

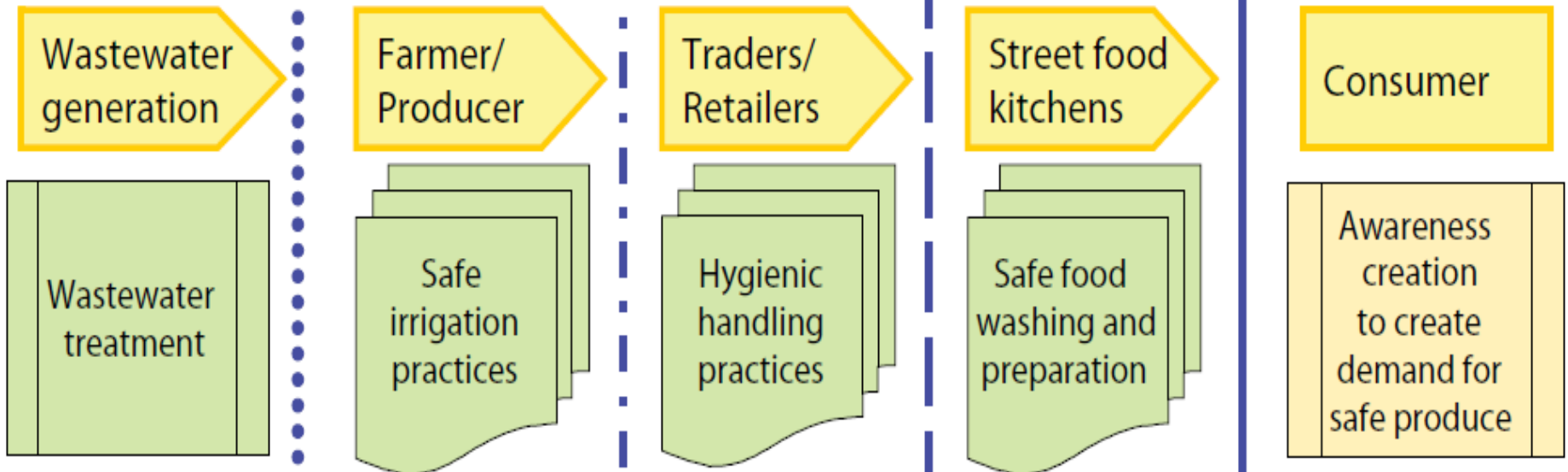
Economic challenges of wastewater treatment and use in agriculture

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OUTLINE

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

Elements in a reuse project?



Steps in an economic appraisal

- Economic justification

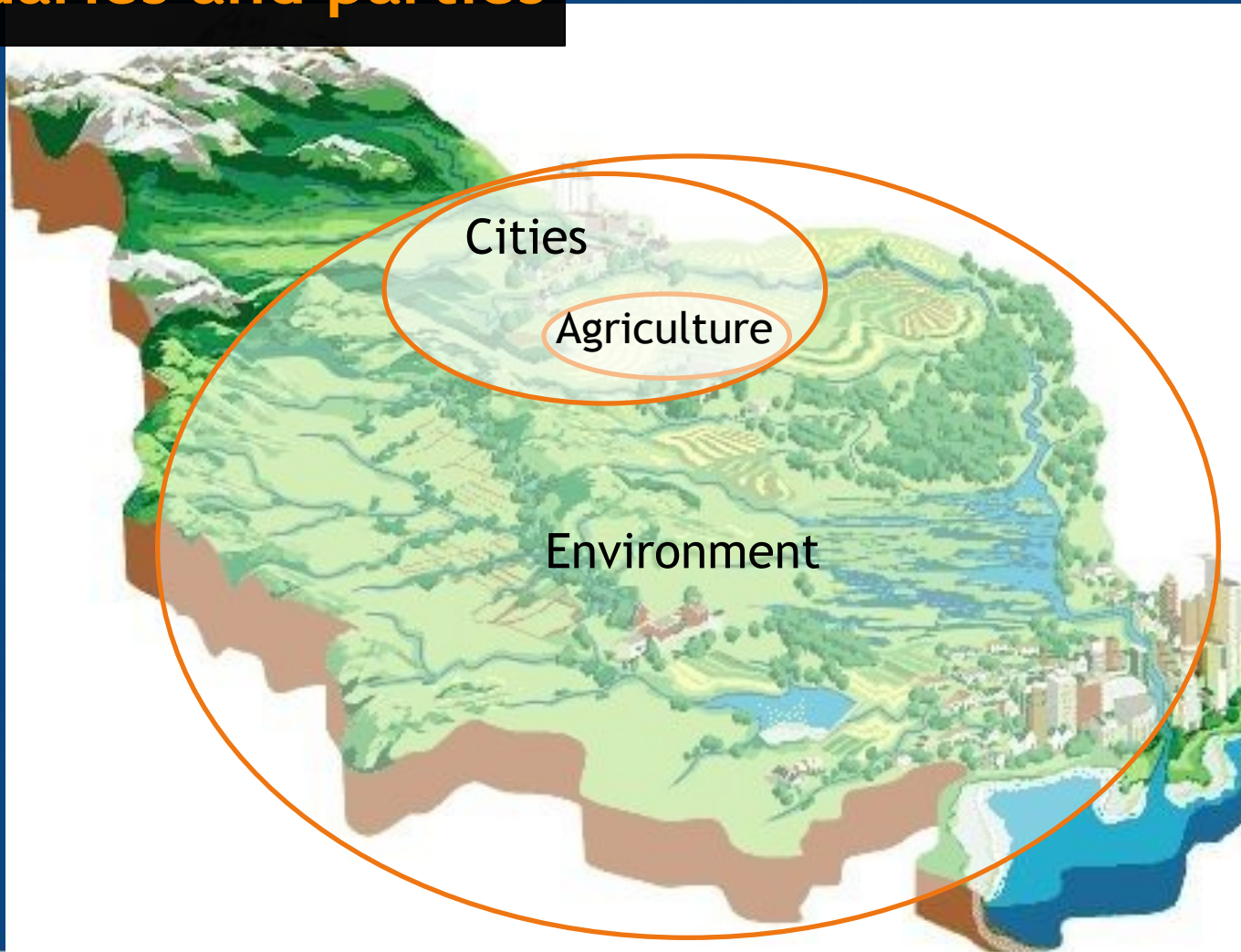
Are Total Benefits higher than Total Costs?

Is reuse the most cost-effective approach?

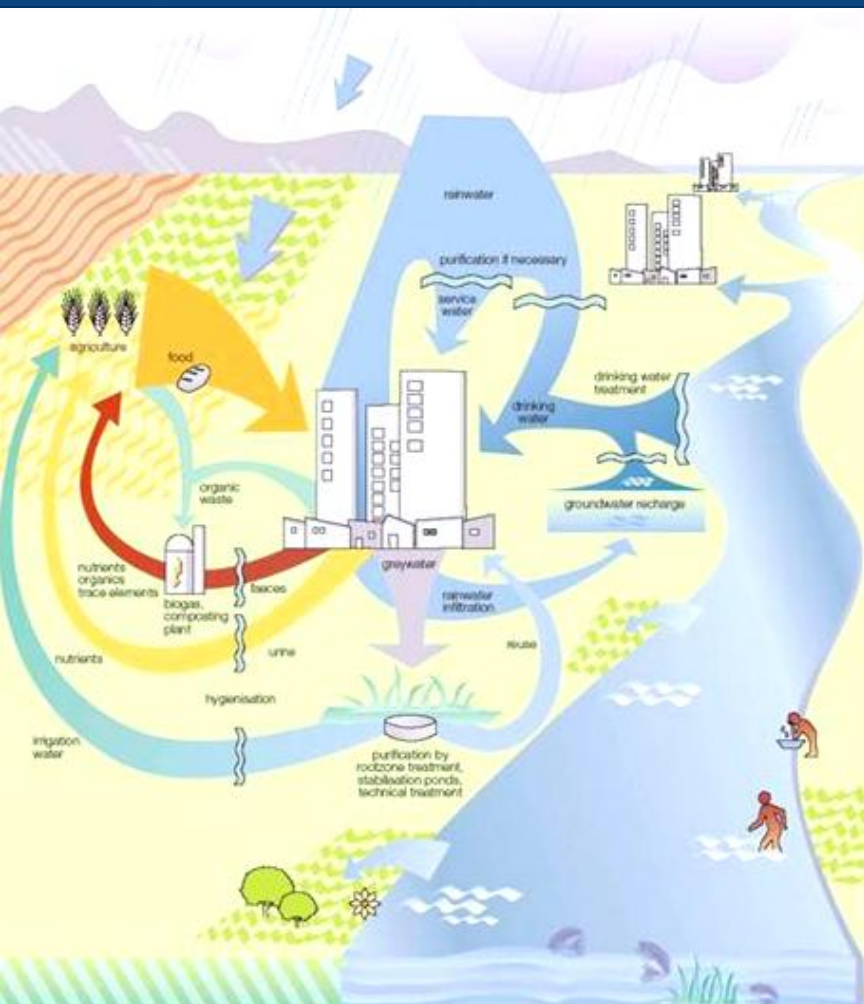
- Financial feasibility

Who pays? And how?

Boundaries and parties



Benefits



Farmers

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

Cities

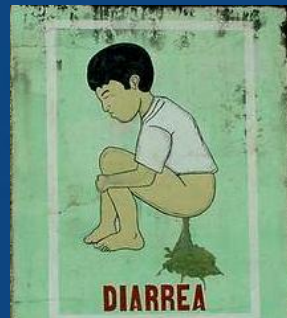
- Food Security
- Low-cost land treatment

Environment

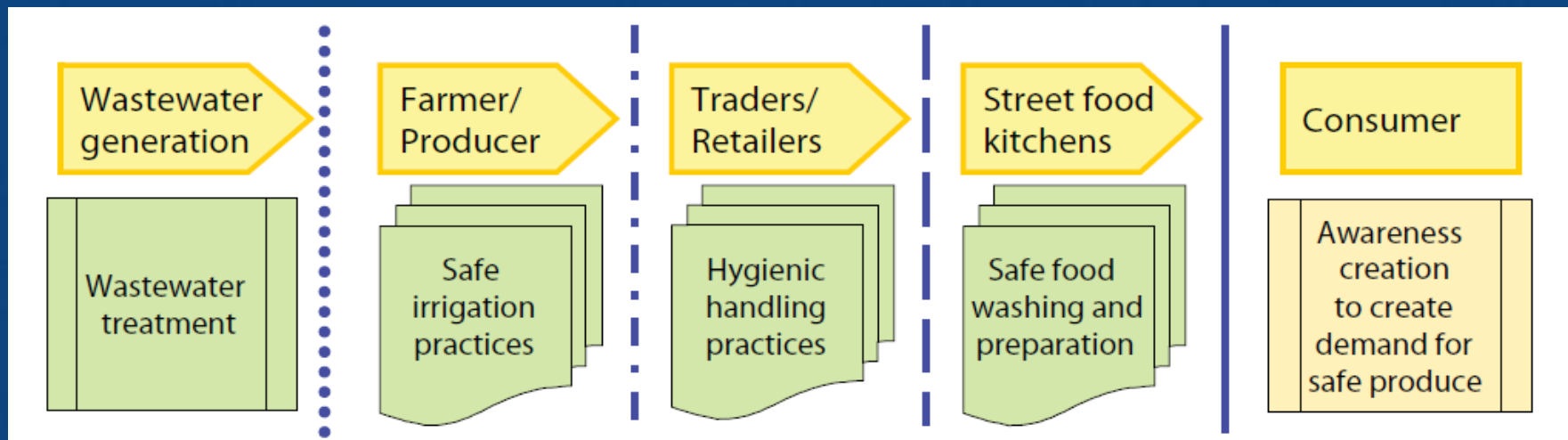
- Reduced pollution
- Freshwater conservation
- Lower C foot print

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 reuse the most cost-effective approach?

Alternatives.

- Water harvesting
- 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
 - ...

Could reuse be a business opportunity ?

- What is the target? **Higher revenues than costs.**
- In most cases 20-90% recovery treatment or distribution costs.
- Reasons:
 - High costs: expensive technology (O&M)
 - Low revenues: low fresh water tariffs → lower wastewater tariffs

But

- There are examples of **100% 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)

Four-point cost-saving strategy:

1. Plan early for reuse as a source of revenue:

- Plan treatment sites in demand proximity
- Assess market demand, perceptions and willingness to pay
- Explore additional finance options (e.g. C credits).

2. Keep energy requirements low :

- Use **gravity flow** instead of pumping
- Low-energy plants: pond-based or anaerobic systems
- **Energy recovery**: anaerobic sludge digestion can cover 40 - 80% energy demand!
- Treat only to the level the reuse requires (e.g. nutrient removal costs much energy)

3. Avoid the common failure trajectories:

- Does public sector has enough capacities?
- Private Sector can play a Key Role:
 - Performs well in O&M
 - Can facilitate innovative (win-win) reuse models

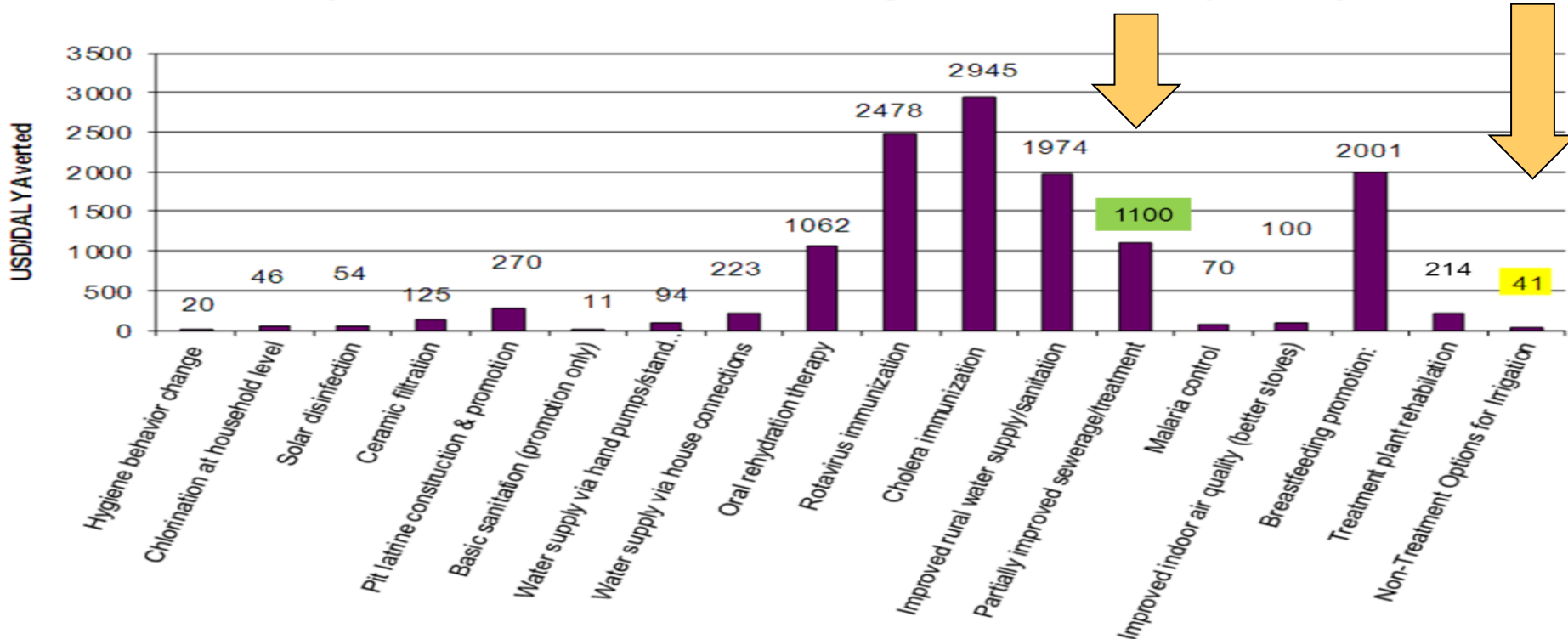
Murray, A. and P. Drechsel. 2011. Why do some wastewater treatment facilities work when the majority fail? *Waterlines* 30 (2), April 2011, pp.135-149

4. Invest in multiple barriers

(not only conventional treatment)

more cost-effective for health risk reduction

How many USD does it take to gain a healthy life year?



Many reuse projects remain small or fail because economics have been disregarded.

Smart economic planning will support project sustainability including cost recovery.



→ 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