

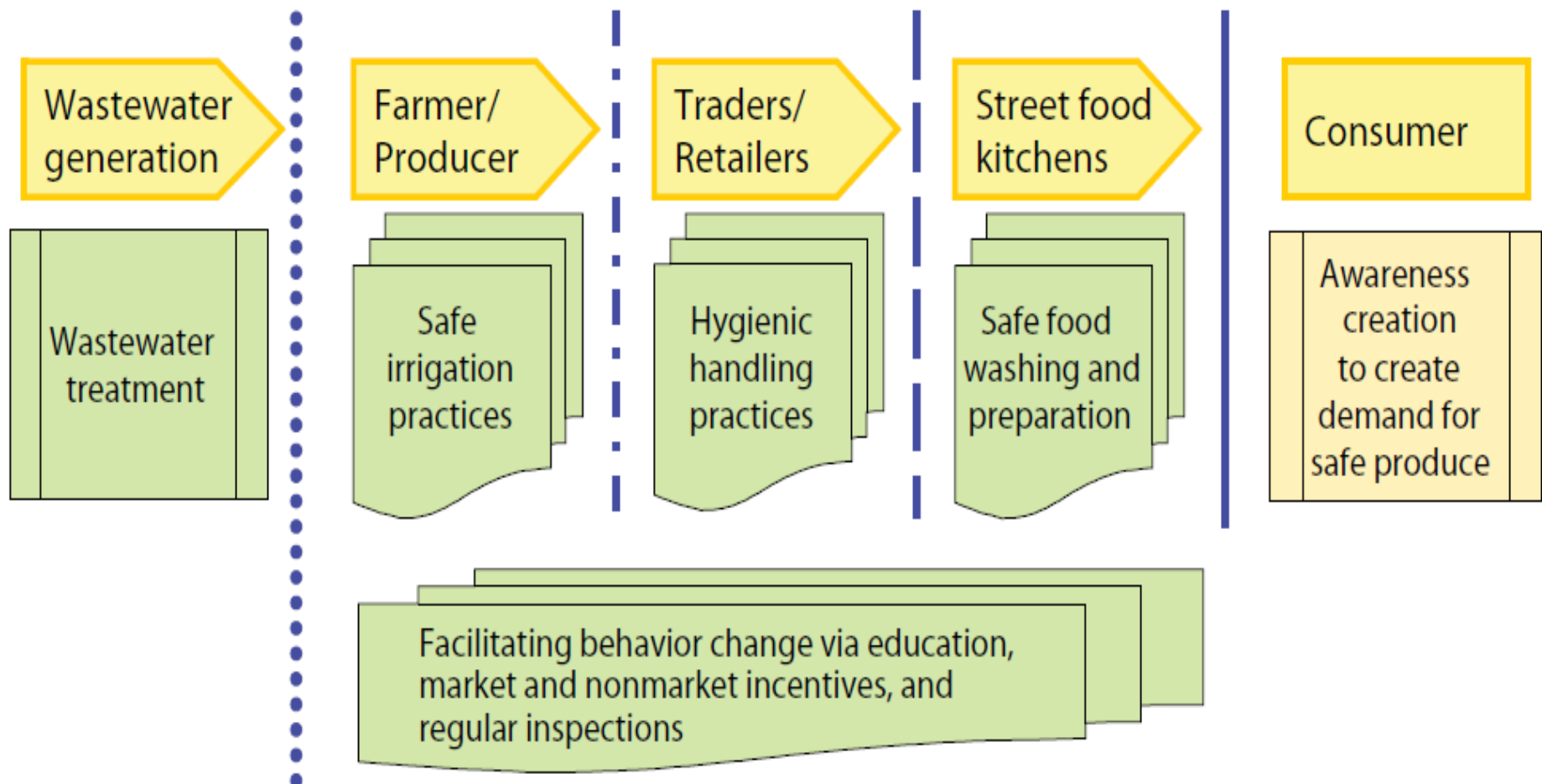
Economic challenges of wastewater treatment and use in agriculture

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OUTLINE

- What a reuse project could be?
- Steps in an economic appraisal
 - Economic justification
 - Cost-benefit
 - Cost-effectiveness
 - Financial feasibility
- Reuse as business opportunity ?

What a reuse project could be?



Steps in an economic appraisal

- Economic justification

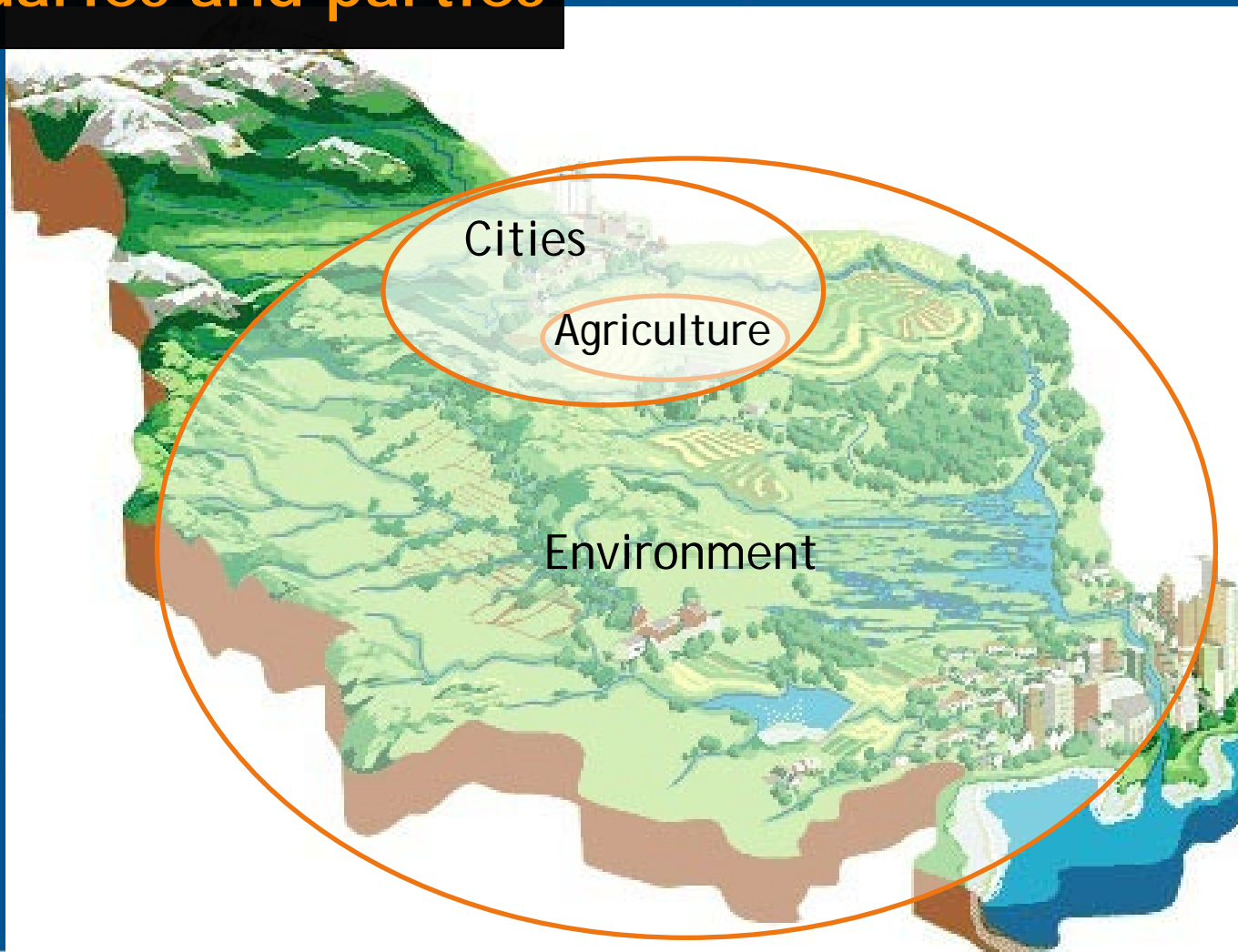
Are Total Benefits higher than Total Costs?

Is reuse the most cost-effective approach?

- Financial feasibility

Who pays? And how?

Boundaries and parties



Benefits



Farmers

- Water all year round
- Nutrients and organic matter
- Avoided costs of pumping

Cities

- Food Security
- Low-cost land treatment

Environment

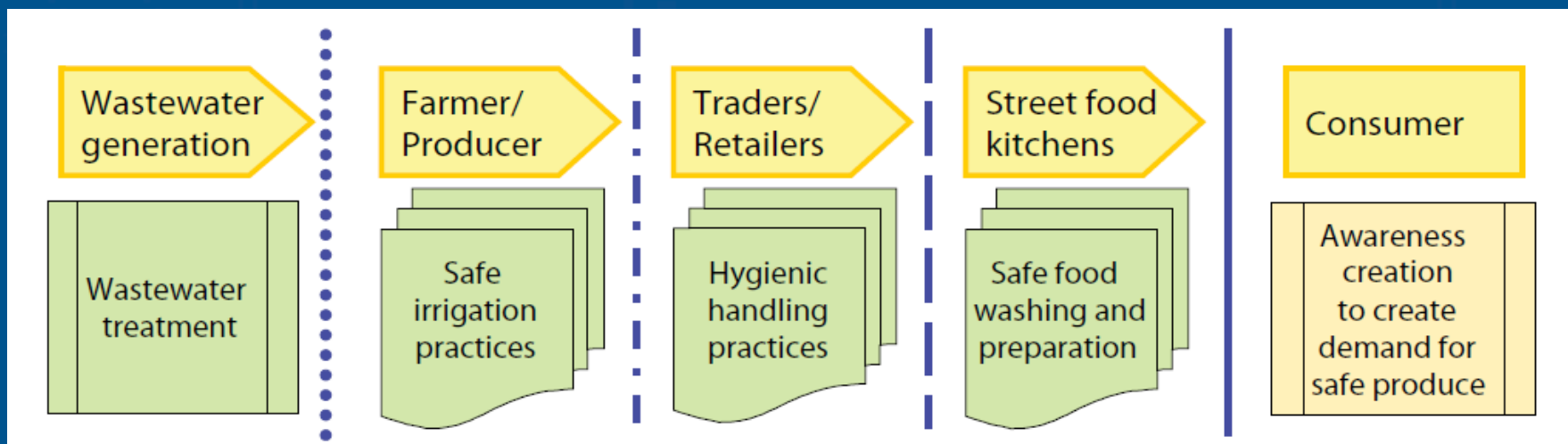
- Reduced pollution
- Reduced freshwater abstraction
- Lower C foot print

Costs

Risks



Minimizing risks = Cost



Cost-Benefit analysis

Other costs

- New infrastructure

Water pumping and conveyance

- Environmental costs

Environmental impacts (e.g. Salinization)

- Health costs

Illness due to infectious and chemical agents

Cost-Effectiveness

If Total Benefits $>$ Total Costs

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

Alternatives.

- Water Conservation
- Desalination
- Water transfer
- Others

Financial feasibility

Financial impact on stakeholders:

- Farmers
- City authorities
- Regional or national government

Who benefits



and who loses



?

Financial instruments

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

How much cost recovery can we expect? Could reuse be a business opportunity ?

- What is the target? **Higher revenues than (M&O) costs.**
- In most cases only 20-90% recovery of **additional** treatment or distribution costs (MENA).
- Reasons:
 - expensive technology M&O
 - low fresh water tariffs → lower wastewater tariffs
 - free groundwater and low demand

But

- There are examples of 100% general O&M cost recovery (→ water, nutrients, **energy**) in Jordan, India, ...
- There are examples even of capital cost recovery after 6 years e.g. through duckweed fed aquaculture (low-cost pond systems in Bangladesh and Peru)

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Four-point cost-saving strategy:

1. Plan early for reuse as a source of revenue
 - a) Plan treatment sites in demand proximity
 - b) Assess market demand, perceptions and willingness to pay.
 - c) Explore additional finance options (e.g. carbon credits).

Normal status: retrofit

2. Keep energy requirements low :

- Use **gravity flow** instead of pumping; low-energy plants or pond-based systems (aeration accounts for about 50% of the overall energy costs).
- **Energy optimization** (cut 20% energy costs).
- **Energy generation** from anaerobic sludge digestion can cover 40 - >80% energy demand!
- **Fit for purpose**: Treat only to the level the reuse requires (e.g. nutrient removal costs much energy).

3. Avoid the common run-to-failure trajectory:

Private sector performs much better in O&M, which saves money and sustains plants.

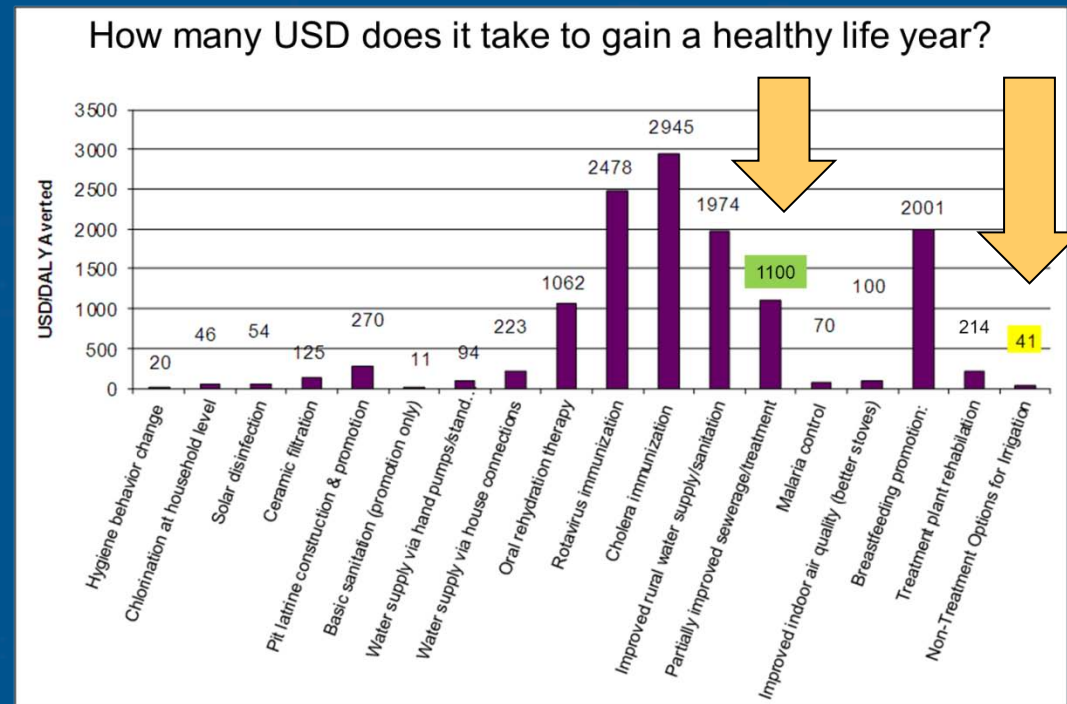
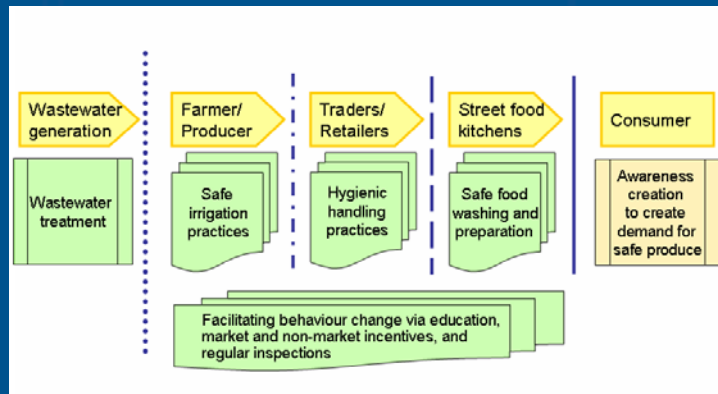
Private sector can also facilitate innovative (win-win) reuse models (example: wastewater aquaculture, Ghana).



Murray, A. and P. Drechsel.
2011. Why do some
wastewater treatment facilities
work when the majority fail?
Waterlines 30 (2), April 2011,
pp.135-149

4. Invest in multiple barriers

(not only conventional treatment): lower risk, less costly, and more cost-effective for health risk reduction.



Many reuse projects remain small or fail because economics have been disregarded. Smart economic planning will support project sustainability including cost recovery.

- **FAO Water Report 35** provides a sound methodology for the economic appraisal of reuse projects.
- **IWMI Working Paper 26** provides a useful framework for an economic assessment.

All reports are on the distributed CD.



→ Working group

- Are there success stories or failures of wastewater treatment and/or reuse which we could share to learn from each other?
- Which role did economics play?

Thanks