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THE COMPLEXITY OF WATER AND SANITATION PROVISION IN PERI-URBAN AREAS IN DEVELOPING COUNTRIES: THE EXAMPLE OF ADENTA, GHANA

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Abstract

Urbanisation and population growth are increasing the pressures on cities, resulting in people living without adequate provision of water and sanitation. This is particularly the case in peri-urban areas surrounding urban centres in the developing world, where expansion of infrastructure cannot keep pace with rapid urbanisation. The problem is accentuated by peri-urban areas falling between the different administrative divisions and legislative systems for urban and rural areas. In Adenta, Ghana, a mix of different solutions for water and sanitation provision is presently used. This article presents the current situation in Adenta, and the challenges and dynamics in service provision as seen by stakeholders representing assembly officers, assembly members and service providers. Further, it discusses several critical issues for a municipal administration, faced with rapid urbanisation and a population that in many areas is still under-served with respect to water and sanitation. Finally, an integrated and systemic multi-pronged approach to service delivery is outlined, aiming to resolve *what* should be the priority areas; *how* to increase service delivery; *where* to start; and *who* should take action. Additionally, the role of the interconnectedness of technical, social, financial and behavioural systems, as well as the need for appropriate timing, is highlighted.

Key words – Ghana, cross-sectoral, stakeholders, peri-urban, planning, water and sanitation provision, urbanisation

Introduction

In many parts of the world, urbanisation and population growth are increasing the pressures on expanding cities, resulting in more people living without adequate provision of drinking water and sanitation. For example, the number of urban dwellers using improved sanitation has risen by 779 million since 1990, but has not kept pace with urban population growth of 956 million (UNICEF/WHO, 2008). According to UN predictions, the overwhelming majority of urban growth will take place in small and medium sized cities in the developing world over the next two decades (UN-Habitat, 2006); in other words, in cities with the least capacity to manage it. This problem is especially abundant and growing in the peri-urban areas surrounding urban centres, where expansion of infrastructure cannot keep pace with rapid urbanisation. Since 1990, the urban population without improved drinking water sources increased from 107 million to 137 million, and most of this increase took place in urban areas of the developing world (UNICEF/WHO, 2008). In addition to this increase in number, it should also be remembered that improved drinking water sources are defined as "sources that, by nature of their construction or through active intervention, are protected from outside contamination, particularly faecal matter. These include piped water in a dwelling, plot or yard, and other improved sources" (ibid), and

therefore they are not necessarily household connections.

Planning of sanitation and water is generally a complex issue, dealing with not only infrastructure but with financing, supply chains, users acceptance and willingness-to-pay. However, it is particularly complex at the municipal level where many different, and sometimes conflicting, aspects need to be considered in close relation to the implementation of new or upgraded services. Such aspects may be densification pressures from both housing and commercial activities, the state of a range of already existing services, and the protection of natural resources and environments, as well as diverse income, education levels and various cultural habits of the population. This leaves the local planner or decision-maker in a difficult position, where complex and rapid urbanisation patterns need to be met with insufficient time and resources to address the various aspects affecting the success or failure of planned service delivery. For example, a study of water supply services in Mozambique found that the factors limiting service were due mainly to lack of adequate treatment, inadequate management of distribution and lack of knowledge among operators (Matsinhe, 2008). Difficulties are augmented by local planners having few opportunities for exchanging experiences with colleagues being in similar situations.

The aims of this article are twofold. First, it will present Adenta, a fast growing area bordering to Accra, as an example of a peri-urban area where a mix of different solutions for water and sanitation provision is presently used. Thereafter, the article will discuss several issues and challenges for the municipal administration, which is faced with rapid urbanisation and a population that in many areas is still under-served with respect to water and sanitation. The objective of this article is thus to provide a better understanding of the complex dynamics affecting urban sanitation planning, especially in areas on the fringe of, but often not covered by, centralised systems. Such a holistic description and problematisation will, hopefully, support planners and decision-makers in their task to develop better futures for all inhabitants.

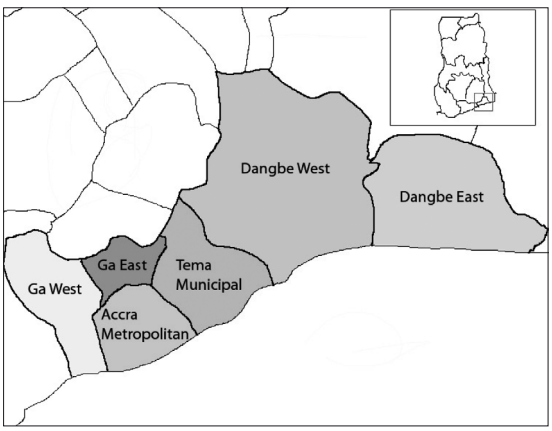

Figure 1. *Districts in the Greater Accra Region before the inauguration of four new districts in February 2008. The smaller figure shows the ten administrative regions in Ghana.*

Urbanisation of peri-urban Accra

Ghana is an Anglophone country situated in West Africa. It is about half the size of Sweden and has approximately twice the population. The capital Accra is part of the Greater Accra Region, which is the smallest of ten administrative regions in Ghana (Figure 1). Although the Greater Accra Region occupies only 1.4 % of the total land area of Ghana, it is the second most populated region, accounting for 15.4 % of Ghana's total population. Accra is one of the fastest growing cities in West Africa. In 2000, the city had an estimated population of 1.7 million with a population growth rate of about 3.4 % annually (GSS, 2002). For the period 1991–2002, the estimated physical expansion of urban Accra was 25 km^2 per year (Yankson et al., 2004). Outside the official city boundary, the adjoining districts of Ga and Tema are growing at even faster rates, 6.4 and 9.2 % respectively, leading to urban sprawl and uncontrolled physical expansion beyond the municipal boundary of Accra Metropolitan Area (Twum-Baah, 2002).

The legal boundary of the city has been redefined several times in the past. The Structure Plan produced for Accra in 1992 provides a framework for guiding the current and future development of the cities of Accra, Tema and Ga in an integrated manner. The plan, however, does not provide any measures for dealing with areas which have already developed in a haphazard manner without any spatial planning, nor does it consider the ongoing urbanisation of peri-urban areas, characterized by an increasingly sprawling cover of large one-family housing at various stages of completion, which is in places mixed with fairly compact and preserved indigenous villages and high density settlements (Yankson et al., 2004).

Adenta Municipal – a new district in the Greater Accra Region

Each administrative region in Ghana is headed by a Regional Minister who is the direct representative of the government. These regions are further subdivided into areas of district assemblies, which are the highest politi-

cal and administrative authorities. The domination and power of the district assembly depends on the settlement's population or the degree of urbanisation. In general, a district assembly with more than 1,000,000 inhabitants is a metropolitan assembly, whereas a district assembly with more than 400,000 inhabitants or a high degree of urbanisation is a municipal assembly (H. Esseku, pers. comm.).

The Greater Accra Region used to have six districts (Figure 1), but in 2007 new districts were created by the president of Ghana. One of these new districts is Adenta Municipality which used be a Zonal Council belonging to Tema Metropolitan District. Inaugurated in 2008, the boundaries for the new district are not yet finalized (L. Baeka, pers. comm.) and in Figure 2 only preliminary boundaries are shown, where Area 3 shows the actual Adenta Township and Area 2 shows all the smaller communities also included in the district.

Governance and administration

Adenta district is a municipal assembly due to its high degree of urbanisation, and due to its elevated status a whole new administration had to be put in place and new district plans and policies had to be produced. Although Adenta Municipal today is a separate administrative authority, this geographic area has been, and in some ways still is, considered as part of peri-urban Accra.

In Ghana, each administrative enclave, such as Adenta Municipal, is under the control of a Chief Executive who is appointed by the president, thus representing the central government, but derives his/her authority from a local assembly, i.e. the assembly has a final say in the approval of the appointment. Two-thirds of assembly members are elected through local elections, while the remaining one-third is appointed by the government. Adenta Municipal District has only four electoral areas. There are 63 employees in the core units of the assembly administration, and the main affiliation of the staff is presented in Table 1. In the district, there are 34 communities and based on an estimated growth rate of 2.6 % the current population estimate is 79,014 (AdMA, 2008). Further, based on the 2000 census, approximately half of the population in this area are living in the community Adentan East (GSS, 2002), i.e. Area 3 in Figure 2.

Water supply

According to the National Water Policy (MWRWH, 2007), district assemblies are responsible for the planning, implementation, operation and maintenance of water and sanitation facilities and are also the legal owners of public infrastructures in rural communities and small towns. For urban water supply, however, the Ghana Water Company Limited (GWCL) is responsible for overall planning, managing and implementation. There are three main water supply services in use in the district: centralised distribution, tanker service and sachet water/bottled water. Private boreholes are also used, but not included in this article.

There are three piped-water systems in the district. First, the main centralised system is managed by GWCL, which supplies the Accra-Tema Metropolitan area with water from two sources: Densu River and Volta River. This water supply and distribution are managed through two water works (Weija and Kpong) and three regional offices. However, only limited parts in the Southern areas of the district are actually covered by this supply

Table 1. *Core units in AdMA and their number of employees.*

Core units	No. employees
Central Administration	8
Environmental Health, Sanitation	11
Waste Management	3
Planning	2
Budget	1
Internal Audit	1
Finance and Revenue	13
City Guards and Task Force	11
Works	8
Transport	5
Total	63

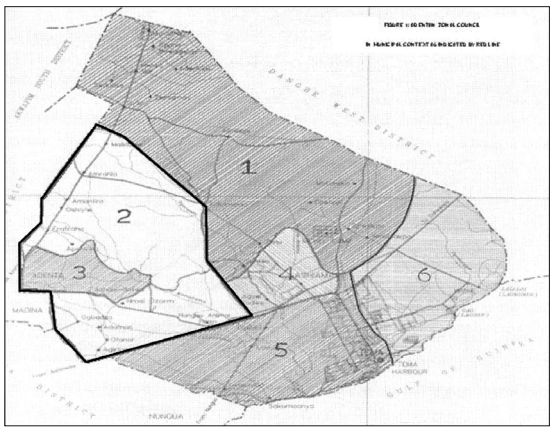

Figure 2. *Preliminary boundaries (indicated in heavy black) of Adenta Municipal in Tema Metropolitan Context. (Source: AdMA Planning Unit)*

scheme, and within the supplied areas the total customer connections are 3,484 but only 1,952 (56 %) are active (B. Bilabia, pers. comm.). Water is supplied once or twice per week and customers are billed monthly. If the bill is not paid within one month the customer is disconnected and has to pay a fee for reconnection. The water charge for domestic use is 0.66 GH¢/m^3 for 1–20 m^3, thereafter 0.91 GH¢/m^3, and for commercial use the charge is 1.0 GH¢/m^3 (J. Ayolgo, pers. comm.). In February 2009, 1 GH¢ (Ghana Cedi) was approximately 0.5 Euro.

Second, according to the GWCL definition, the Northern parts of Adenta Municipal belong to the Dodowa district and, therefore, the supply should come from the North. In Dodowa there is a borehole with an installed capacity of 1,680 m^3/day, but only one community in Adenta Municipal (Amrahia) is supplied with water from this source (M. Botse-Baido, pers. comm.). Third, the last system is the Oyibi Water Area Scheme situated in Northern Tema district, which is a small system constructed with funding from DANIDA and managed by a local administration. It extracts water from boreholes in two villages in Tema and serves 7000 people including one community (Malejor) and the Valley View University in Adenta Municipal. Water from Oyibi is sometimes rationed in the dry season, and the cost is 1.65 GH¢/m^3 or 0.03 GH¢ per bucket (Staff at Oyibi Area Water Scheme, pers. comm.).

For those without access to piped water, delivery of water by tanker services is very common for many people in Accra and Adenta alike. To date, services from tankers and vendors are actually often more reliable compared to piped water, even in some of the areas served by the GWCL mains. The cost for tanker water is around 5–10 GH¢/m^3, an amount not set by any tariff but rather depending on factors, such as location, season and type of truck (D. Van Rooijen, pers. comm.). Tankers are also used as an extended arm of the piped distribution network. For example, GWCL has installed large polytanks in areas where the network supply does not work as a way to tackle the supply deficit. People in the neighbourhood can then buy water there at a flat rate comparable to the price for piped water.

Finally, small-scale private water providers play an important role in fulfilling the critical water needs of a high proportion of the urban population. Water in sachet (plastic) bags should come from legal sources and thereby have the same standard as the treated drinking water distributed through the piped system. However, this is not always the case and the sachets might be produced from uncontrolled sources. One sachet bag of 500 ml of water cost 0.05 GH¢, which is about 200 times the cost of drinking piped water in your house, and 1.5 L of regular bottled water cost about the same as 1 m^3 of piped water. For comparison, some examples of prices for 1.5 L of bottled water are: 0.55 GH¢ for BonAqua (local, bottled by the CocaCola Company), 0.7 GH¢ for AquaSplash (local), 3.95 GH¢ for Evian (France) and 6.70 GH¢ for Volvic strawberry taste (France).

Environmental sanitation

According to the Environmental Sanitation Policy (MLGRDE, 2007), district assemblies have the overall responsibility for: i) waste management (covering collection and sanitary disposal of wastes, including solid wastes, liquid wastes, excreta, industrial wastes, healthcare and other hazardous wastes; stormwater drainage; and cleansing of thoroughfares, markets and other public spaces); ii) public health management; iii) environmental monitoring; iv) provision of works related to environmental sanitation facilities; and v) planning, monitoring and public relations. Waste management is to be carried out by the Waste Management Department within the assemblies, who may provide the services either directly or indirectly through private contractors or franchisees. All other environmental sanitation tasks are to be carried out by the Environmental Health and Management Department, but with private sector involvement where appropriate.

As with the water supply coverage, it is difficult to give actual figures on sanitation services provided in Adenta Municipal. What is available is an overview of the variety of sanitation facilities in the Greater Accra Region in 2000, i.e. at the time of last national census (Figure 3). In the region, 32 % of the population used flush toilets, although the numbers of WCs out of service might be significant. The use of public toilets is common, but here there is no distinction made between

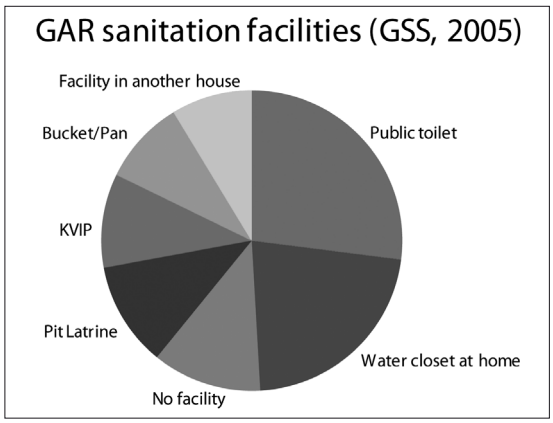

Figure 3. *Distribution of sanitation facilities in Greater Accra Region.*

different types of shared/public toilets. The present trend is that future public toilets will be built with flush toilets (Y. Sarkodie, pers. comm.). Public toilets cost 0.06–0.2 GH¢ to use.

A typical urban community in the district is described as having slum-like characteristics at the centre (i.e. the old rural village) but nicely planned infrastructure at the periphery (i.e. the now urbanised countryside). In the fringe areas of Accra, such as Adenta, no houses are attached to a main sewerage system and the facilities available vary widely between the settlements. Systems for liquid waste are generally solved between the residents and private service providers, or by the residents themselves. It is estimated that almost half of the houses in the newly developing areas have flush toilets that empty into septic tanks in gardens. A significant part of the population is still depending on pit and pan latrines. Liquid waste collected within the district should be discharged at a septic treatment plant located on the road to Tema. However, there is a big discrepancy between the estimated collection from the households and what actually ends up at treatment plants.

Solid waste collection is either based on house-to-house collection (in high and middle income residential areas) or on communal central containers (in high density low income residential areas, such as the old rural villages). Planned areas thus have their waste collected by contractors who provide house-to-house service for a monthly fee, while the poor households, who cannot afford the monthly fee, are provided with skip containers by the assembly. Today there are several communal containers in the area but the goal is that, with time, they will all be removed and replaced by the house-to-house system. Privatisation of services became part of the Ghanaian official policy in 1995, and both systems can be run either by public or private operators. In the district, collection is mainly performed by the private company Zoomlion Ghana Limited, and solid waste is disposed of in a landfill located in Ga East district. During 2009, a pilot project will start in the SSNIT-flats (79 blocks, approximately 16 families/block) with source separation of plastic, paper and metal with the ambition that it will turn into a permanent solution and be replicated in other areas.

Complexity and challenges

Faced with rapid growth and urbanisation and a population that is under-served with respect to water and sanitation, the Adenta Municipal Assembly (AdMA) has the challenging task of creating a strategic plan for service development. Provision of water and sanitation can be solved in many different ways, as exemplified by the text above. However, in addition to technical solutions there are institutional and organisational issues, as well as sociocultural aspects, to be considered when discussing problems and solutions, challenges and opportunities. Two studies have been carried out to clarify how people working with water and sanitation perceive the situation today and to identify local constraints. The first was an interview study with ten participating stakeholders, i.e., officials directly or indirectly involved in water and sanitation issues within the district (Norström et al., 2008). Those directly influencing decisions were AdMA unit heads or electoral area heads (i.e. assembly members), while those influencing decisions indirectly were representatives of affiliate projects such as waste management companies. The second study was carried out at a workshop where 12 assembly officers from different units within AdMA participated (Norström et al., 2009). During the workshop, the assembly officers formulated problem areas connected to water and sanitation provision in the form of questions in need of response (Table 2). These problem areas covered: providing households with water and toilets, collection and disposal of liquid and solid waste, improving drainage systems, empowering women and the disabled, providing education and reducing school drop-out rates, decreasing traffic and transport problems, improving internal revenue, and increased awareness of citizen rights. The inter-linked problem areas fall into the five main themes (Figure 4) discussed below.

Water supply and sanitation services

The central issue in both studies was water and sanitation services in Adenta Municipal District. As can be seen from the context overview given in the beginning of this article, both of these services are currently a complex patchwork of different services, much as the district itself is a mix of urban, peri-urban and rural settings, as well as un-planned and planned settlements. For both water and sanitation there are a number of potential technical options, where options for providing clean water include boreholes with quality control, rainwater harvesting, using local surface water, importing water in tankers and extension of the piped-water GWCL system. Choosing among these options is a matter of setting priorities and goals within the municipality. However, there are also significant uncertainties connected to the different options, such as when (or if) the centralised GWCL system will be extended and how much the occassional, but today quite frequent, power cuts will affect the overall performance of the different options. During the workshop there was also an interesting discussion about making sure that every household had access to water, versus the need of making sure that it was

Table 2. *Problems for the assembly connected to water and sanitation formulated as questions at the workshop by assembly officers.*

Main theme	Problem areas
Water supply and sanitation services	How to make sure that every household has water ? How to make sure that every household has clean water? How to improve drainage? How to make sure that solid and liquid waste is collected, managed and properly disposed off? How to make sure that every household has a toilet facility?
Infrastructure and spatial logistics	How to decrease transport? How to improve public transport? How to provide public toilets for non-residents? How to improve attractiveness of local markets?
Internal organization	How to get necessary departments in place? How to improve internal revenue? How to make sure that the planning procedure is complete? How to make sure that plans are followed?
Rights and obligations	How to stop unauthorized dumping of refuse? How to improve awareness of rights and obligations?
Social welfare and education	How to make sure that there is enough education (schools, teachers, levels) in the district? How to reduce school dropout (junior and senior high school)? How to empower women (finance, education, decision power)? How to empower the physically challenged? How to take advantage of the in-moving ageing population?

also clean water. The participants where not in agreement, but the decisions made on such priorities will influence both choice of technical options and the setting up of regulations for quality control and monitoring.

During the interviews there were a variety of priorities and focuses on sanitation issues as well, but in general, solid waste management and the common practice of open defecation seemed to get the most attention (versus other excreta management issues). Only the Environmental and Health Officer argued that the most prominent sanitation issue in the municipality is the disposal of wastewater. During the workshop, all participants agreed that it was necessary to make sure that solid and liquid waste was collected, managed and properly disposed off, but it seemed as if many representatives saw this mostly as a question of solid waste management and improving drainage systems (i.e. the most visible components of sanitation). Similar to the discussion on priorities in water provision, there was a debate where most participants argued for the aim to provide sanitation facilities (i.e. flush toilets) to every household as opposed to improving public facilities. However, one assembly member argued that some of the critical sanitation issues could be addressed if the assembly would soften its stance on only building public toilets in commercial areas, and also build public toilets in communities where open defecation is a major sanitation issue. He believed that even though there are problems connected with public toilets, such as inadequate maintenance, long queues in the mornings and the need for improving health aspects and incentives for using the latrines, this is a valid option to consider when centralized systems are not really feasible.

Integrated infrastructure and spatial logistics

Working with water and sanitation systems includes working in parallel with other existing and developing infrastructure. For example, for better utilisation of meagre resources, development or upgrading initiatives can be combined with improvement of road constructions. In this way, improved access to public transport can be coupled to the functionality and attractiveness of the municipal space, such as improved access to sanitation facilities. Today, all existing public toilets are either privately owned or publicly inherited from Tema Metropolitan, and according to the Environmental and Health Officer, no public toilets have been constructed in the district since its inception. One expected step towards improvement is the 5-year action plan currently under development that will advocate for the provision of toilet and bathroom facilities in all public places with intense activities, such as lorry parks and markets.

As previously described, a typical urban community in Adenta Municipal has slum-like characteristics at the centre but nicely planned infrastructure at the periphery. In addition, there are also low-income settlements in the more remote peri-urban areas. Logistics are therefore an

issue when it comes to reaching all communities and settlements with services, and to provide equal opportunities for all. The Environmental and Health Officer stressed that logistics certainly applies to his unit; for example, customers from distant communities are asked to provide transportation for municipal officers to come fix things if there are problems, which will of course impact on the customers willingness to call for help. In addition, some remote areas are not covered by services at all, and one assembly member commented the need for waste contractors to extend their services to include these areas.

Internal Organization

As a new municipality, AdMA is also facing challenges regarding internal organization, capacity development and planning. These aspects affect the capacity of the municipality to provide for services, both from managerial and economic points of view. The different core units in the municipality are relatively new and sometime still in the process of developing roles and organizational structures. Routines, policies and norms are also still being established, as are the procedures for planning. During the visioning exercise of the workshop, several participants alluded to the need for a well-functioning institution in order to deliver a complete planning procedure, improved infrastructure and policy, and follow-through for service delivery.

Improving internal revenue flows is also a key concern for the municipality. During a brainstorming session around problem areas, internal revenue was selected as one of the five most important areas to address for the assembly. There are a number of potential solutions for improving revenue, e.g., to impose fines and sanctions, to increase rates for service delivery, to control licenses for building or operation, to implement new taxation, or even to establish businesses and other investments to improve the income of the population so that they can afford services. However, there are limits to each one of these options. The assembly has trouble enforcing fines and sanctions as this requires manpower and strong political will. It also demands awareness-raising efforts within the population about what happens if they misbehave or default on service payments. Additionally, collecting rates for service delivery demands sufficient technical expertise and management skills to offer a quality service for which people will keenly pay, and a marketing of these services to bring them on-board. Some revenue options are not within the direct control of the municipality, e.g. the Ghana Water Company collects and sets the rates for piped water supply based on guidelines provided by the Public Utilities and Regulatory Commission, and tax increases are controlled by the national government.

Rights and obligations

This theme includes rights and obligations for the authorities as well as for the individual. For the authorities, such aspects are often stated in various kinds of documents and policies. In Ghana, the overall responsibilities for an assembly are stated in the National Water Policy and the Environmental Sanitation Policy, although each district is also responsible for creating their own policies and implementation plans. AdMA does not have their own written policies regarding sanitation provision yet, but are in the process of developing such guidelines. According to the Environmental and Health Officer, they will be in-line with the Government's lean towards more private sector participation, and thus advocate private provision and supervision of waste management services.

When it comes to the general population, the participants believed that it is important to improve their awareness of rights, as well as obligations. One assembly member stated that there is a perception among parts of the communities that since they pay taxes, it is the responsibility of the assembly to provide services. In areas where waste is collected by contractors, some residents have not registered with a waste contractor, which has resulted in dumping of solid waste on unoccupied lands and in open drains. Residents need more education regarding their obligations as citizens and what services can be expected from the assembly. On the other hand, it is not only a lack of obligation or enforcement of policy, but also a questions of logistics and organization. The absence of dumping sites within the district as well as the ineffectiveness of some of the contractors in charge of waste collection were also pointed out by both an assembly member and the Planning Officer as being significant contributing factors to the prevalent situation of poor sanitation.

Another assembly member believed that there must be a better understanding among all stakeholders so issues such as the kind of services demanded by the residents, and what fees can be charged by the service providers can be aligned with the effectiveness and efficiency of service delivery. The Planning Officer also said that regarding service provision to the communities, there is a high possibility of misconception on the part of the assembly relative to residents' conceived needs, and that the latter are likely to have better knowledge of the current situation. Hence, she believed that the local residents are key stakeholders who should be consulted and involved in problem identification and problem reporting. Today, the assembly is working to encourage such dialogue by attending residents associations meetings.

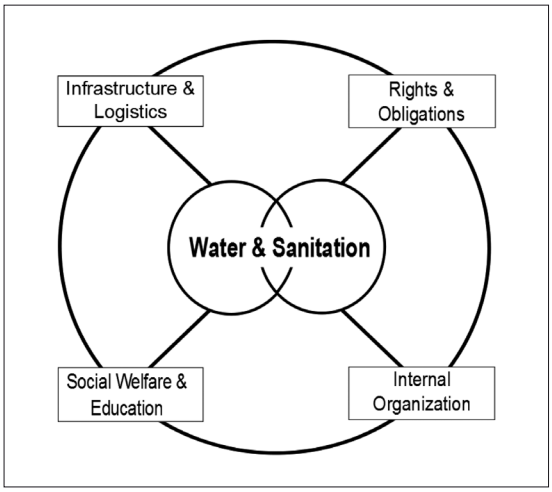

Figure 4: *Formulation of the main priority problem areas affecting decisions in the field of water and environmental sanitation.*

Social Welfare and Education

Several of the interviewed stakeholders argued that the greatest challenge for realising good sanitation is the attitude of the residents. The practice of open defecation and the indiscriminate throwing of solid waste are common, and there is lack of knowledge concerning the links between sanitation, behaviour and health. One assembly member argued that to ensure a good healthy environment there is a need to change behaviours and attitudes towards sanitation in general. He believed that one way is to make people aware of the link between diarrhoea and loss of school and labour days, i.e. both the societal and individual costs of poor sanitation. One proposed strategy is public education, especially for school children and youth on the dangers of poor sanitation. However, improving education in the district is a challenge in itself and requires investment in infrastructure (schools) and long-term training, recruitment, and retention of teachers and students. It is one area where the linkages and interdependence of several sectors become evident. Participants in the workshop pointed out that improving education will improve sanitation and also impact internal revenues as the educated population is more likely to understand the need for service charges and will also have a higher income to pay for them.

Regarding provision to the poor, an emphasis is on the mobilisation of communities to improve their own sanitation situation by stressing the advantages of sanitation solutions defined by the local residents themselves, including the women, disabled and elderly. There seem to be almost a consensus that active community participation in community-led sanitation activities is paramount if the 'war' on poor sanitation is to be won. For example, effective waste disposal cannot be achieved by only one method. Separation of waste at the source, recycling, and composting are all mentioned as possible alternatives, but to work on a large scale, requires more people to do their part. Here, the empowerment of women was brought forth as a necessity since they are the ones most involved in water and sanitation tasks in the home. However, how such public education is supposed to be carried out to reach a significant part of the communities is not yet defined. It is also not clear how the communities will be educated and informed about the wide range of available alternatives for sanitation solutions, how they will be supported in implementing their choice of solution, and how these systems should be sustained.

Conclusions and future work

In this article, different aspects of water and sanitation provision have been discussed and also how the various aspects tend to interconnect. The need to expand and upgrade services in the district is evident and the findings of the two studies underpinning the article give a clear picture of the challenges surrounding such service development. Furthermore, since the different proposed solutions all have their positive and less positive aspects, a mix of technologies and organisational setups is likely to be a fruitful strategy. Also, to make the most of scarce resources, any selected setup must address several issues at once, i.e., in terms of making the most of technical, organisational, educational and financial capacities.

The above points towards the need for employing a multi-pronged, but still integrated, approach to improvement of service delivery. In such an approach, critical issues to resolve are *what* should be the priority areas; *how* to increase service delivery in a way that matches municipal capacity, economic constraints and the needs of the population; *where* in the delivery systems to start dealing the priorities; and *who* should take such action. Additionally, a critical issue to understand and manage is how the interconnectedness of technical, social, financial and behavioural systems plays a role for the choice, and the success/failure, of system solutions. This seems to be a matter of making the interconnectedness play out in favour of improved service delivery – and not as a counterproductive mechanism. Here, the appropriate timing of different interventions also becomes an important tool. All in all, improvement of water and sanitation provision in settings like Adenta Municipal District seem to depend on a strategic, systemic and multi-disciplinary planning approach in order to include all interrelated aspects. Such an approach

will also highlight potential opportunities to collaborate with other stakeholders in win-win situations.

This article has presented challenges and dynamics in provision of water and sanitation as seen by stakeholders representing the assembly officers, assembly members and service providers. It has also outlined some elements of an integrated and systemic approach to service delivery. The next step to validate the findings should be to look into the needs and challenges from the perspective of the residents, as well as the views of active small-scale water and sanitation entrepreneurs. An extended interview and workshop study with the aim to uncover and assess the views of these different groups on service provision and sanitation challenges is, therefore, essential.

References

AdMA (2008) *Urban Poverty Reduction Project – Adentan.* CB-DP-2008. Preliminary report compiled by Adenta Municipal Assembly.

GSS (2002) *Summary Report of Final Results, 2000 Population and Housing Census.* Ghana Statistical Service.

Matsinhe N.P. (2008) *Challenges and Opportunities For Safe Water Supply in Mozambique.* PhD thesis in Water Resources Engineering, Lund University, Report No 1046, Lund.

MLGRDE (2007) *Environmental Sanitation Policy – Draft Final, May 2007.* Ministry of Local Government, Rural Development and Environment, Government of Ghana.

MWRWH (2007) *National Water Policy.* Ministry of Water Resources, Works and Housing, Government of Ghana. June 2007.

Norström A., Kain J.-H. and McConville J. (2009) *Workshop report: An approach to integrated planning of water and sanitation.* 16 pp.

Norström A., Owusu E.S. and Van Rooijen D. (2008) *Sanitation challenges for a new Municipal Assembly in the Greater Accra Region, Ghana.* In: proceeding of IRC symposium Sanitation for the urban poor: partnership and governance. Delft, The Netherlands, 19–21 November.

Post J., Broekema J. & Obirih-Opareh N. (2003) Trial and error in privatisation: experiences in urban solid waste collection in Accra (Ghana) and Hyderabad (India). *Urban Studies* 40(4): 835–852.

Twum-Baah, K.A. (2002) *Population growth of Mega-Accra: Emerging issues.* In: Mills-Tettey, R. and K. Adi-Dako (eds). Visions of the City. Accra in the 21st Century. Woeli Publishing Services, Accra, p. 31–38.

UN-Habitat (2006) *State of the World's Cities 2006/7.* UN-Habitat, Nairobi.

Yankson P., Kofie R. and Moller-Jensen L. (working paper, 2004) *Monitoring urban growth: urbanisation of the fringe areas of Accra.*

UNICEF and WHO (2008) *Progress on Drinking Water and Sanitation: Special Focus on Sanitation.* UNICEF, New York and WHO, Geneva, 2008.

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