Excreta and Wastewater Management Contributing to Cities' Economic Development – A Paradigm Shift

On-site sanitation installations will serve the growing urban populations in developing countries for decades to come. Creating an enabling framework for sustainable service provision to users of on-site sanitation facilities is key to attaining the MDG in sanitation. Doulaye Koné

Growing cities – a challenge for sanitation

Cities, as engines of economic growth and social development, require large quantities of natural resources to meet the inhabitants' economic and social needs. Good infrastructure and reliable service provision are important to sustain urban development. In this regard, they enhance investment opportunities and service access to low-income populations. To respond to the lack of sanitation infrastructure, many governments, development agencies and NGOs generally set up latrine programmes for poor and disadvantaged populations. These programmes often do not link infrastructure provision and its necessary management requirements. As a result, most "latrine-based", unsewered cities cannot reliably handle emptying (when latrines are full), transport and treatment of urban excreta and wastewater. Furthermore, planning of conventional water and sanitation infrastructure does not account for local business opportunities involving resources such as water, nitrogen or biosolids. In many cases, these failures place huge financial burdens on municipalities, which have to permanently rely on subsidies to operate and maintain existing infrastructures. The recent WHO guidelines on safe use of wastewater, excreta and greywater pave the way to reuse opportunities other than urban irrigation, thus leading to a new paradigm.

One decade remains to meet the Millennium Development Goals (MDGs) established by the international community in 2000. Yet many countries, particularly in Africa and South Asia, are off track. Examples abound of slow or failing efforts, i. e. inadequate resources and weak governance contribute to over 10 million children dying annually of readily preventable diseases; only three-fifth of the urban and one-quarter of rural low-income households in developing countries have access to improved sanitation facilities [1]. Since the world population is migrating towards cities, the share of the urban population is rapidly increasing and expected to reach 55 % by 2015.

Cities are engines of economic growth and social development fuelled by human activities and requiring large quantities of natural resources to meet the inhabitants' economic and social needs. For city managers, industrial or traditional activities taking place in the urban area are potential sources of revenue from taxes, rents and fees. In some countries, large cities contribute significantly to the GDP [2]. Hence, urban infrastructure planning in the fields of water, electricity or transport is a key element to sustain economic growth. According to the World Bank, infrastructure enhances investment opportunities and growth, which in turn increases productivity, bridges market gaps and facilitates trade. Households also benefit as they are supplied with basic needs necessary to guarantee quality of life, such as access to safe water and improved sanitation [3].

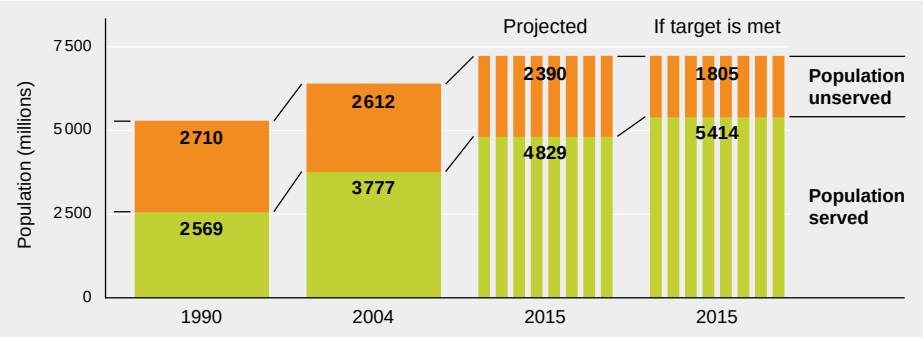
Although the Millennium Development Goals have mobilised the international community, the report published in 2006 [4] shows that half of the developing countries still lack improved sanitation and are far off track to meet the water and sanitation target aiming at reducing by half the number of people without sustainable access to safe drinking water and basic sanitation by 2015 (Fig.1).

In urban areas of developing countries, on-site sanitation systems predominate over water-borne, sewered sanitation [8]. In sub-Saharan Africa, 60–80 % of the houses in large cities and up to 100 % in secondary towns are served by on-site sanitation facilities [9]. Citywide, sewered sanitation is not a viable option although small-bore or low-cost satellite sewer systems may prove feasible in a few selected urban areas. Thus, on-site sanitation installations will serve the growing urban populations in developing countries for decades to come. Upgrading existing systems in "latrine-based cities" is an urgent priority in terms of reducing excreta-related diseases and protecting mankind and the natural environment. It is unrealistic to believe that existing on-site technologies (latrines, septic tanks, small-bore sewers) can simply be phased out given the current lack of resources to service the unserved with networked sanitation infrastructure.

A paradigm shift is needed

To date, global water and sanitation experts agree that it will need a dramatic change to meet the established target

Figure 1: World population with and without access to improved sanitation. (Source: WHO and UNICEF, 2006).



and go beyond "business as usual" [5]. In the past (Water Decade 1980–1990), inappropriate planning and a lack of users' involvement have led to dramatic failures in the massive provision of water and sanitation infrastructure [6]. For instance, many wastewater treatment works built in Africa since the 1980s have become dysfunctional after a few years of operation due to scarce financial and human resources for proper operation and maintenance [7]. When it became apparent that sewer systems were inappropriate in most urban contexts of developing countries, investments in sanitation infrastructure shifted to latrine provision programmes, but omitted to include other components of the sanitation system such as latrine emptying, excreta and faecal sludge management as well as the principles of closed loop recycling.

In its latest guidelines on safe use of wastewater, excreta and greywater [10], WHO introduced a new paradigm for dealing with sanitation in developing countries. Conventional thinking provided sanitary engineers with three (3) intervention tools (sanitation infrastructure, water infrastructure and hygiene education) used individually or in combination for interventions targeting public health improvements. The new guidelines, based on the quantitative microbial risk assessment approach (QMRA), allow to identify a series of barriers and measures to reduce or hinder contamination. Hence, countries are left to define their own health target, depending on the type of wastewater, excreta or greywater use and exposed risk. It links sanitation to agricultural productivity and business and provides, for the first time, realistic wastewater, excreta or greywater reuse alternatives. Implementation of the guidelines is supported by a number of chapters covering non-technical aspects of sanitation and health management. These include: institutional arrangements, socio-cultural aspects, capacity development, private service provision, regulation, and policy. This sanitation intervention concept constitutes a paradigm shift. Indeed, application of the WHO guidelines will require the involvement of the following key national ministries: Health, Water and Sanitation, Agriculture, Environment, Finance, Planning, Justice etc. Therefore, the current WHO guidelines encourage sanitary engineers to open their own network to others.

Ngoutane Pare MM, Cameroon, 2005

Photo 1: Demand for urban and peri-urban dairy products is increasing worldwide. Natural pasture is limited and decreasing steadily due to climate change. Forage plants and cash crops can be grown on excreta and wastewater treatment works to contribute to livestock production and urban food security.

Research opportunity: Linking sanitation to business opportunities

Sandec's research programme Excreta and Wastewater Management (EWM) is placing focus on creating an enabling framework for sustainable service provision to users of on-site sanitation facilities. Our programme develops research-based policy and technological options that contribute to sustainable strategic planning, as well as financial, economic and institutional measures. These enhance resource and nutrient reuse, equity and effectiveness in service delivery and create new business opportunities for sanitation entrepreneurs.

To link treatment units with urban economic development agendas, our research on macrophyte-based excreta and wastewater treatment systems will centre on cultivating plants for use as forage crops to support urban and peri-urban dairy systems (Photo 1). The research and investigation will focus on maximising the nutritive value of forage grown on treatment units, nitrogen uptake efficiency and on minimising health risks for humans and animals. Use of downstream excreta and wastewater irrigation as polishing or final treatment step will be tested on non-water-based forage crops (legumes, grass). The expected income derived from the sale of forage is likely to contribute to maintaining treatment works operational and to cover maintenance costs. Such infrastructure has a far greater urban economic development potential.

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