



Planning for Drinking Water and Sanitation in Peri-Urban Areas

A proposed framework for strategic
choices for sustainable living



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Photo: Manfred Matz, SIWI

Note to the Reader:

The Swedish Water House Water and Sanitation in Peri-Urban Areas cluster group aims at building networks and partnerships among various kinds of water actors within Sweden and the international arena. Further, it seeks to provide a forum for dialogue where focus is on the problems of delivering healthy drinking water and to safely take care of wastewater to people in peri-urban areas around the world.

Planning for Drinking Water and Sanitation in Peri-Urban areas is a report produced collaboratively by the cluster

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The Impacts of Poor Water Supplies and Inadequate Sanitation

Safe drinking water, good sanitation and hygiene are fundamental to people's health, survival, growth and development. Yet, roughly one-sixth of the world's population lacks access to safe water, and around two-fifths lack adequate sanitation. In terms of human suffering and financial loss the costs are enormous. In developing countries, for example, the costs of disease and productivity losses linked to inadequate clean water and sanitation are equivalent to 2% of gross domestic product.

Children are particularly hard hit, as dirty water and poor sanitation account for most of the 5000 childhood deaths that occur every day from diarrhoea. Water-related diseases also prevent them from attending school – costing 443 million school days every year.¹

Lack of water and sanitation also raises serious issues of personal safety and dignity, particularly in urban areas. Girls in both rural and urban areas drop out of school when they reach puberty, for instance, because toilets are not available that offer any privacy. Women may also drop out of the urban workforce for the same reason. In urban areas issues of personal safety may mean that many people, particularly women and girls, cannot leave their houses at night to go to the toilet. As a result, they are forced to simply throw excreta into the dirty and poorly drained streets outside their homes.²

The consequences of inadequate supply of domestic water and sanitation can be further emphasised by looking at how improved access would contribute to the overall possibility of reaching all the Millenium Development Goals.³

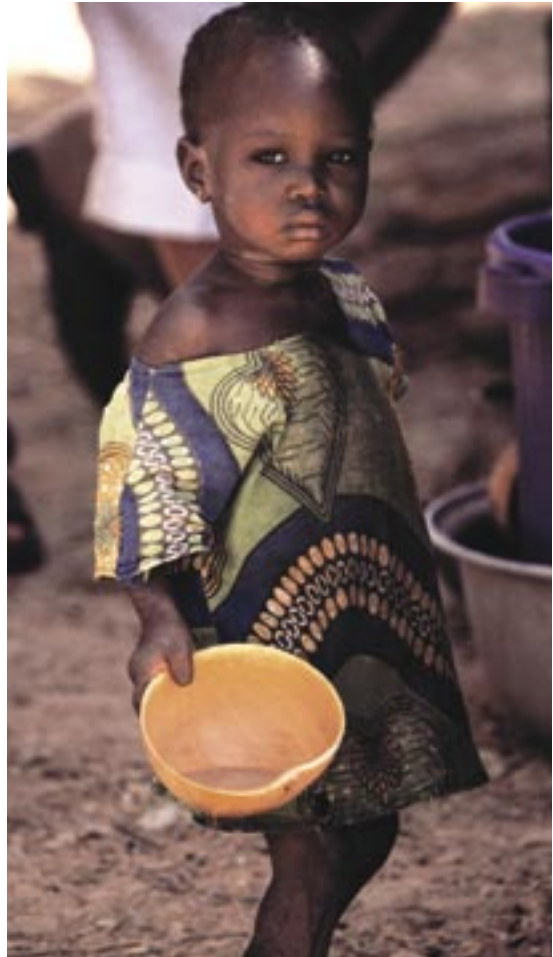


Photo: Manfred Matz, SIWI

Facts

- Urbanisation is accelerating worldwide. If efforts to provide water and sanitation to the unserved continue at the current rate, more than 692 million people will live without basic sanitation, and 240 million without improved sources of drinking water, in urban areas in 2015.
- The peri-urban interface is characterised by strong urban influences, and easy access to markets, services and other inputs. Water and sanitation are complex but critical problems in these areas, due to sustained poverty, poor infrastructure and a lack of institutional frameworks and governmental support.
- Managing water supplies and sanitation is a fundamental dimension of sustainability. Water is needed for survival and hygienic purposes, but water supply issues cannot be sustainably resolved without also providing proper sanitation. On the other hand, disposal and treatment of human excreta can be solved in a safe way without connections to water.

Contribution of access to domestic water supply and sanitation to the Millennium Development Goals³

Millennium Goal	Contributions of domestic water supply and sanitation
<p>Poverty To halve the proportion of the world's people whose income is less than \$1 a day</p>	<ul style="list-style-type: none"> Household livelihood security rests on the health of its members; adults who are ill themselves or who must care for sick children are less productive. Illnesses caused by unsafe drinking water and inadequate sanitation generate health costs that can claim a large share of poor households' income. Time spent collecting water cannot be used for other livelihood activities.
<p>Hunger To halve the proportion of the world's people who suffer from hunger</p>	<ul style="list-style-type: none"> Healthy people are better able to absorb the nutrients in food than those suffering from water-related diseases, particularly worms, which rob their hosts of calories.
<p>Primary education To ensure that children everywhere complete a full course of primary schooling</p>	<ul style="list-style-type: none"> Improved water supply and sanitation services relieve girls from water-fetching duties, allowing them to attend school. Reducing illness related to water and sanitation, including injuries from water-carrying, improves school attendance, especially for girls. Having separate sanitation facilities for girls in schools increases their school attendance, especially after menarche.
<p>Gender equality To ensure that girls and boys have equal access to primary and secondary education</p>	<ul style="list-style-type: none"> Community-based organisations for water supply and sanitation can improve social capital of women. Reduced time, health and care-giving burdens from improved water services give women more time for productive endeavors, adult education, empowerment activities and leisure. Water sources and sanitation facilities closer to home put women and girls at less risk for sexual harassment and assault while gathering water and searching for privacy. Higher rates of child survival are a precursor to the demographic transition to lower fertility rates; having fewer children reduces women's domestic responsibilities.
<p>Child mortality To reduce by two-thirds the death rate for children under five</p>	<ul style="list-style-type: none"> Improved sanitation, safe drinking water sources and greater quantities of domestic water for washing reduce infant and child morbidity and mortality. Sanitation and safe water in health-care facilities help ensure clean delivery and reduce neonatal deaths. Mothers with improved water supply and sanitation services are better able to care for their children, both because they have fewer illnesses and because they devote less time to water-fetching and seeking privacy for defecation.
<p>Maternal mortality To reduce by three-fourths the rate of maternal mortality</p>	<ul style="list-style-type: none"> Accessible sources of water reduce labor burdens and health problems resulting from water portage, reducing maternal mortality risks. Improved health and nutrition reduce susceptibility to anemia and other conditions that affect maternal mortality. Safe drinking water and basic sanitation are needed in health-care facilities to ensure basic hygiene practices following delivery. Higher rates of child survival are a precursor to the demographic transition toward lower fertility rates, and fewer pregnancies per woman reduce maternal mortality.

Millennium Goal	Contributions of domestic water supply and sanitation
<p>Major disease To have halted and begun to reverse the spread of HIV, malaria and other major diseases</p>	<ul style="list-style-type: none"> • Safe drinking water and basic sanitation help prevent water-related diseases, including diarrheal diseases, schistosomiasis, filariasis, trachoma and helminthes. 1.6 million deaths per year are attributed to unsafe water, poor sanitation and lack of hygiene. • Improved water supply reduces diarrhea morbidity by 21 percent; improved sanitation reduces diarrhea morbidity by 37.5 percent; hand washing can reduce the number of diarrheal cases by up to 35 percent; additional improvements in drinking water quality, such as point-of-use disinfection, would reduce diarrheal episodes by 45 percent.
<p>Environmental sustainability To stop the unsustainable exploitation of natural resources; to halve the proportion of people without water and sanitation; to improve the lives of 100 million slum dwellers</p>	<ul style="list-style-type: none"> • Adequate treatment and disposal of excreta and wastewater contributes to better ecosystem management and less pressure on freshwater resources. • Improved sanitation reduces flows of human excreta into waterways, helping to protect human and environmental health. • Inadequate access to safe water and inadequate access to sanitation and other infrastructure are two of the five defining characteristics of a slum.

United Nations Millennium Project Task Force on Water and Sanitation (2005) *Final Report: Health, Dignity, and Development: What Will It Take?* Earthscan, London, UK. Table 2.1, p 18.



Photo: Anna Nörström

The Challenge of Urbanisation and the Supply of Water and Sanitation

In developing countries, the number of people living in towns and cities is growing rapidly – both as a result of natural urban growth and because of migration into towns and cities from rural areas. This will add significantly to the number of people living without clean drinking water or adequate sanitation in urban areas. It will also cause more unemployment and poverty, widening the gap between the urban rich and the urban poor – who lack access to a whole range of basic services besides clean water and sanitation, including health care, education, transport, adequate housing, security, information and justice.

The rapid urbanisation has in many places resulted in an increase in slums. According to the UN-HABITAT definition a ‘slum’ household is one that lacks one or more of the following: (1) water, (2) sanitation, (3) durable housing, (4) a living area with a maximum of two people per room, and (5) secure tenure. It is estimated that more than 920 million

people lived in slums in 2001 – that is about one-third of the world’s total urban population. By the year 2020, as much as half the world’s total urban population, which include those who live in the peri-urban areas surrounding city centres, could be living in poverty.⁴

Poverty is one reason that the number of slums is growing. However, slums are not the only urban areas without adequate access to water and sanitation. It is a fact that in many cities the necessary infrastructure simply cannot be built quickly enough to keep up with growing urban populations. For example, the urban population served with improved drinking water sources increased nearly 36% from 1990 to 2004. Despite this effort the number of urban people unserved is increasing over time (Figure 1).

If efforts to provide sanitation coverage in urban areas continue at the current pace, coverage rates will increase from 80% in 2004 to only 82% in 2015 because of expected population

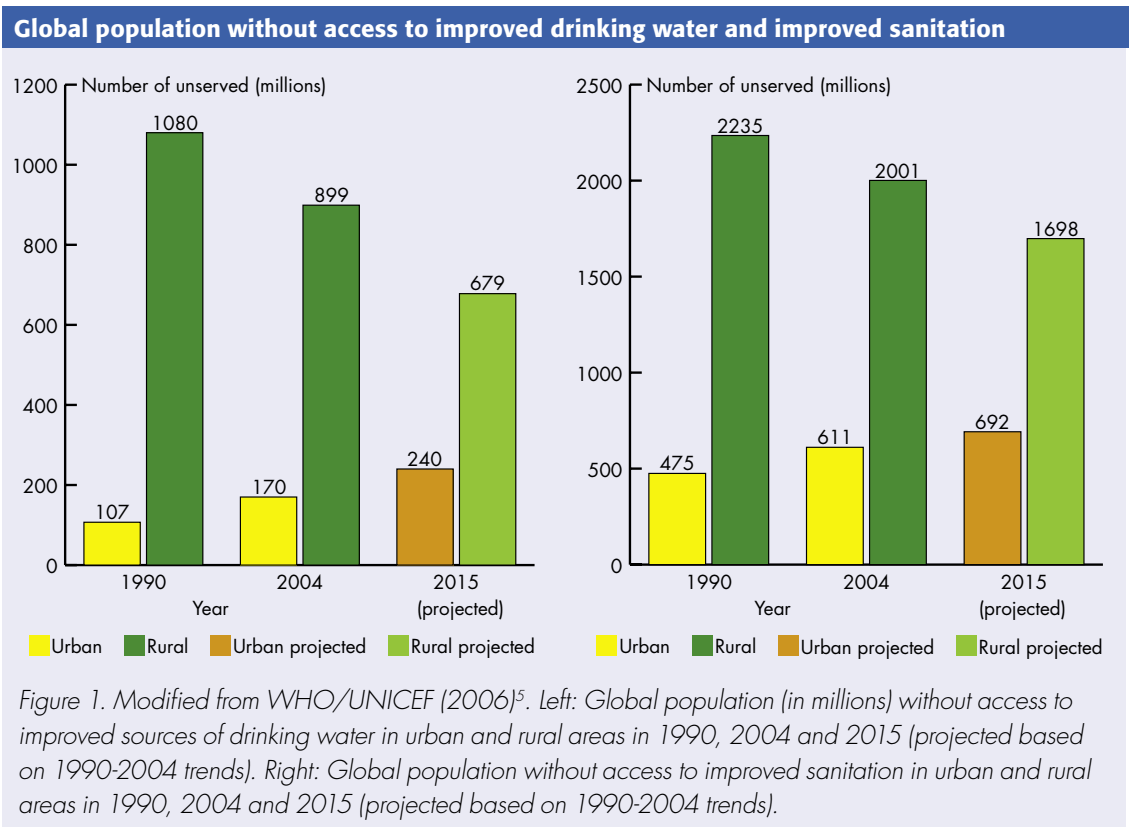


Figure 1. Modified from WHO/UNICEF (2006)⁵. Left: Global population (in millions) without access to improved sources of drinking water in urban and rural areas in 1990, 2004 and 2015 (projected based on 1990-2004 trends). Right: Global population without access to improved sanitation in urban and rural areas in 1990, 2004 and 2015 (projected based on 1990-2004 trends).

increases. In absolute terms, this small increase means that 692 million people will be living without basic sanitation in urban areas in 2015 – 81 million more than in 2004.

Cities and towns account for a large share of the non-renewable resources that are consumed, producing large amounts of waste and serious air and water pollution in the process. This makes good water and wastewater management, as well as provision of adequate sanitation, essential in order to limit pollution and minimise health risks.

In fact, most cities today are environmentally unsustainable. With a substantial percentage of their residents living in areas without adequate shelter and basic services, many cities in the developing world are also socially unsustainable. Decision makers therefore need to view sustainable urbanisation as a crucial issue for the future of humanity. In so doing, they must recognise that the proper handling of water supplies and sanitation are fundamental dimensions of such sustainability.



Peri-Urban Areas – The Interface Between Urban and Rural

Most people have a clear idea of what is an ‘urban’ area and what is a ‘rural’ area, usually visualising some ideal landscape that corresponds to each. But simple divisions like this are meaningless in reality, and of no use to policy makers. Nowhere is there a neat dividing line where the city meets farmland, forest or desert.

In fact, although cities have spread rapidly they have not grown uniformly, because how they grow is dictated by a range of factors. These include the type of terrain and environmental barriers, the availability and cost of transport networks, land tenure systems, the value of the land around the city and the uses to which it is put, and different administrative and political boundaries.⁶

In general, the peri-urban interface is characterised by strong urban influences, easy access to markets, services and other inputs, and ready supplies of labour. The interface can be roughly divided into two zones:

- (1) a zone of direct impact, which experiences the immediate effects of the demand for land exerted by urban growth, pollution, waste disposal and the like; and
- (2) a wider market-related zone of influence – characterised by the production and trade of food and other products such as fibre and fuelwood, to satisfy demand from the urban area.⁶

The Water and Sanitation Challenges and the Peri-Urban Areas

Peri-urban areas face a unique set of water- and sanitation-related challenges which can only be tackled by good planning. Peri-urban areas include open spaces, for example, that are easy to access from built-up urban areas. As a result, they are often used as dumping grounds for urban waste – which has a severe impact on the areas' ecosystems and the people living there. So, it is important to consider the peri-urban zone as an extension of the city rather than as an entirely separate area, and to plan the services provided accordingly.

Such planning must also take into account the wide range of variety found in a peri-urban area, however. The outer zone, for example, will contain rural settlements with urban characteristics – which neither rural water and sanitation programmes nor urban utilities will be able to serve effectively. The peri-urban interface will also contain slum areas and informal settlements that lack essential services

like water and sanitation. The problem of sanitation in such areas is both critical and complex, because within them many people live in sustained poverty in cramped conditions without infrastructure, or any form of secure tenure, and at the mercy of those more powerful than them. Equity is also a crucial issue, as neighbouring communities may have different levels of access to water and sanitation.

As stated previously, overcoming these issues will require good urban planning, which should be used to properly coordinate land-use, infrastructure, urban functions and the provision of green areas. Good urban planning also involves coordinating the social and economic aspects of the development of new or improved infrastructure. It is a process that aims to coordinate the different institutional systems needed to properly provide and manage urban and peri-urban services.



Photo: WHO, P. Vitrot

The 'Rules' of Good Peri-Urban Planning

Photo: UN-HABITAT



In order to achieve sustainable solutions in water and sanitation in peri-urban areas, comprehensive assessments of different options need to be supported. Any meaningful analysis requires a holistic approach – which can only be achieved if it considers (1) the system's technical structure, (2) its organisation, and (3) the system's users (Figure 2).

The technical structure of the water supply system includes necessary treatment and distribution; the sanitation system includes collection, transport, treatment and end management of human excreta, greywater and solid waste. In some areas, industrial wastewater and storm water management are also included in the system structure.

A comprehensive analysis of sustainability should always address the following five issues: health, the environment, the economy, socio-culture aspects and technical function.⁷ Other issues may also have to be included in the assessment, however, in order to take account of issues specific to a particular area – what might be called local planning issues.

Key to sustainable peri-urban development is the promotion and use of a strategic planning process that is based on open, creative and constructive communication and cooperation between decision makers, experts and the public. In addition, planning must be driven by local needs and carried out at the local level.

Planning in this way creates a forum which brings decision makers into contact with business people, researchers and members of the public with local knowledge.

What is more, when interested parties are involved from early on in the planning process, they can help to (1) identify the first steps to take, (2) formulate the main aims of the process, and (3) develop and assess planning alternatives.

For strategic planning to be both integrated and comprehensive it needs to consider the technical, economic and cultural aspects of sustainable development. Public participation can play an important role in preventing the process from being dominated by one of the aspects over the others. Good planning is a systematic process that defines (1) a strategy that sets goals, and (2) what has to be done (in terms of allocating resources) to achieve those goals. The planning process is iterative, in that it can be repeated until an acceptable consensus is achieved. It should also be able to respond to any future changes that may occur.

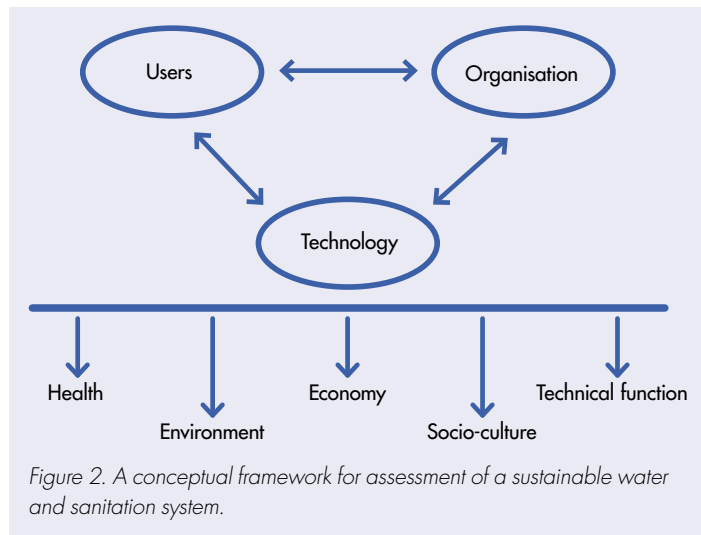


Figure 2. A conceptual framework for assessment of a sustainable water and sanitation system.

The Strategic Choice Approach – A Potential Framework for Sustainable Water and Sanitation Planning

The Strategic Choice Approach (SCA)⁸ is a framework tailor-made for complex planning issues. Decision-makers and planners can use SCA in planning for sustainable water and sanitation systems.⁹ The SCA consists of the following four interconnected stages or “modes”, all of which are linked in an iterative and participatory way:

- **The shaping mode** – during which strategically relevant questions are selected to shape the focus placed on the problem.
- **The designing mode** – during which plausible options are identified and potential strategies for addressing the problems are designed.
- **The comparing mode** – during which the potential strategies designed are evaluated and compared; this involves
 - a) selecting criteria and indicators for use in assessing the potential strategies,
 - b) introducing relevant information to aid the comparison, and
 - c) starting the process of integrating knowledge of involved stakeholders
- **The choosing mode** – while choosing among the potential strategies the process moves towards a phase of decision-making and building of commitment among stakeholders. Lack of knowledge and uncertainties are also identified.

The shaping mode

When entering the shaping mode, problems (known as “decision areas”) are formulated as questions that need to be addressed by the ongoing planning and decision-making process. Formulating specific questions in this way helps planners to focus on particular issues rather than a general issue such as “the water and sanitation system in this area is not working satisfactorily”. This activity is sometimes known as “expressing the problem situation”.

Some examples of how questions concerned with water and sanitation in peri-urban areas might be defined during the shaping mode are:

- What is not functioning today?
- How would the stakeholders like the system to function?

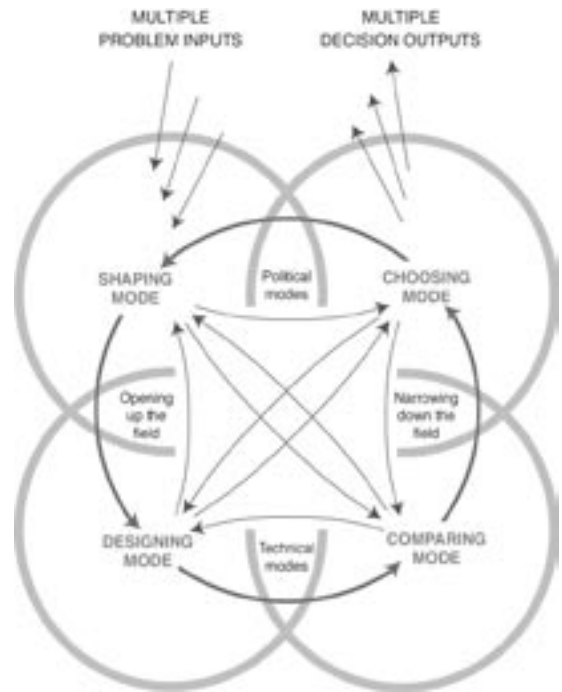


Figure 3. The Strategic Choice Approach. Modified from Friend and Hickling (1997)⁸

- What desires do the population and the authorities have on the service level?
- In what way can water supply be arranged, given the local water shortage or the low quality of the water source?
- How can the problem of polluted groundwater be solved?
- In what way can knowledge concerning local wastewater management be disseminated and maintained among local residents?
- How can proper sanitation be implemented?

The designing mode

During the designing mode, those involved in the planning process explore and identify the different options available to address the different problems identified during the shaping mode. For each problem a range of different potential courses of action will be available. Lack of knowledge,

uncertainties, priorities and reasons for those priorities needs to be identified. Therefore, it is imperative to involve local stakeholders from all levels, ranging from the household to the district and city level, as early on as possible.

As was the case in the shaping mode, the different courses of action identified in the designing mode will reflect the different world views and interpretations of the different actors involved. The design of options at this stage will, therefore, consist of a series of negotiations that define what should be seen as viable alternatives and what should not. Once sufficient options have been identified, they will need to be amalgamated across all stated problems (“decision areas”). The aim is to generate alternative solutions (known as “decision schemes”) that form sequences of options to address the different problems (“decision areas”).

Even if only a small number of options are identified, they can be combined in various ways to produce quite a large number of theoretically possible solutions. This can lead, in turn, to numerous “decision schemes”. However, some combinations of options may be mutually exclusive, some options may be more feasible than others, and some may simply be too unrealistic to consider further. For example, an analysis of the service delivery capacity of the utility or authority can help to eliminate unrealistic options.¹⁰ Weighing up the different option-combinations in this way can reduce the final number of theoretically possible combinations.

The table below contains examples of some solutions and

related different options for questions regarding water and sanitation in peri-urban areas, as defined in the shaping mode.

The comparing mode

When entering the comparing mode, the aim is to weigh up the pros and cons of the different decision schemes. This is done using what are known as “evaluation areas” or “comparison areas”. These evaluation/comparison areas define the criteria for comparing different decision schemes, and are formulated by the participants during meetings. They may consist of both place-specific local criteria and generic globally-relevant criteria. Needless to say, here, as in the previous stages, the world views and individual interpretations of the participating stakeholders play a significant role in the selection of evaluation/comparison areas.

Examples of evaluation areas to be used for water and sanitation in peri-urban areas are:

- Health – difference in risk of infection between the options
- Environment – differences in emissions into air and water, and the use of energy and natural resources
- Economy – annual costs related to the options, revenues
- Socio-cultural aspects – the appropriateness to current or local cultural context, institutional viability
- Technical function – differences in system robustness, risk of failure, effect of failure, structural stability, robustness against extreme conditions, maintenance requirements

Problems	Possible solutions	Options
Personal hygiene	Increased water supply	Connection to urban water supply Use of local wells Collection of rainwater
	Behavioral change	Increase public awareness Education of school children Advocacy campaigns
Unhealthy environment	Proper sanitation	Use of dry latrines and collection services Use of water closets and piped sewers Use of diverting systems and collection services
	Behavioral change	Use of demonstration facilities Community-led Total Sanitation (CLTS) Prioritise sanitation service delivery
Groundwater pollution	Greywater treatment	Connection to urban sewer system On-site treatment Use of treated effluents for irrigation

CLTS - Community Led Total Sanitation

Community Led Total Sanitation (CLTS) is an innovative methodology for mobilising communities to completely eliminate open defecation. CLTS is characterised by participatory facilitation, community analysis and action, and no hardware subsidy. In a matter of often just weeks, communities mobilise themselves to construct latrines and achieve total sanitation. For more information, visit www.livelihoods.org/hot_topics/CLTS.html

The choosing mode

The last phase of the SCA cycle, the choosing mode, addresses two issues: (1) the management of uncertainty and (2) the process of decision-making. To manage uncertainty, decisions are made step by step and, as uncertainties are defined, options are identified to explore them. The aim of the process is to reduce a wide range of potential strategies to a limited number of principal strategies that can be used for decision-making. SCA focuses on the timing of decisions and sort the issues in immediate actions, deferred choices (i.e. decisions that need to be taken in the future), and contingency planning.

SCA results in "action schemes" and "commitment packages" which reflect the various small steps taken throughout

the decision-making process. Such commitment packages could consist of the following:

- Concrete and immediate actions which implement the chosen water and sanitation systems within the peri-urban area in question may be initiated
- A commitment to explore remaining uncertainties further before proceeding
- Choices which may be deferred for future reconsideration, possibly including the timing of such future decision-making
- The formulation of contingency plans to deal with future events that may affect the process at hand

Swedish Example of SCA in Action

In Sandviken, an urban periphery of Stockholm, the SCA model was used to support planning for sustainable wastewater systems. In 2004, a working group of 13 inhabitants and three local municipality officers met five times – 2.5 hours each time – to discuss and compare relevant system structures for the area. STRAD (a software package based on the principles of the Strategic Choice Approach) was used to support structuring the process, documentation, managing uncertainties and integrating knowledge. Twelve relevant criteria and seven potential system structures were identified and assessed, based on risk for infection, protection of receiving water, nutrient recycling, private economy, municipal economy, use of natural resources, robustness, flexibility, user aspects, legislation, densification and topography. The system alternatives consisted of one central system, two local collective systems and four systems with treatment for each household. In this case, the central system was recommended as the most beneficial alternative.

Adaptive Planning for Water and Sanitation in Peri-Urban Areas

Most planners realise that simply scaling-up existing efforts will not substantially expand and improve water and sanitation provision in peri-urban areas, especially not in ways that will benefit low-income groups. The key to ensuring that the poor really benefit is to support a diversity of smaller scale local initiatives. Existing large-scale systems for water and sanitation are public assets that provide opportunities, but it can be difficult (physically and technically) to adapt them to serve the needs of vulnerable groups. Services at the periphery of these systems can be expanded, however, using complementary, small-scale technical systems such as on-site treatment systems. Disposal and treatment of human excreta can for example be provided at a decentralised level in a safe and sustainable way without direct access or connection to water, e.g. with maintained simple pit

compost toilets. To achieve this, however, new or other institutions might be needed to manage and coordinate the two different systems.

There is also need to recognise that measures to address scarcity and investments in new infrastructure will not automatically help the poorest and most vulnerable members of society. These groups will only benefit if steps are also taken to safeguard provision in the more deprived areas and to empower disenfranchised groups and include them in the planning process.

This means that participatory planning processes must be fully inclusive, and must aim to put in place cross-cutting strategies and projects that help to build people's awareness of issues, as well as their level of education, and their capacity to help themselves. At the same time, they must also work to

fulfil the needs of institutions, build sound partnerships and improve information management. So, long-term integrated planning will be required, as will regulatory reviews of new frameworks and methods of enforcing any decisions made.

Urban development needs to balance the needs of marginalised, “squatter” and peri-urban communities with those of the city. As shown by various examples in the World Watch Institute’s report *State of the World 2007*, success comes when governments recognise that the needs of currently unserved groups are legitimate – even when

those groups live in illegal or informal settlements.¹¹ More governments and city authorities need to recognise this.

By the same token, city and government decision makers need to set realistic targets, and to develop achievable actions plans. In this way they should be able to allocate sufficient resources (human, financial and time) to bring safe drinking water and basic sanitation in a sustainable way to their population. This should be a priority for all national and local governments.

Recommendations

- Peri-urban areas vary greatly from area to area. So, any planning must be adapted specifically to the local context and should consider the fact that, as populations grow and settlements increase in size, they will begin to compete with neighbouring settlements.
- Adaptive planning requires a holistic approach. So, any definition of a water and sanitation system should include the technical structure, the organisation (both formal and informal), and the users. By the same token, any comprehensive analysis of sustainability should cover the following issues: health, the environment, the economy, socio-culture factors and technical function.
- Lack of knowledge, uncertainties, priorities and reasons for those priorities needs to be identified. Therefore, it is imperative to involve local stakeholders from all levels, ranging from the household to the district and city level, as early on as possible.
- The Strategic Choice Approach (SCA) can be used to guide efforts to choose sustainable water and wastewater systems in an iterative process that includes: shaping the problem focus, designing potential strategies for addressing problems, comparing those strategies, and finally choosing a strategy to be implemented.

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Planning for Drinking Water and Sanitation in Peri-Urban Areas

A proposed framework for strategic choices for sustainable living

In some parts of the world, the supply of water and sanitation is part of the existing technical infrastructure. However, in many developing countries the situation is quite different, and planning and implementing of an adequate supply is an important task. This is because safe drinking water, good

sanitation and hygiene are fundamental to people's health, survival, growth and development. In *Planning for Drinking Water and Sanitation in Peri-Urban Areas*, the Swedish Water House assesses the challenges in these areas and presents a potential framework for sustainable planning.



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