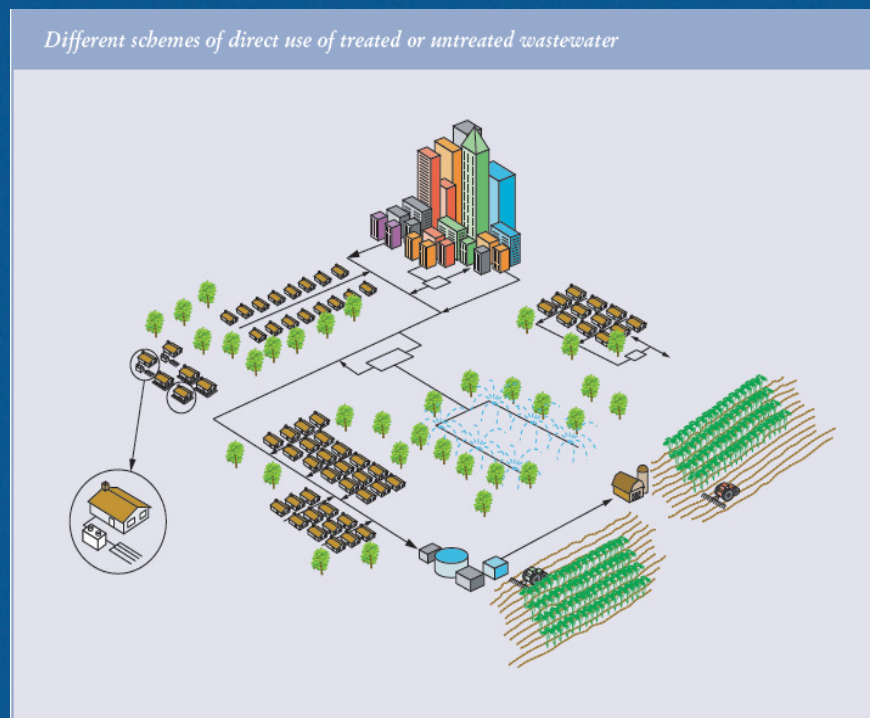


An economic framework for wastewater irrigation: Cost-benefit analysis and financial considerations

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Different schemes of direct use of treated or untreated wastewater





- NEW FAO WATER REPORT

- Authors:

- James Winpenny
- Ingo Heinz
- Sasha Koo-Oshima

- Case Study Authors:

- Miquel Salgot
- Jaime Collado
- Francesc Hernández
- Roberta Torricelli

The wealth of waste

The economics of wastewater use in agriculture



- The need of economic appraisal of reuse projects
- Steps in an economic appraisal of a reuse project
 - Economic justification
 - Financial feasibility
- Case Study. The Llobregat Delta (Spain). Reality check
- Final remarks

Why an economic appraisal

Reuse technology is mature and feasibility of reuse projects depends almost exclusively on:

- **economic aspects**
- **social acceptability**
- **rules and regulations**



- Economic justification

Are Total Benefits higher than Total Costs?

Cost-benefit analysis

Is reuse the most cost-effective approach?

Are there better alternatives?

Cost-effectiveness analysis

- Financial feasibility

Who pays? And how?



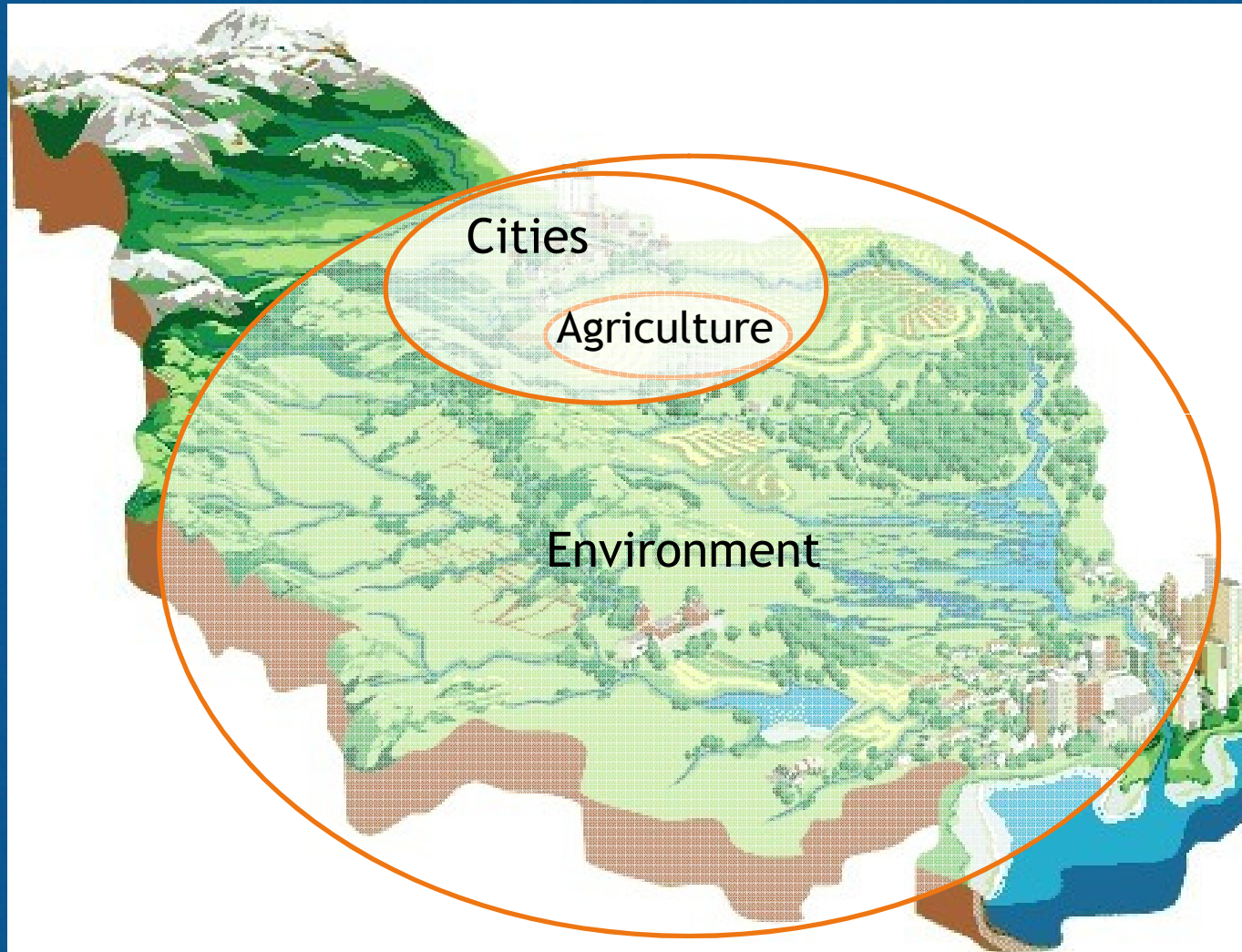
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WATER

Economic justification



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Boundaries and parties





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Cost-benefit analysis

Potential Benefits Farmers



- Reliable source of water
- Savings in fertilizers
- Avoided costs of pumping

Potential Benefits Cities



- Fresh water released by agriculture
- Avoided costs of freshwater abstraction and transmission from remote sources
- Savings in wastewater treatment

Potential Benefits Environment



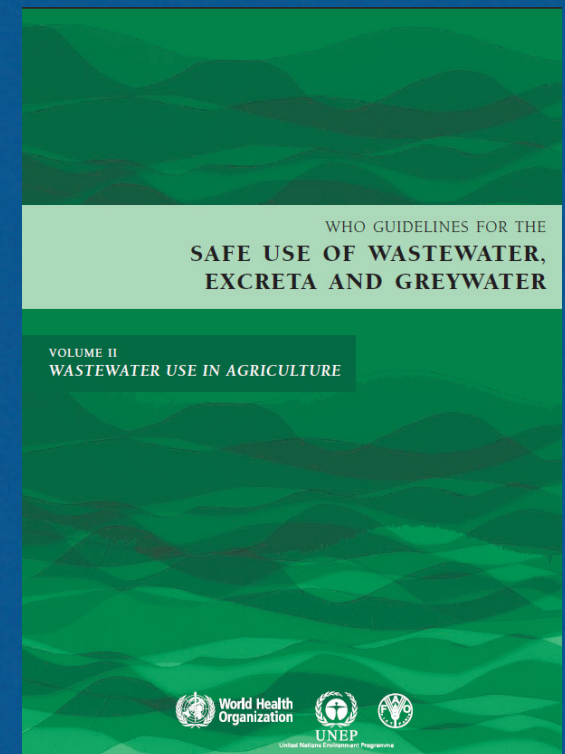
- Lower contamination downstream
- Reduced freshwater abstraction
- Prevention of Mineral Fertilizer being extracted from mines: carbon foot print

Risks

- Contaminants in wastewater can harm human health and the environment

Minimizing risks = Cost

- Treatment options
- Non treatment options



Other costs

- New infrastructure

Water pumping and conveyance

- Environmental costs

Environmental impacts (e.g. Salinization)

- Health costs

Illness due to infectious and chemical agents

If Total Benefits > Total Costs

Is the chosen reuse approach the most cost-effective approach?

Alternatives.

- Water Conservation
- Desalination
- Water transfer
- Others



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Financial feasibility

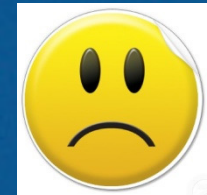
Stakeholders:

- Farmers
- City authorities
- Regional or national government

Who benefits



and who loses



?

- Subsidies
- Others
 - Soft loans
 - Payment for environmental services
 - Water charges
 - Pollution taxes
 - ...

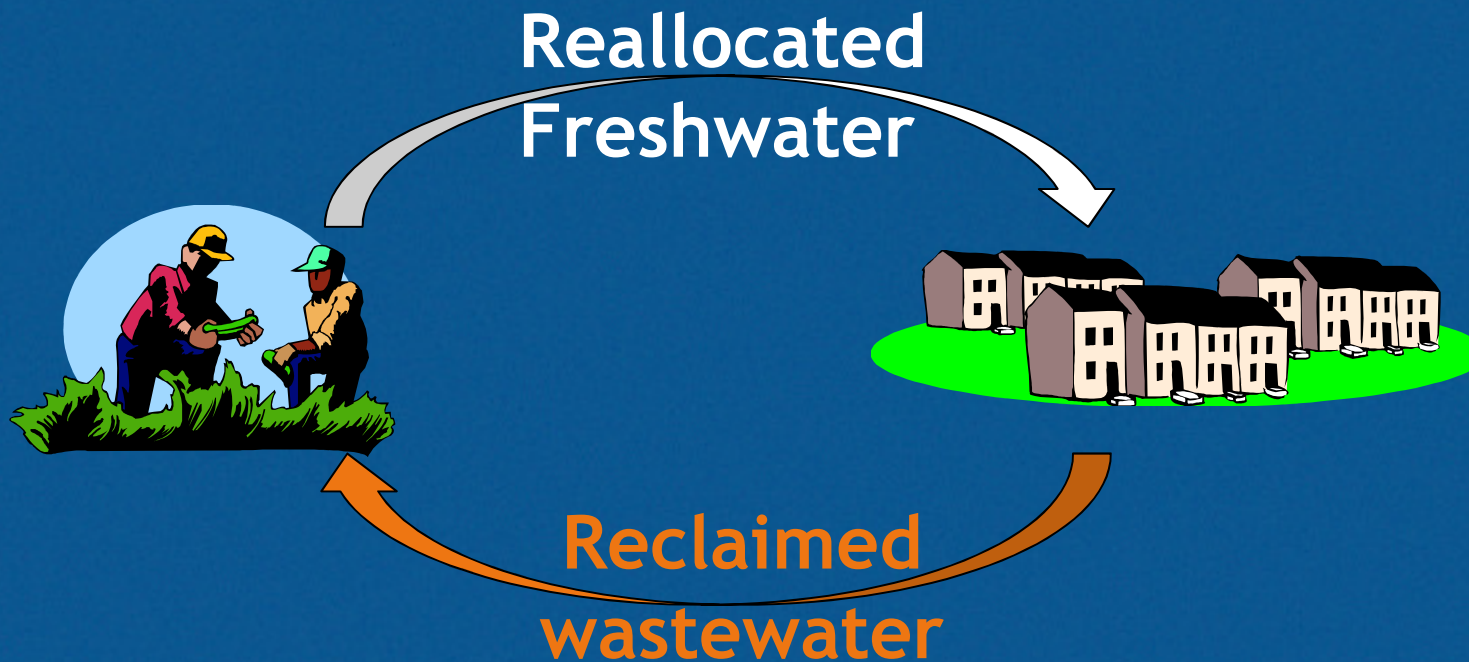
A Reality Check: The Llobregat Delta (Spain)





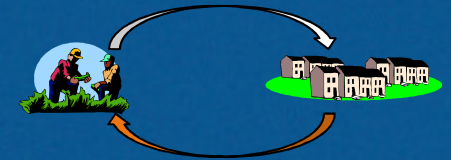
WATER EXCHANGE

7.3 Mm³ / yr



A reality check: Llobregat Delta (Spain)

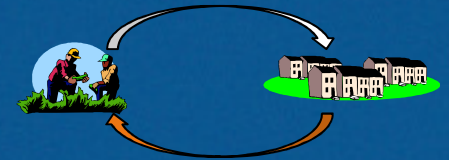
Costs:	Mill €/year
Wastewater treatment	0.59
Wastewater conveyance	0.21
Freshwater conveyance	0.81
Total costs	1.61



Benefits:	Mill €/year	
Costs savings in water abstraction	0.06	0.46
Cost savings in fertilizers	0.01	
Increase in yields	0.39	
Value of released freshwater	8.13	

Unitary value of freshwater: 1.11 €/m³

If farmers pay the costs

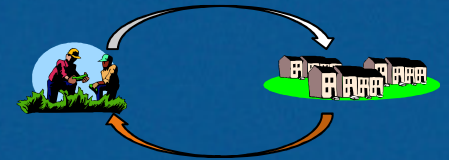


Total costs	1.61 Mill €/year
Farmers benefit	0.46 Mill €/year
Net benefit	-1.15 Mill €/year

The reuse project would not be justified



If the value of the fresh water released is accounted



Total costs	1.61 Mill €/year
Farmers benefit	0.46 Mill €/year
Value of fresh water	8.13 Mill €/year
Net benefit	6.98 Mill €/year

The reuse project would be fully justified!

Farmers are not committed to contribute to the cost of wastewater reuse

The city can pay

Win-win situation

Net benefit
of the city

6.52
Mill €/yr

Farmers
Benefit

0.46
Mill €/yr



Final Remarks

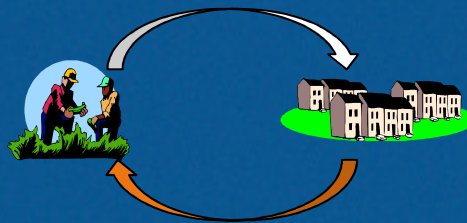
Economic appraisal of projects (including reuse projects) is an essential tool for water planning and allocation strategies within IWRM.

The FAO report provides a sound methodology for the economic justification of reuse projects.



Application of this methodology to real reuse cases has shown that:

A positive net benefit can be gained from water exchange between agriculture and cities resulting in a win-win situation, while also delivering interesting environmental benefits.



THANK YOU!

