

## Social Life Cycle Assessment: A comparison of wastewater treatment facilities in Mexico.

3rd edition of the International Seminar on Social LCA



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# INTRODUCTION

- Why consider social aspects?



- Why wastewater facilities?



## Challenges related with sustainability

- New approaches, new solutions for a persistent problem
  - Innovative
  - Adapted
  - Holistic
- Need to identify wastewater treatment systems with lower environmental impact, economically affordable and socially acceptable.
- Creation of decent working conditions and other positive social impacts for the wastewater sector in LAC
- Promote sustainable development with adoption of these technologies

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## Goal :

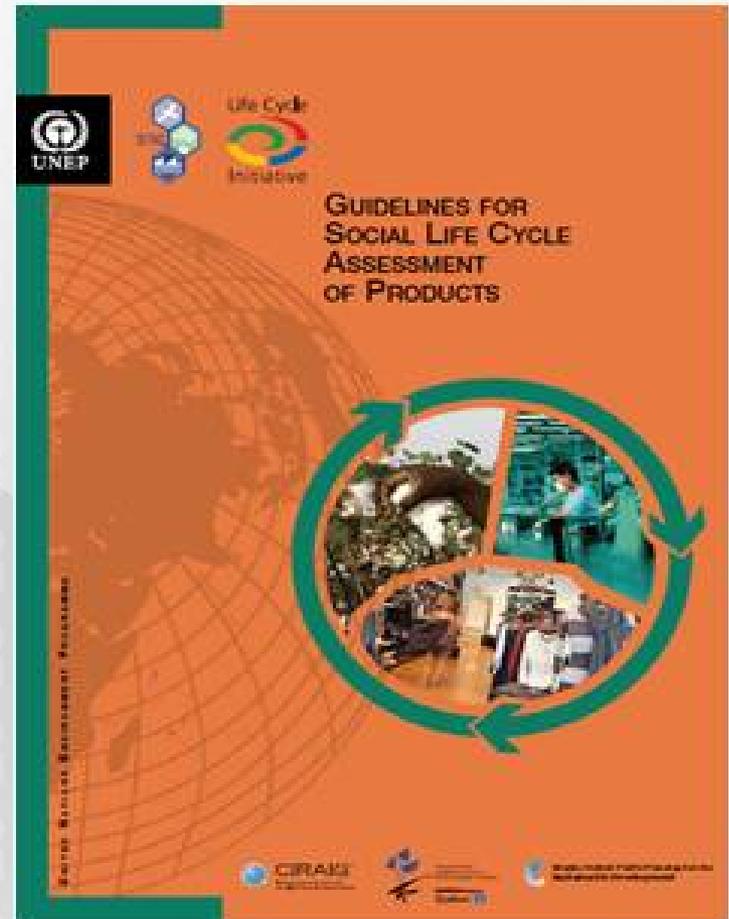
*Evaluate the environmental impacts of the most representative water treatment technologies in Latin America and the Caribbean in order to identify mitigation strategies*

## Specific goals (+):

- To develop an inventory of treatment technologies in LAC
- To generate representative treatment scenarios of LAC
- **To identify the social and economic characteristics of representative scenarios**
- To assess the environmental impacts of treatment scenarios with emphasis on the quantification of GHG through Life Cycle Assessment (LCA)
- To identify research topics in order to minimize environmental impact and GHG generation for the identified (improved) wastewater treatment technologies.

# METHODS

- **UNEP/SETAC Life Cycle Initiative framework**
  - System boundaries: type of process involved
  - Analysis of stakeholders categories
  - Analysis of the subcategories
  - Identification of inventory indicators for the system under study

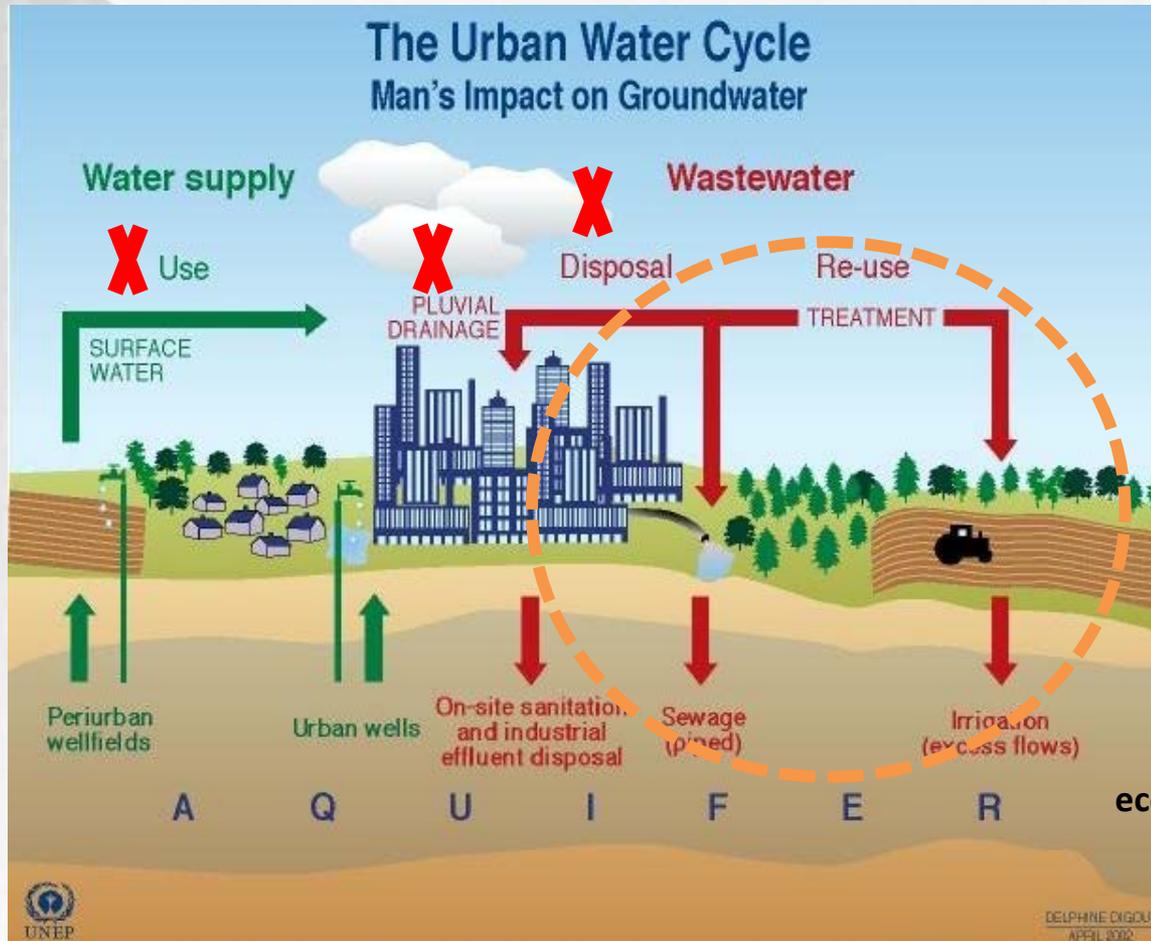


# Step 1: Goal & Scope

- An in-depth assessment of the socio-economic impacts of two wastewater treatment facilities
  - Determine differences between management and technology social impacts
  - Assess the existing situation of households related to social participation and acceptance in wastewater management
  - Know the awareness among citizens regarding their dual role as polluters and beneficiaries of wastewater management

System boundaries

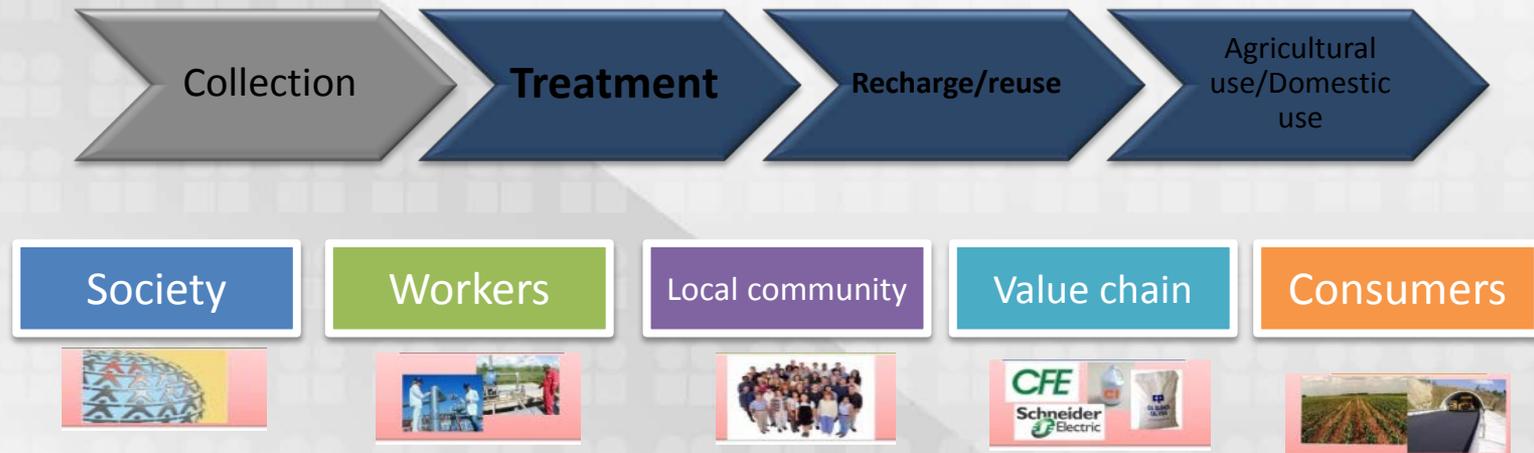
Wastewater life cycle



Source: Brian Morris, British Geological Survey, 2001.

# Foreground and background process

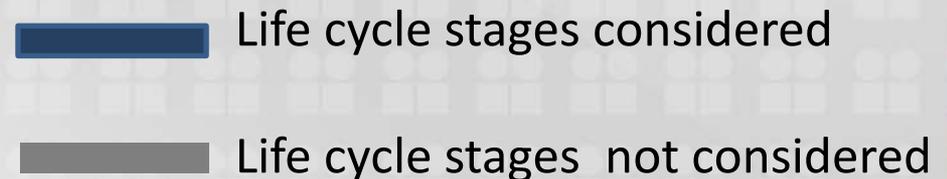
## Sanitation Process



## Stakeholders

### Also considered:

- Public authorities/ state



Basilica de Nuestra Señora de los Remedios  
<http://iglesias-mexico.blogspot.com/>



## Urban Area

- Municipality: Naucalpan, western of Mexico city
- Population: 900,000 inhabitants
- GDI: 13,000 USD per capita
- Wastewater facility: activated sludge, flow: 20 l/s



## Rural Area

- Municipality: Tepalcingo, 200 km from Mexico city
- Population: 30,000 inhabitants
- GDI: 3,000 USD per capita
- Wastewater facility: UASB+ trickling filters, flow : 20 l/s

# Subcategories developed and integrated

Stakeholder category/Subcategory	Workers/employees	Local community	Society	Consumers	Value chain actors
Public participation		✓	✓		
Sustainable behavior		✓	✓	✓	
Odor	✓				
Social acceptance		✓	✓	✓	
Expertise	✓				
Training	✓				
Operative risks	✓				
Demand satisfaction				✓	

# Stakeholders involved

The stakeholder categories considered on each life cycle stage

Life Cycle Stages/ Stakeholder category	Treatment	Recharge/reuse	Agricultural/do mestic use
Workers/employees	✓	✓	--
Local community	✓	✓	✓
Society	✓	--	✓
Consumers	--	✓	✓
Value chain actors	✓	--	--

## Considered stakeholders and subcategories

- For foreground process four main stakeholder groups were considered
- For background process only workers, local communities and consumers were regarded as stakeholders
- 23 of 31 subcategories were part of the analysis
- 8 subcategories developed and integrated



## What do want to consider?

- Situation in country/region/sector => generic analysis
- Situation in company/site => specific analysis

## Case study: Considered indicators

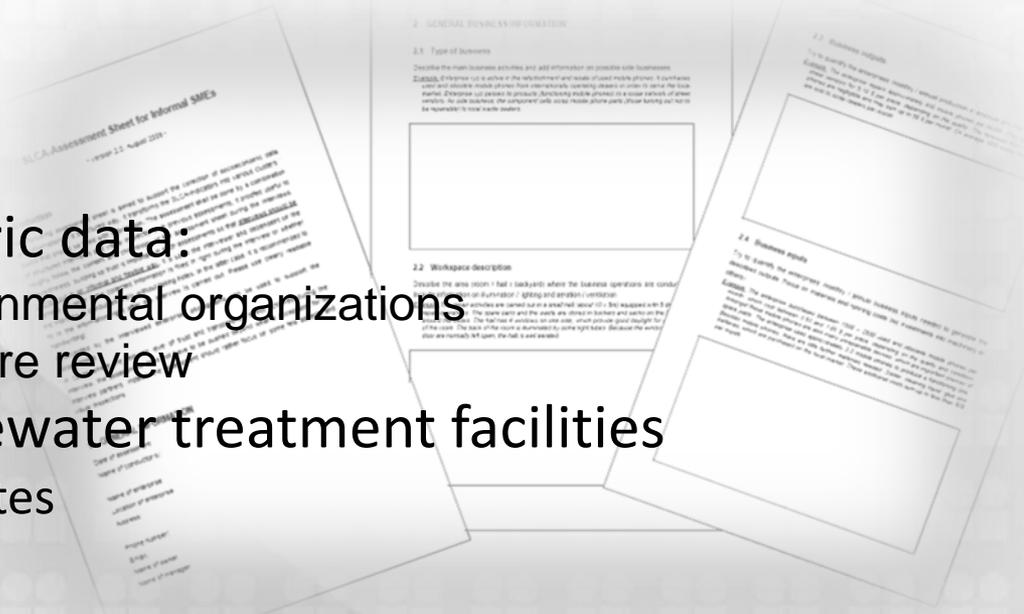
- Use more than 50 indicators
- Indicators are mainly qualitative
- Several indicators are based on the method sheets
- Several indicators were newly defined, as the supposed indicators of the method sheets were partly considered as inappropriate

## Step 2: Inventory

Data level	Data source
Country/regional	<ul style="list-style-type: none"> <li>• Mexico Department of Labor (country reports)</li> <li>• ILO</li> <li>• The world bank (development indicators, statics)</li> <li>• WHO</li> <li>• CEPIS</li> </ul>
Sector	<ul style="list-style-type: none"> <li>• Sector associations</li> <li>• Trade unions</li> <li>• ILO</li> <li>• OECD</li> <li>• GOs</li> <li>• NGOs</li> </ul>
Company site	<ul style="list-style-type: none"> <li>• Websites and public reports</li> <li>• Interviews with management and employees/workers</li> </ul>
Households	<ul style="list-style-type: none"> <li>• Interviews house by house</li> <li>• Questionnaires</li> </ul>

## Case study: data sources

- Main data sources for generic data:
  - Governmental and non-governmental organizations
  - Internet research and literature review
- Main data sources for wastewater treatment facilities
  - Corporate reports and websites
  - Reports from NGOs
  - Questionnaires
  - Interviews with workers
- Main data sources for local community/society
  - Interviews with neighborhood association
  - Specific questionnaires



Expert Interviews: Are You Ready?



**Issue: Often different data sources are contradictory**

Which source/ who is more credible?

Who has the largest initiative to whitewash?

→ Triangulation (seeing aspects from different sides,  
from different sources)

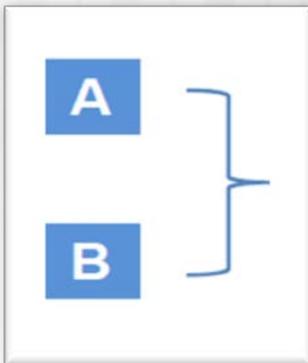
**Data storage and assessment**

**Issue: No appropriate software tools for Social LCA**

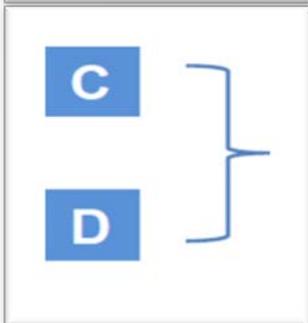
# PRELIMINARY RESULTS

## Step 3: Impact Assessment

- Evaluation of qualitative, quantitative, and semi-quantitative data
- Performance assessment
- Performance reference points based on international, national, regional and local guidelines
- Intuitive rating scale, based on a four levels scale for each subcategory (in relation to the fulfillment of a basic requirement , meets or does not meet)



The Organization **meets** the BASIC REQUIREMENT

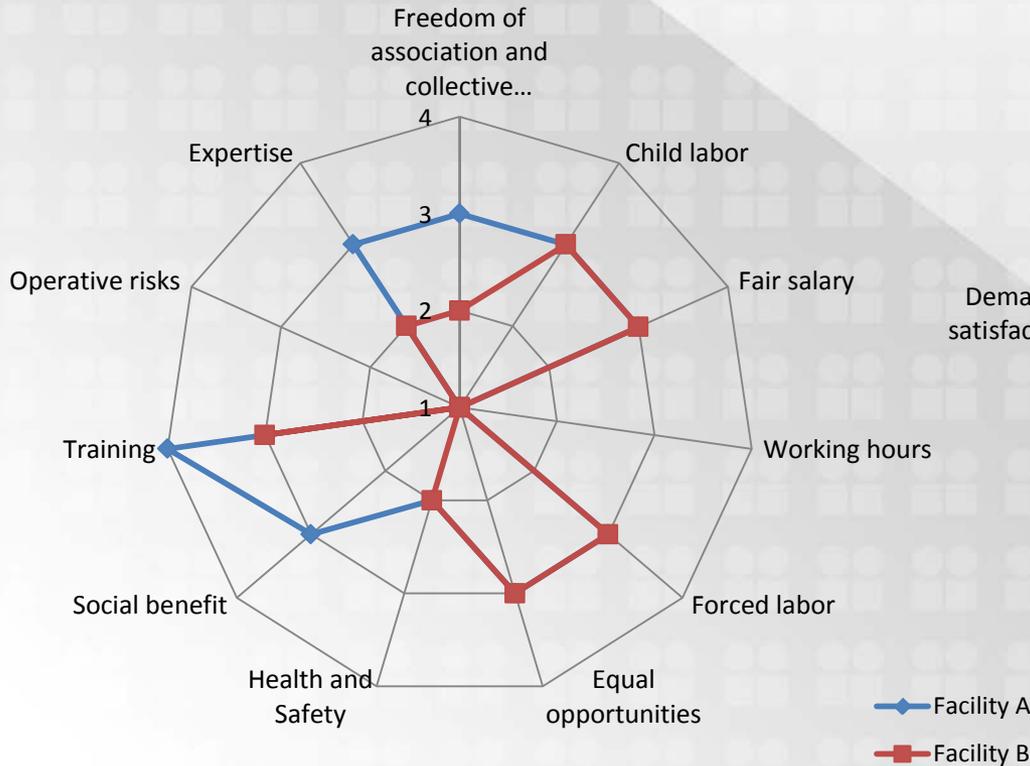


The Organization **does not meet** the BASIC REQUIREMENT

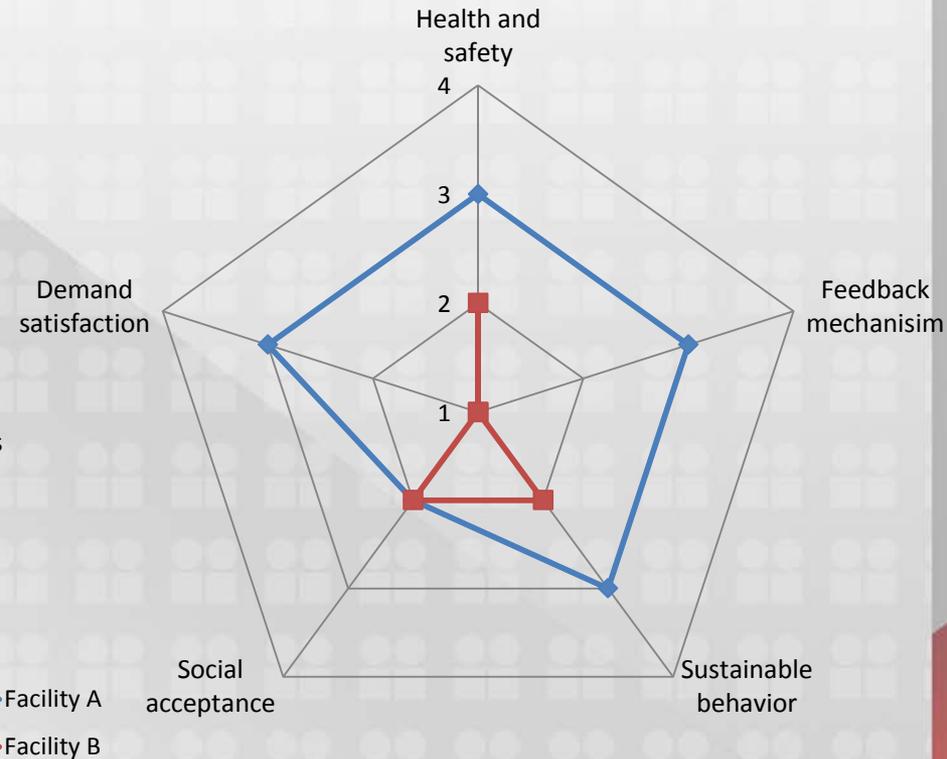
## Performance reference points

Subcategory	Performance reference point	Source
Fair salary	The wage level should ensure a decent standard of living. The payment of the minimum wage is often not sufficient. Further, companies should pay in time and do not withhold shares of the salary	<ul style="list-style-type: none"> <li>• ILO labor standards</li> <li>• Political constitution of Mexico</li> <li>• Federal labor law (Mexico)</li> <li>• Local labor standards</li> </ul>
Freedom of association and collective bargaining	<p>Does the have legislation for freedom of association in country?</p> <p>Employees have the right to exercise freedom of association and collective bargaining?</p>	<ul style="list-style-type: none"> <li>• Collective bargaining agreement</li> <li>• Political constitution of Mexico</li> </ul>

## Employees/workers



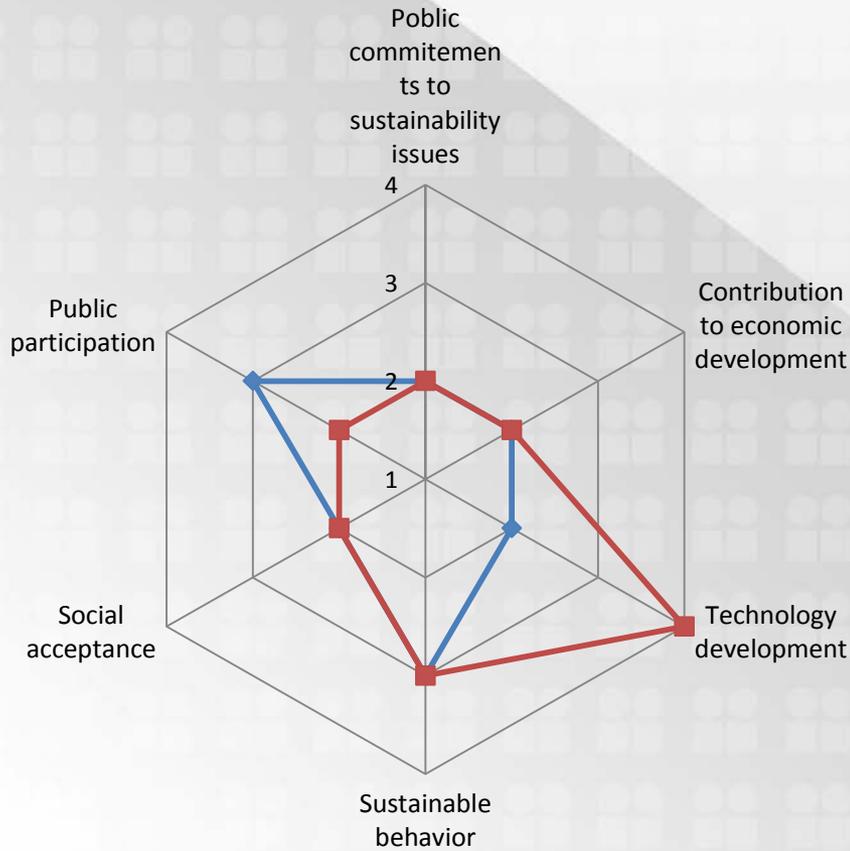
## Consumers/clients



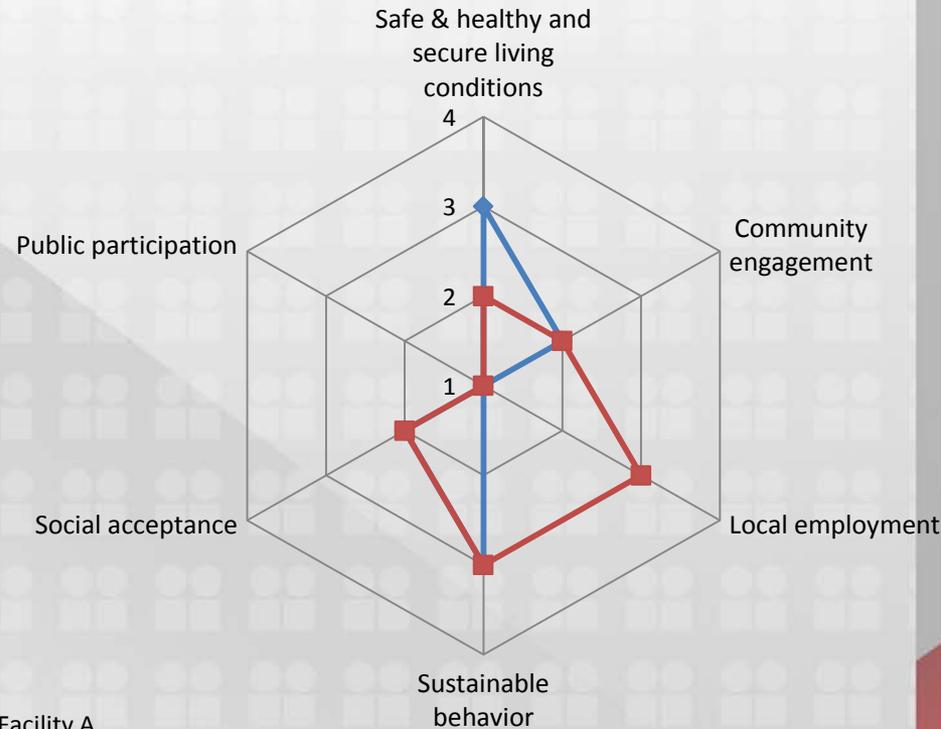
Facility A (urban)

Facility B (rural)

## Local community



## Society



◆ Facility A  
■ Facility B

Facility A (urban)

Facility B (rural)

# FINAL REMARKS

- It was clear from the meetings, the questionnaire, discussions and the interviews with stakeholders that they have no serious objections to the reuse of treated wastewater in principle. However, there are observations and concerns that decision makers must attend.
- Considering cultural and economical concerns for such practices, it is important to allow farmers as well as other civil society organizations to participate in the development of standards and regulations associated to wastewater facilities.
- The study showed variability in the response of stakeholders in both facilities toward assessing treated wastewater reuse and thus variability in their interest in the reuse. This resulted in changes and variability in the relative importance of agriculture among rural areas and urban areas.
- It is important that potential customers, who are willing and capable to reuse wastewater, are involved in planning from the beginning. They can be identified through a market assessment.

- S-LCA methodology can be used to generate a better understanding of wastewater management issues, its hot spots, cause and effect chains and possible measures for improvements
- Primary data integration possible; data gaps can be filled from statistical sources.
- A big advantage of S-LCA methodology is its use in action oriented decision making; both at the level of wastewater facility as well as policy. For such an objective, analysis of social impacts at the level of sub-categories is not only efficient in terms of time & resources, but it also leaves much less room for error and misinterpretations of social situations.



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# Water and Sanitation:

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