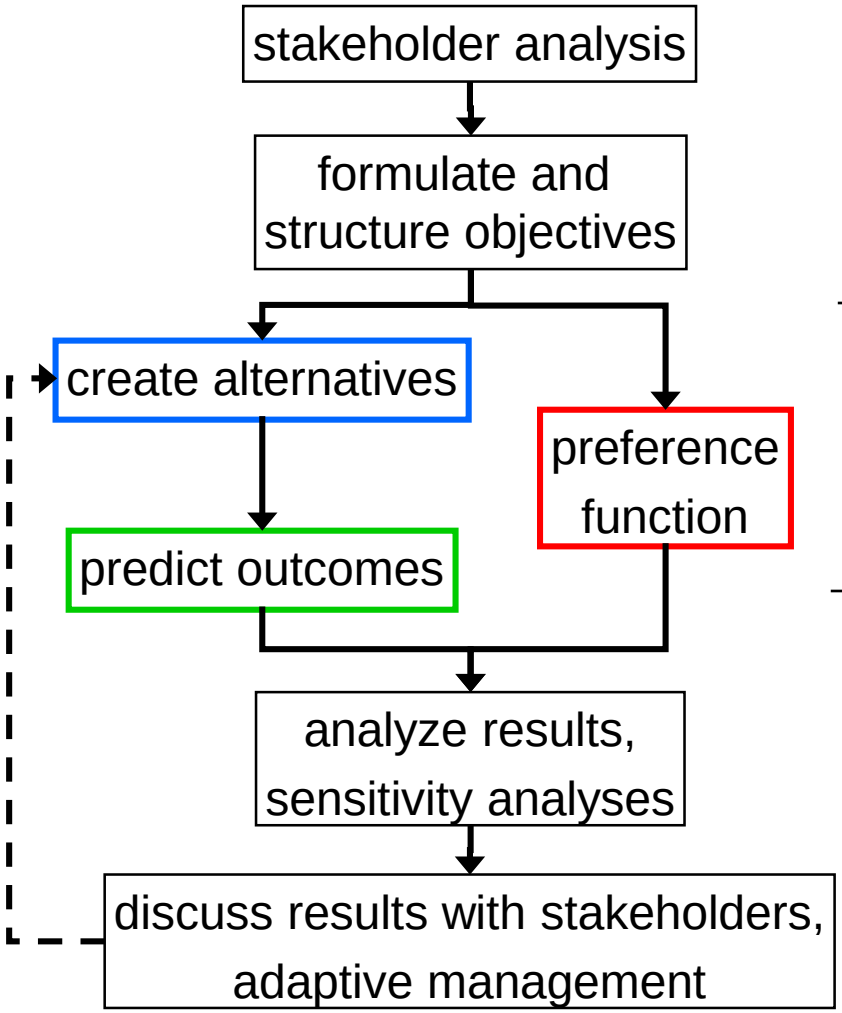
# Decision Analytic Framework




Actors and relevant groups?

Management Goals?
How to measure fulfillment?

Management Options
under Future Scenarios?

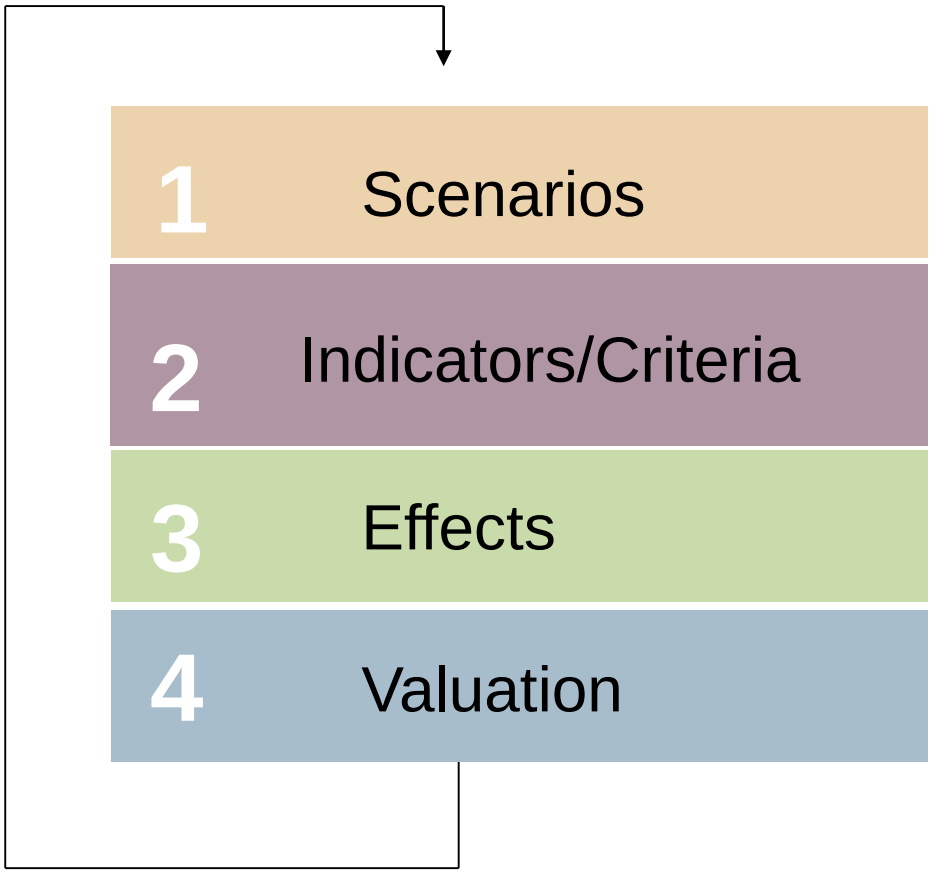
valuation of different states,
weighting of criteria?

Objective predictions
of consequences?

Valuation of alternatives,
robustness?

Predictions right?
Changing Goals?

# Stakeholder Involvement in GLOWA-Elbe
# Global Change of The Water Cycle




Stakeholder Involvement

Identification of Conflicts and Options for Action

→ *Interviews, Workshops & Informal*

Additional Criteria → *Informal*

Information for Valuation Functions → *Interviews*

Involvement in Multi-Criteria.Analysis (e.g. Weights for Criteria ) → *Workshop*

Verification and Adaptation of “Thesis ” → *Workshop*

# Some Recommendations for the Valuation of (Major) Water Engineering Projects

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# „Extended Approaches“

- A broad concept of values – not only measurable and monetizable numbers
- A broad set of valuation methods – not only simplest methods
- Emphasize equal importance of monetary, quantitative and qualitative values

# „Integrative Approaches“

Foster collaboration between natural scientists, engineers and social scientists when valuating water projects

- Over the whole process of problem definition, valuation and intrument design and implementation

- Mutual learning increases understanding sets the ground for joined valuation

# „Process-oriented Approches “

- Inclusion of stakeholdern in valuation processes, if possible, right from the beginning
  - Identification of important stakeholders
  - Joint development of valuation criteria
  - Definition of Weights
  - Discussion of Uncertaities

- Some methods are particularly „stakeholder-open“ (e.g. MCA). However, not the method as such but the process is decisive

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# Objectives of pricing / Role of prices

Provide information about water scarcity
→ Information function

Steer individual's behaviour to use the scarce resource water in a sustainable manner
→ Incentive function

Provide finances for water protection measures
→ Financing function

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# Elements of pricing (prerequisites that prices fulfil their objectives)

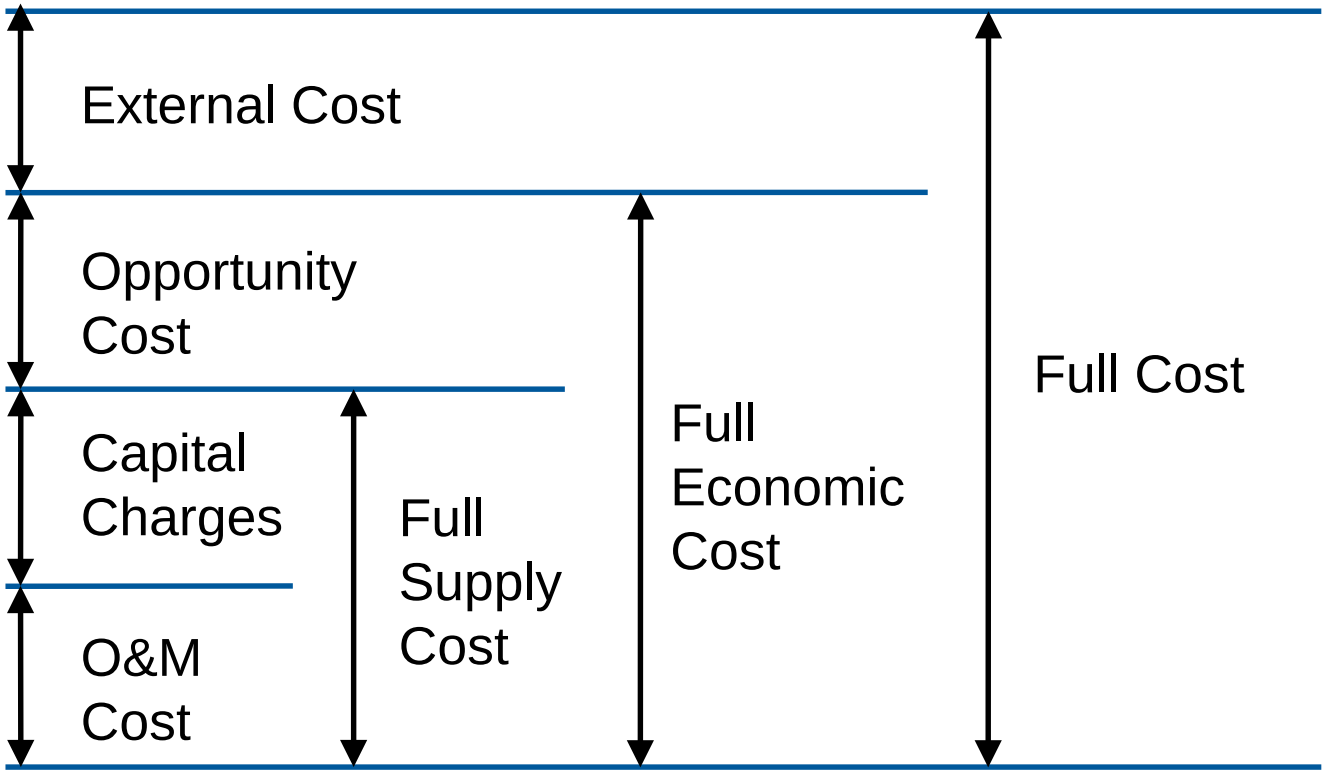
Define the amount of costs that should be priced

→ What total **cost** should be the basis for pricing?

Define the distribution of costs among users

→ How – according to which rules – should cost be distributed among users?

# COSTS OF WATER
## Full Cost of a Single Use




Adapted from Rogers et al. 1998, p. 7

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# Defining total cost: The cost recovery principle

**„Re-financing Perspective“**
(re-financing of past and present costs

+ investment costs
+ variable costs
+ foreign capital costs

plus

**„Business Perspective“**
(Preservation of the plant‘s value)

**In addition:**

+ calc. depreviation (based on current costs)
+ calculatoric capital costs

plus

**„Economic Perspective“**
(private and social costs)

**In addition**:

+ calculatoric costs
+ environmental and resource costs

result

**(Full) cost recovery for water services**

# Elements of pricing (prerequisites that prices fulfil their objectives)

Define the amount of costs that should be priced

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Define the distribution of costs among users

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# ELEMENTS OF DESIGNING PRICES

## Who pays?

**Payer**

- End-user (farmer)
- Organisation
- …

## What for?

**Assessment base**

- Farm
- Field size
- Water Volume
- …

## How much?

**Level**

- Marginal cost vs. average cost
- Full cost vs. O&M cost
- …

**Tariff**

- Fixed vs. variable
- Single-part vs. two-part
- Uniform vs. differentiated
- …

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# Prerequisites for efficient pricing

Define the amount of costs that should be priced
--> What total costs should be included in the price?

Define the distribution of costs among users
→ What are the cost addressed to the individual user?

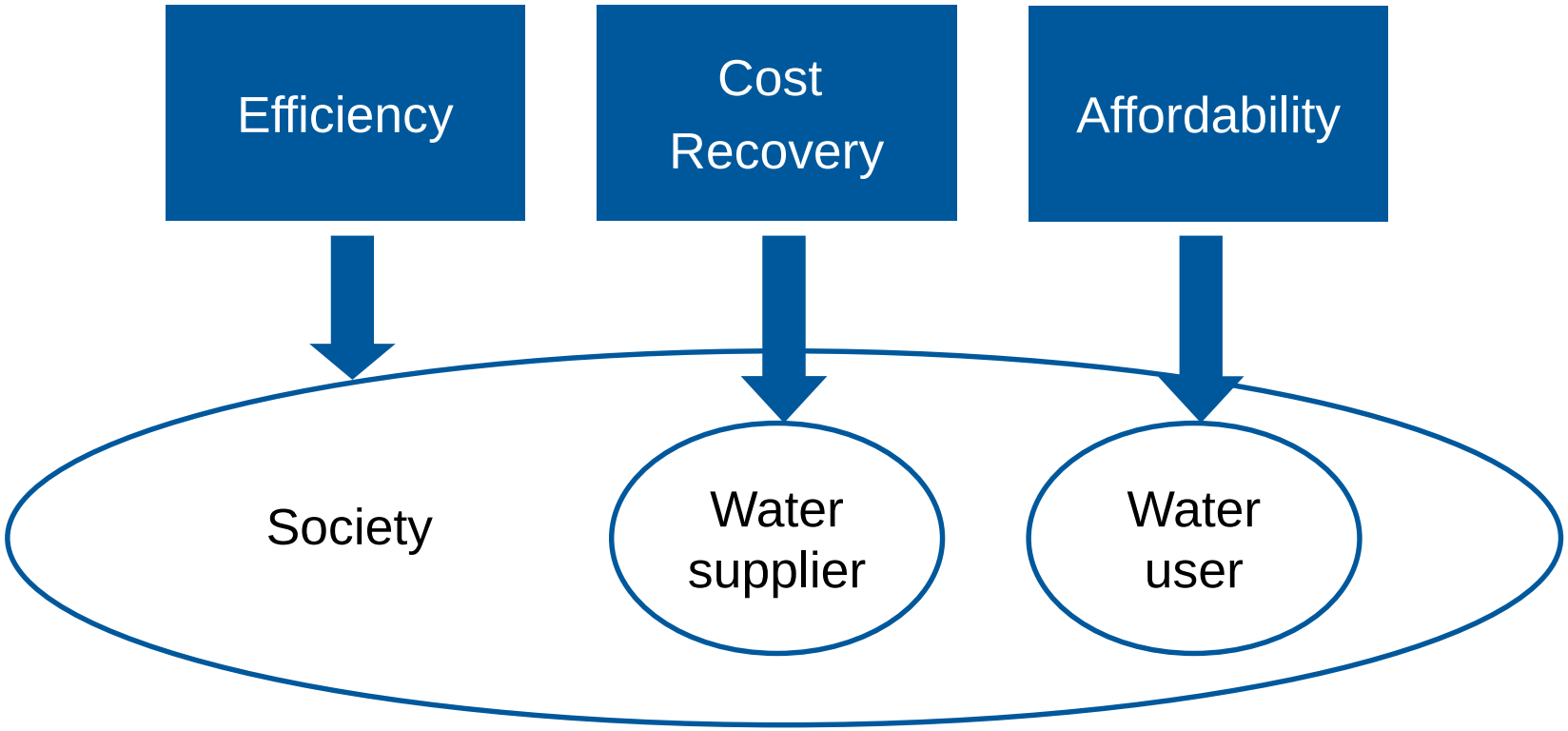
# Incentives for water savings with prices

Requirements:

- Differentiation by different water use values affected
- Water user should have full responsibility for action.
  → he/she should have full options to freely choose actions
- Direct link to final user and extent to which different use values are affected

| Use value | Payer | Assessment Base |
|---|---|---|
| Commodity benefit | Consumer | Quantity of potable water consumption |
| Irrigation | Farmer | Volume of Water received |

# DESIGN CRITERIA FOR PRICING

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# Concluding remarks

1. The “Economics of Water” gives decision support how to deal with scarce water resources and how to make “good” decisions
2. Economics can demonstrate the full value of water. This includes a variety of value (not only direct values, but also indirect values and non-use values).
3. Economics can provide important rules for defining cost of water resources and for distributing these cost among water users

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