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SUSTAINABLE ENVIRONMENTAL SANITATION AND WATER SERVICES

Mini water supplies for sustainable development, Nigeria

A O Coker and M K C Sridhar, Nigeria

THERE ARE ABOUT 40 million people now living in urban cities and towns in Nigeria. The urban population is growing at a rate of 5.5% per annum, and increasingly water plays a very important role in sustainable development.

The Nigerian National Water Resources Master Plan revealed that the country is endowed with 268 billion m3 of surface water and 52 billion m3 of ground water. Nigeria boasts 24 major rivers, one large lake and several natural springs and as well as ground water sources. Southern Nigeria in particular has an annual rainfall of 180 to 225 cm, which is spread over about 8 months in the year. The River Niger is 1,174 Km long and is regarded as Africa's third largest river followed by River Benue which runs to 796.5 Km.

Although water may appear to be plentiful there is a shortage of potable sources in many places, even in cities which have piped supplies. Surface water has been the major source of urban water supplies. The infrastructure laid in the early years of independence has collapsed over the years. This perennial water shortage has resulted in many communities resorting to alternative water supplies such as rain, springs, ponds and seasonal streams to augment their water needs. As a result, typhoid, cholera and gastroenteritis are the most prevalent diseases affecting populations. A recent nationwide survey by the Nigerian Demographic and Health Survey (1999) listed some environmental indicators for urban and rural areas (Table 1). In its National Water Supply and Sanitation Policy, the Federal Government has lamented "in spite of the efforts of various Governments at all levels, the water supply coverage in the country appears to be decreasing and deteriorating".

Table 1. Environmental Indicators for Nigerian Urban and Rural Areas, 1999 (% of Population)

Indicator	Urban	Rural
Water source		
Piped-water	24.0	3.7
Public tap	25.8	9.5
Well in residence	16.9	15.1
Public well	9.6	19.8
Borehole	12.4	9.1
Spring	1.1	4.0
River / Stream	3.2	32.2
Pond / Lake	0.5	1.6
Rain water	0.3	0.8
Tanker / Trucks	1.6	1.1
Bottled water	0.4	0.1
Time taken for fetching Water from source (< 15 min)	74.2	46.5
Faecal disposal facility		
Own toilet	20.7	2.9
Shared toilet	9.9	1.4
Pit toilet	46.4	56.7
VIP toilet	8.8	5.2
Bucket	0.3	0.1
None	12.3	32.1
Number of households Used in the survey	2,313	5,334

Mini water supplies

Mini water supplies, which derive water from either surface or ground water sources, are located in a designated place serving a defined population. A qualified engineer manages them with a few operators. The State Government usually owns them. The advantages are low maintenance costs with fewer breakdowns. Ibadan, Lagos and Kano have such examples where one can still witness the remnants of public standpipes, collapsed treatment units and rusted pipes running through the storm water drains in various highly populous communities.

Having become frustrated with the perennial water shortage, some communities in these areas have embarked on community-owned and managed mini water schemes to overcome Governmental lethargy and bureaucracy. These supplies are provided at an agreed location and people go to the facility to fetch water for their needs. A caretaker employed by the community is in charge of these facilities and collects a certain levy as fixed by the community. The fee collected is used for maintenance of the facility and to pay the salary of the caretaker. The caretaker is empowered to make sure that the users abide by the agreed regulations. Each community forms a 'Water and Sanitation Committee' with all the stakeholders drawn from various wards and opinion leaders. They meet at frequent intervals and decide on various welfare issues, review the performance of the facility and take decisions. These mini-schemes are not intended to provide any household connections. Consultants or Non Governmental Organizations (NGOs) who are familiar to the communities provide the necessary technical know-how. Water quality was monitored as soon as the facility was completed and periodical monitoring was recommended to the sanitation committee. Depending on the season and the available water certain decisions are also taken to improve the facility from time to time. The Local and State Government representatives are drafted onto the Committee. They have no major role to play except as stakeholder in decision taking. Usually, once the facility is handed over to the community, no further support comes from these bodies. These initiatives have

become sustainable after several years of implementation. Some features of these schemes are presented in this paper.

Ibadan case study

Ibadan is the capital of Oyo State and has an estimated population of about 2.5 million. Even though the State has 12 major water supply schemes with a generation capacity of 233,920 m3 only 55,080 m3 is supplied. A study carried out by Itama and Sridhar (2001) identified 16 springs in 5 local government areas of Ibadan (Ibadan North, Ibadan North-East, Ibadan North-West, Ibadan South-East, and Ibadan South-West). They further documented their environmental conditions, yield and quality characteristics. Of these springs, 13 (81.3%) served primarily as sources of drinking water for communities in the vicinity and three (18.7%), for other non-drinking purposes. These springs rank high in preference to other sources, with women and children being the most frequent users. Three springs located at Agbadagbudu, Alagbafo and Odo-Akeu were developed by the communities for their drinking water needs.

The Agbadagbudu spring is located in the Yemetu area of Ibadan, a hilly terrain and a predominantly residential area with economic activities ranging from trading to small and medium scale businesses (bean-cake production and sale, food restaurants etc.). The prevailing environmental and sanitary condition of this spring is good as evidenced by lack of foul odours due to faeces and urine, or refuse dumps. In the past the spring was partially protected with an open concrete wall of about 0.6m built around it. A concrete housing was built over the spring and water was being scooped directly from it with any available container which was unhygienic. The quality of water from the spring met recommended WHO standards (pH, 5.3; TDS, 214-227 mg/l; alkalinity, 22.0-24.0 mg/l; hardness, 54.0-64.0 mg/l; chloride, 7.7-9.9 mg/l, and total coliforms 67-85 per 100 ml) except for the coliform organisms. Therefore, the spring needed to be adequately protected. The water from this spring is being used for drinking, washing, cooking etc. Observation on the rate of use of this spring source revealed that between 224 to 272 and 304 to 400 persons visit this spring over an 8-hour period during the rainy and dry seasons respectively.

Under the Sustainable Ibadan Project, a 'Mini Water Working Group' was formed after the City Consultation to plan and develop any water source for the city. The group meets at periodical intervals. At one such meeting they came up with a proposal to protect the Agbadagbudu spring. The various stakeholders included representatives from the Community Development Association, Oyo State Government, Local Government, selected NGOs, academics from tertiary institutions and professionals. The community was very enthusiastic about the development of the spring, as it will benefit them. Funding came from UNICEF (cash and materials), the community (cash, skills and labour) and today it stands as a model for the community.

The design consisted of a storage tank measuring about 3m wide, 6m long and 1 m high with 6 hand pumps. The

Table 2. Results of analysis of the spring water from Agbadagbudu

Parameters	Period of Sampling		WHO Permissible Limits
	Rainy Season	Dry Season	
Physico-chemical	Mean ± SD	Mean ± SD	
Temperature (°C)	26.6 ± 0	26.4 ± 0.141	-
pH value	6.33 ± 0.156	6.36 ± 0.042	6.5 – 9.0
Total Dissolved solids, mg/l	214.5 ± 0.707	227.85 ± 3.75	1000.0
Electrical Conductivity (mS/cm)	0.44 ± 0.014	0.47 ± 0.085	-
Chloride, mg/l	7.73 ± 1.216	9.91 ± 2.89	250.0
Alkalinity, mg/l	21.8 ± 6.17	23.62 ± 3.59	38.19
Hardness, mg/l	54.15 ± 12.09	64.15 ± 6.01	100-200
Lead, mg/l	0.00415 ± 0.00078	0.00485 ± 0.00021	0.01
Copper, mg/l	0.071 ± 0.011	0.088 ± 0.00042	2.0
Iron, mg/l	0.5 ± 0.014	0.621 ± 0.0078	0.3
Manganese, mg/l	0.074 ± 0.013	0.087 ± 0.0156	0.1
Cadmium, mg/l	0.00215 ± 0.0015	0.0539 ± 0.00085	0.003
Coliforms, per 100 ml	85 ± 21.21	67 ± 18.38	0

area was fenced. In the mornings and afternoons people queue up for entry. The community has formed a committee who monitor the number of people who visit the source and collect Naira 5 to 10 (1 US$=120 Naira) per container, depending on the size. There are health messages and the facility is open for public during specific timings (6 hours in a day, morning and evening) for fetching the water. At times when the yield is not adequate, the caretaker will lock the place for certain number of hours a day for spring water to be stored. Other people who are not members of the community also come to fetch water. They may be permitted only if there is surplus. The community is proud and does not bother about the city piped water supply. Seeing this success, two other communities have also developed their springs and are enjoying uninterrupted water supply.

Lagos city (Ilaje-Bariga community) case study

Ilaje-Bariga is located in Somolu local government area of Lagos. It is located about 12 Km from Ikeja, the capital of Lagos State. This area is a high-density core area which lacks potable water, basic sanitation and other amenities. The community is made up of over 39 smaller communities spread across Somolu LG. The community has about 1,095 houses / buildings with an estimated population of 43,880 occupying an area of 16 Km2. The community is organized into three Community Development Associations, viz. Ilaje, Orile-Seriki, and Kuseyin. Each of the CDAs has its own organizational structure with elected but voluntary officers running the affairs of their community (UNICEF, 1999).

The communities embarked on a water and toilet facility. The community members through their organizational structure met regularly and contributed agreed donations. The Local Government represented by the Community Development Officer, along with other stakeholders planned a community water supply / toilet and bath facility and approached UNICEF for initial funding, technical and material support. As a result, for the last 3 years the community has enjoyed the facility. A caretaker looks after the facility where there are two units, one for men and the other for women. A borehole, a storage tank, a pump and well laid out drains are part of the facility. The scheme is continuing satisfactorily into fourth year.

Kano city case study

Kano city is the capital of Kano State and is located in the northern part of Nigeria. Kano Metropolis has 6 LGAs and the population is estimated to be 5,851,554 (1991 census). About 3,493 million m3 of water is stored in 33 dams. This supply can serve 3,927,300 people, and irrigate 52,920 ha of agricultural land. In addition, there are 14,051 tube wells and wash bores for 42,169 ha of dry season farming activities.

Since 1994 the city has been faced with water scarcity which is worsening. The dearth of water has caused "a series of conflicts between the Government and the people who fell prey to the Shylock water sellers" and have also experienced various water-borne infections. A water keg of 25 litres capacity was being sold at N 20 - N 25 and yet the source was doubtful. A riot was averted and the then Military Administrator planned to sink 16 boreholes in various parts of the State. He also planned to complete Chiromawa and Kafin-Chari water schemes and some boreholes for Sabon Gari, Bala Road, Dala and Kwana Takari communities. The problems of water scarcity were attributed to rising demand, outdated equipment, unregulated and wasteful usage by consumers, poor electricity supply, unplanned development and corruption (Adeniji, 1991; Gadzama & Co, 1998).

The Shuwaki market community in Kunchi LG initiated a community toilet and bathing facility. It is at once useful for community needs and also raises revenue regularly by the sale of water for vendors. The water source is a deep borehole managed by the community. The caretaker collects N 10 for the use of the toilet and N 20 for the bath facility. The water vendors collect water into 25 litre plastic kegs and 14 of them fit into a pushcart. They pay a sum of N 20 and sell for N 70 thus making a clear profit of N 50. There are a series of standpipes on the main road a little away from the facility and the vendors queue up for their turn to fill their kegs. On a visit recently, over 200 such carts were seen waiting for collection. Seeing this success, about 9 others have come up in the city to augment the State water supply. These were funded by the Government but handed over to the communities for managing. About a quarter of the population benefit from such mini schemes which provide steady supply.

Conclusions

In a study carried out by the Paris based Water Solidarity Network, involving 16 African countries it was observed that the centralized, state-based approach to water supply in Africa is rapidly being abandoned in favour of decentralized, locally based institutional arrangements (Africa Review, 1998). In the past, most of the communities in Nigeria depended entirely on the Government for their community needs. Community based projects like 'Comfort Stations' (with bath, toilet and washing facility) 46 of which were built during the 1971 cholera outbreak in Ibadan, have totally failed as the communities were not involved from the planning stage. Similarly, community water and toilet facilities promoted by the State Governments in northern cities such Sokoto, Kano, and Katsina have failed and become homes for destitutes.

Traditionally, many communities owned water sources, such as ponds, springs and water holes to cater for their water needs at home and on the farm. They were owned by the communities, and their community leaders were managing these informally. They had no access to advanced technology. As a result many people suffered from water-borne infections such as guineaworm, schistosomiasis and diarrhoea. Since independence in 1960, Nigeria has been

unable to provide adequate water supplies to the growing urban centres. On the other hand the existing supplies have been failing to meet demand due to population growth, lack of funds, and lack of commitment from various governments both military and civilian. Income from the oil economy needed to match rapid urbanization has not matched infrastructure developments. Of late, people through their improved education and exposure to demonstration projects have started realizing their rights, their needs and capabilities in improving their living conditions. Many self help programmes initiated by international and national funding agencies have made the communities realize their benefits. The mini water schemes have been successful as a result of their simplicity and non-interference from Local and State Governments once they were handed over to the communities. No doubt the initial capital has to be obtained from the Government and private philanthropists or NGOs and international agencies. There is need for a functional water policy in the country and the mini water schemes involving communities may be encouraged as they are less expensive due to the self help involved, are easy to maintain and the communities have a sense of ownership.

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