2 OBJECTIVE OF THE STUDY

The objective of this study is to illustrate how the sustainability of sanitation systems, in three different contexts, can be assessed using an integrated comparative approach. The perspective used for all examples is that of the municipality. The comparative approach outlined in this report could further be used as one integrated part in decision-making for future sanitation investments in the municipal setting.

3 METHOD

3.1 USE OF ILLUSTRATIVE EXAMPLES

Since sustainability only can be assessed when the context is known we have chosen to work with one illustrative example each from three different countries; Sweden, South Africa, and Mexico. The examples were chosen to illustrate different sanitation planning situations. The illustrative examples used are, however, not real case studies, since neither of the comparisons has actually been executed the way suggested here. The aim is to show how a criteria-based comparison of sustainability of sanitation systems using a 0 alternative could look in three different settings:

- planning for upgrading of on-site sanitation outside municipal wastewater treatment jurisdiction, induced by increased pressure on existing on-site sanitation systems (Swedish case);
- planning for sanitation in new low-cost housing areas (South African case);
- strategic decision-making concerning connection to and the dimensioning of future municipal wastewater treatment plant (Mexican case).

3.2 CRITERIA USED

The list of criteria used within this report is presented in Table 3.1. When these kinds of comparison are to be made in actual situations, the sustainability assessment criteria should be identified through a participatory approach with all relevant stakeholders, and properly weighted as described above. The criteria in Table 3.1 have not been developed through that model but are an excerpt of the criteria presented in Appendix 1. Thus, the same criteria are used in all illustrative examples. The main reason behind this is that context-relevant criteria have not been identified and weighed through participative approaches for all three examples used. For the Swedish illustrative example this process had been carried through using the MIKA tool referred to in section 4.1, and is reported in Lundberg and Wijkmark (2005). However, for illustrative purposes we chose to expand those criteria somewhat for the context of this report. The use of the same criteria for all examples will facilitate the illustration that somewhat similar sanitation systems might perform differently depending on context, and also highlight that different criteria might be weighed differently depending on the context.

The sanitation systems alternatives are scored in comparison to the 0 alternative with either ++, +, 0, –, ––. The + sign always indicates higher performance compared to the 0 alternative and the – sign always indicates lower performance compared to the 0 alternative.

Criteria that are difficult to analyse in matrix form, such as legal issues and institutional aspects, were discussed in the text for each illustrative example.

3.3 RELATIVE COMPARISON OF DIFFERENT SYSTEMS TO A 0 ALTERNATIVE

The functional unit for the comparison is the total wastewater fractions generated by one person during one year. The wastewater fraction flows vary for each country and setting.

The 0 alternative, to which the other systems are compared in a relative manner, is a connection to a wastewater treatment plant and subsequent treatment. In the countries of investigation this choice is made since the waterborne flush and discharge is usually preferred. The 0 alternative was assessed according to the list of criteria (either qualitatively or quantitatively depending

Table 3.1: Criteria matrix

(a + sign always indicates higher performance compared to the 0 alternative)

Criteria Each rated as ++, +, 0, – or –– compared to the 0 alternative	**0 alternative: Connection to waste-water treatment plant**	**Sanitation system 1**	**Sanitation system 2**	**Sanitation system 3**	**Sanitation system 4**
Health					
Risk of infection: household	Qualitative				
Risk of infection: immediate environment	Qualitative				
Risk of infection: downstream	Qualitative				
Environment					
Discharge: BOD, mg/L	Quantitative				
Discharge : N,P, mg/L	Quantitative				
Potential for reuse of water	Quantitative				
Potential for reuse of nutrients	Qualitative				
Water use	Qualitative				
Quality of recycled product	Qualitative				
Economy					
Investment costs (individual & societal)	Quantitative				
O&M costs (individual & societal)	Quantitative				
Socio-cultural					
Convenience	Qualitative				
Safety	Qualitative				
Appropriateness to local context	Qualitative				
Technical function					
System robustness	Qualitative				
Odour	Qualitative				
Complexity of construction and O&M (individual & societal)	Qualitative				

on criteria). A choice of at least three different country-relevant sanitation alternatives was identified for each country. The different alternatives were compared, in a relative manner, to the 0 alternative. The relative comparison was based on real data from the country when available and otherwise was based on qualified estimates from local consultants.

All wastewater fractions generated at the household level were included in the comparison: blackwater (or urine and faeces), greywater, or combined wastewater. Treatment and management of all wastewater fractions were included in the comparison. Solid waste, storm water, and industrial wastewater were not considered for this comparison. For responsibility issues the boundary of the system, from a household perspective, is the plot.

METHOD ADAPTATIONS FOR REAL CASES

The assessment of sanitation systems based on criteria alone, as presented in this report, does not suffice for the planning and implementation of sustainable sanitation systems and services. The use of sanitation sustainability criteria is one important component of the planning and implementation of sanitation systems. It is of utmost importance that the use of sustainability criteria is connected to an integrated planning tool, taking into consideration all relevant sanitation flows (water, wastewater, storm water, solid waste, industrial wastewater) and responsibility issues across all the different domains of a city, to avoid sub-optimisation. Moreover, what is sustainable in the actual context needs to be agreed upon, taking into consideration the context (need for comprehensive site assessment) and the views of all relevant stakeholders, including everything from legal to household aspects. The criteria identified as important to fulfil sustainability will also need to be weighted through negotiations with the stakeholder group.