

## New approaches for improved sustainability in urban environmental sanitation infrastructure and services

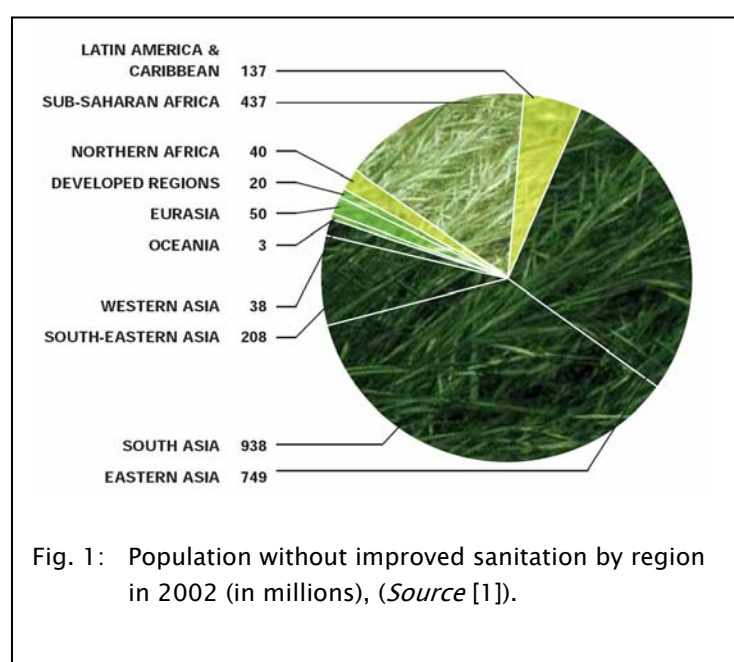
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### Introduction

Safe drinking water and hygienic sanitation facilities are a precondition for health and for success in the fight against poverty, hunger, child deaths and gender inequality. They are also central to the human rights and personal dignity of every woman, man and child on earth [1]. At the United Nations Millennium Summit in September 2000, all 189 heads-of-state adopted the Millennium Development Goals (MDGs), which set clear, numerical, time-bound targets for making real progress, by 2015, in tackling the most pressing issues developing countries face. Among those targets is the Millennium Development Target 10 (as expanded by the 2002 World Summit on Sustainable Development): to cut in half, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation [2].



Still 2.6 billion people lack adequate sanitation facilities, whereby most of these people are located in the Eastern, South-Eastern and Southern Asian region (Fig. 1). Globally, WHO estimates that 1.8 million people die each year from diarrhoeal diseases, 200 million people are infected with schistosomiasis and more than 1 billion people suffer from soil-transmitted helminth infections [3]. A Special Session on Children of the United

Nations General Assembly in 2002 reported that nearly 5,500 children die every day

from diseases caused by contaminated food and water. The adverse impacts of poor sanitation can extend well beyond the direct impacts on health. Health risks and epidemics from waterborne diseases can greatly reduce tourism and agricultural exports, with economic costs much greater than the cost of investments in water supply and sanitation to address the problems [9].

For achieving the goals set for 2015, increased focus will especially have to be given to the urban and peri-urban population. According to the most recent estimates, over 900 million people can be classified as slum dwellers – that is, lacking one or more of the following conditions: access to improved water, access to improved sanitation facilities, sufficient living space, dwellings of sufficient durability and structural quality, security of tenure. In today's world, almost one out of three urban dwellers already lives in a slum. It is such urban poor, living in “slums” that suffer most from deficient environmental sanitation<sup>1</sup> infrastructure and services [4].

This unacceptable situation and recent experiences provide sufficient evidence that conventional approaches to environmental sanitation are unable to make a significant dent in the service backlog which still exists

### **Conventional approaches**

The typical conventional approach addressing the problems related to urban environmental sanitation has been one in which planners and engineers defined the needs of the poor, and then decided what type of infrastructure and service will be provided. Sector professionals then translated hypothetical demand into project designs based on sewerage and treatment technologies commonly used in industrial cities of Europe and the United States [8]. Such supply-driven approaches have seldom been appropriate in the developing country context as many examples illustrate. In Accra, Ghana, 20 years after construction of a sewerage system designed for 2,000 connections, only 130 connections were made. In Ma'an, Jordan, only 690 connections were established to a system designed for 6,000 connections, and in Addis Ababa, Ethiopia, during the 10 years after construction of the new sewerage system, only 10 percent of the expected connections were made [8]. In many of the cases of sewerage systems, which have more or less good coverage, only few have functioning treatment plants. In the Latin American average, about 2 percent of collected sewage receives any treatment. In Mexico more than 90 percent of the existing wastewater treatment plants are non-functional resulting in discharge of untreated sewage into nearby bodies of water. In Mexico City and

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<sup>1</sup> Environmental sanitation is defined as: interventions to reduce people's exposure to disease by providing a clean environment in which to live, with measures to break the cycle of disease. This includes hygienic management of excreta, wastewater, solid waste, stormwater and the control of disease vectors and provision of washing facilities for personal and domestic hygiene. Environmental sanitation involves both behaviours and facilities which work together to form a hygienic environment

Amman (Jordan) new water supply sources had to be identified far from service areas because nearby sources are polluted. For the example of Shanghai, the city had to move its water supply intake 40 kilometres upstream at a cost of US\$300 million because of degradation of river water quality around the city [8].

McGranahan et al. [10] describes three approaches of organizing environmental improvements (Table 1). The supply-driven approach described above corresponds closely to the “planning model”.

|                                      | <i>Planning model</i>                        | <i>Market model</i>                              | <i>Collective action model</i>                   |
|--------------------------------------|--|--|--|
| <b><i>Principal mechanisms</i></b>   | Bureaucratic organization                    | Market processes                                 | Voluntary associations                           |
| <b><i>Decision-makers</i></b>        | Administrators, engineers, public officials  | Individuals, households, vendors, enterprises    | Leaders and members of grass-roots organizations |
| <b><i>Criteria for decisions</i></b> | Policy, and conformity with a plan           | Efficiency: maximization of profit or utility    | Interests of members and visions of leaders      |
| <b><i>Guides for behaviour</i></b>   | Targets, regulations and technical standards | Price signals, incorporating taxes and subsidies | Agreements and accepted goals                    |
| <b><i>Sanctions</i></b>              | State authority backed by coercion           | Financial loss                                   | Social pressure                                  |
| <b><i>Mode of operation</i></b>      | Top-down                                     | Individualistic                                  | Bottom-up  |

Table 1: The organizational basis of three approaches to local environmental improvement (*source* [9]).

The “market model” involves an increasing role of market mechanisms, emphasizing financing of public utilities, promoting competition where the private sector operates and if necessary privatizing public systems. The shortcomings of the market model are low expected revenues for the private sector when pro-poor service is required. Even at the height of interest of large scale private sector participation in water supply and sanitation, few projects sought to deliver services for low income areas. Few dealt with sanitation services where the backlog of investment was considered too high and the revenue stream too hard to secure [11]. Now, as private sector is losing interest in the “emerging” market, it seems even less likely that the large scale private sector can provide the levels of investment needed. However there is still potential for medium- and small-scale private sector participation in some aspects of sanitation and hygiene promotion. Research from Africa and Asia has shown that there is a small but flourishing private sector market in areas such as pit and septic-tank emptying, and in the operation of small localized sanitation systems [17].

Bottom-up approaches or the “collective action model” (Table 1) can be described as self help initiatives of community groups or individuals. Motivation for action is

given by the threatening environmental health situation and little hope that the responsible authorities will provide alleviation. Although often successful in improving the individual or neighbourhood environment, many individual or collective actions are initiated and operated without any coordination with the local authorities and with little thought towards the well-being of the society as a whole. Individual or collective options, which do not follow city wide strategic plans, may transfer the environmental health problem to a neighbouring community or even to the city as a whole. For example in Manila (Philippines) and Jakarta (Indonesia), faced with an inadequate supply of sanitation options, middle-income households have been constructing their own septic tanks. As regulations for soil adsorption systems are not enforced and sludge treatment strategies and facilities are not available, the septic tank effluent and untreated faecal sludge pollutes water bodies and results in a “faecal film” in other parts of the city. While self-provision may have addressed private sanitation needs, it has thus also created costly environmental pollution. Bottom-up approaches, once perceived to be the best alternative to the planning model, can often not solely solve complex environmental problems, especially in urban areas. Such initiatives need to be integrated and harmonized with the public sector.

## **New Approaches**

In a meeting at Bellagio, Italy in February 2000, an expert group brought together by the Environmental Sanitation Working Group of the Water Supply and Sanitation Collaborative Council (WSSCC) agreed that current waste management policies are abusive to human well being, economically unaffordable and environmentally unsustainable. They formulated the following principles as underpinning basis for a new approach in environmental sanitation [5]:

- 1. Human dignity, quality of life and environmental security at household level should be at the centre of the new approach, which should be responsive and accountable to needs and demands in the local and national setting.*
- 2. In line with good governance principles, decision-making should involve participation of all stakeholders, especially the consumers and providers of services.*
- 3. Waste should be considered a resource, and its management should be holistic and form part of integrated water resources, nutrient flows and waste management processes.*
- 4. The domain in which environmental sanitation problems are resolved should be kept to the minimum practicable size (household, community, town, district, catchment, city) and wastes diluted as little as possible.*

Based on these “Bellagio Principles” the Environmental Sanitation Working Group developed the “Household-Centred Environmental Sanitation” (HCES) model [15]. It places the stakeholder at the core of the planning process. The HCES approach responds directly to the needs and demands of the user, nevertheless retaining coordination with the local authority. With reference to Table 1, it could be best described as a hybrid of the three models. Its main components comprise improved practices of planning and recovery of waste as a resource.

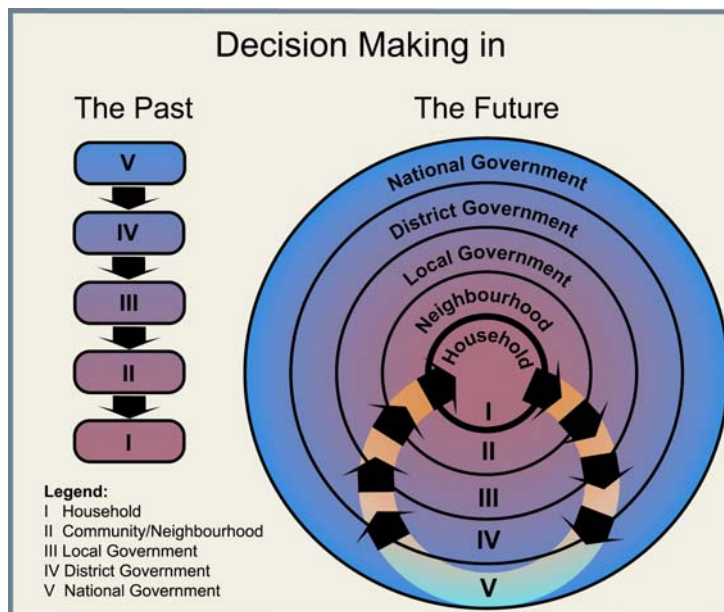


Fig. 2: The household at the core of the planning process. The HCES approach attempts to avoid the problems resulting from either “top-down” or “bottom-up” approaches, by employing both within an integrated framework

One of the key aspects of the HCES approach is that decisions are reached through consultation with all stakeholders affected by the decision, according to their spatial attribution. Thus, individual households determine what on-site sanitation they want; together with other households, they decide on the piped water system they want for their community, together with other communities, they determine how the city might treat and dispose of its waste. On the other hand sanitation policies and regulations, critical for an enabling environment are determined by central government, but their implementation is delegated to the appropriate levels, as close to the household as reasonable.

A further component of the approach is that problems should be solved as close to their source as possible with an emphasis on recovery of waste as a resource. Only if the affected zone is unable to solve the problem, should the problem be “exported”, that is, referred to the next spatial or administrative level.

Innovative organizational partnerships such as public-private, public-community-private or community-private models are a key to finding most sustainable solutions. There are already a number of examples of communities working with local governments, non-governmental organizations or local entrepreneurs to provide low-cost sanitation systems in urban and rural areas of developing countries. The model of Sulabh in India, shows a successful partnership of local government with a

non-governmental organization, which has grown into a formal private operator while retaining its non-governmental organization character [13]. Various municipal corporations in India have entered into arrangements with Sulabh to supply pay toilets and/or subsidized toilets in slums. The community toilet complexes are built and maintained by Sulabh International and have significantly improved the surrounding environment [2].

There is now a consensus among leading experts that improvements towards sustainable environmental sanitation has the following key elements which should play a central role in all projects:

- Attention to users' preferences and providing users with the services that they want and for which they are willing to pay. Household decision making is crucial to effective uptake and use of sanitation options and change in hygiene behaviour.
- Integral involvement of women in sanitation planning, as they are usually most directly responsible for instilling habits of good sanitation and hygiene.
- Availability of a wide choice of technological options to accommodate the contextual diversity and user preferences whereby enhancing technologies that safeguard the environment and maximise the potential of waste products to be reused.
- Creative use of both non-formal institutions (such as neighbourhood associations, nongovernmental organizations, and informal private sector) and formal institutions (such as municipalities, utilities, and local private sector) in planning, implementation, operation and maintenance of infrastructure and services.
- Recognition that hardware investment needs to be complemented by programmes to raise awareness and promote improved hygiene and sanitation, particularly in schools.

## **Outlook**

Preliminary guidelines for the implementation of the HCES approach were prepared, which are mainly targeted at municipal planners (especially those responsible for planning urban environmental services) and civic officials, such as mayors and city managers. These are the people who will initially have to take the decisions on whether and how to apply HCES, who will implement and support the process, and who will be responsible to their citizens for the results. The guideline is intended to assist them to understand the HCES approach, to apply it in their own circumstances, and to be able to explain it to the user communities. The provisional guideline (Fig. 3) provides specific guidance for; a) creating an enabling environment for the use of the HCES approach; and b) undertaking a 10-STEP process for developing and

implementing the HCES approach [16]. These guidelines have been adopted by development agencies and will be tested and evaluated in selected projects.

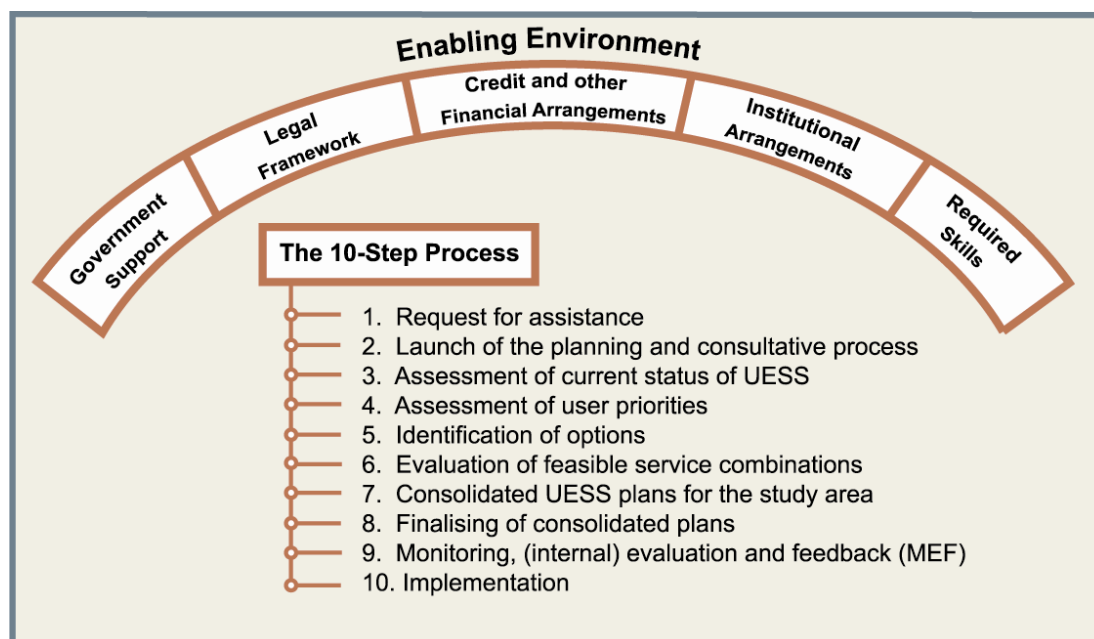


Fig. 3: The two main components of the Preliminary Guideline for the Implementation of the HCES approach: The Enabling Environment and the 10-Step Process (UES = Urban Environmental Sanitation Services)

Furthermore, the Millennium Project Task Force 7 on Water and Sanitation in the Interim Report [2] has suggested tasks for the national and international research community to support activities towards reaching the MDG target 10 for 2015. These research tasks comprise to:

- Better document the economic benefits of improved water and sanitation services;
- Increase research and development on technologies aimed at meeting several "Millennium Development Goals" simultaneously;
- Foster research and development of appropriate, affordable sanitation technologies;
- Conduct further research and disseminate findings on effective strategies for providing sustainable water supply and sanitation services in persistently challenging settings (e.g., unregularized urban communities);
- Develop appropriate technical standards for sewerage and sewage treatment.

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