Operational Paper

Water supply measures used by the rural people of Ebonyi and Enugu, Nigeria

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ABSTRACT

This study investigates the water supply improvement measures used by the rural people of Ebonyi and Enugu State, Nigeria. For the survey six study communities were picked through systematic random sampling. Three hundred households in the six rural areas of Ebonyi and Enugu State were randomly selected and served with questionnaires. Tanker drivers, community heads and government officials were also served with questionnaires. Findings indicate that most government aided improvement measures existing in the various study communities are inefficient. Best applicable alternative improvement measures are then suggested. Among several high-value and low-value alternative improvement measures, massive rainwater harvesting, community participation and training of manpower/educating the masses are the ones most recommended for all the study communities.

Key words | communities, government, improvement, measures, rainwater, supply

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INTRODUCTION

There exist in rural areas of the world, and developing countries in particular, simple water development improvement measures for improving water supplies. These strategies are highly successful in ensuring efficiency.

Presently, for most rural communities in developing and developed nations (Glennie 1983), the demand for water often exceeds the supply thus creating a situation of perpetual water deficiency. It is only with the adoption of a good strategy for water resource management for rural water supply that water problems can come to an end.

Rural Bangladesh uses locally made handpumps (Aziz *et al.* 1990). The type of handpump commonly used in Bangladesh is capable of drawing water from a depth greater than 8 m, it is known as the Tara pump. According to Aziz *et al.* (1990), these are installed on tubewells sunk using the ingenious 'sludger' method. This method employs no sophisticated equipment or machinery. In rural Bangladesh, one handpump is available for every

125 rural inhabitants. This approach is in principle very successful. However it is obvious that the water quality needs to be monitored carefully before drilling large numbers of wells. Unfortunately this has not been done in Bangladesh; as a result thousands of wells produce water which contains too high concentrations of arsenic, which is a great health risk for the consumers.

Shallow wells are also in use. Morgan (1990) maintained in his study that shallow wells are used by more people than any other single source of water in rural Zimbabwe; these wells are usually not more than 15 m deep.

For some rural areas, long-term policies and planning strategies are employed. In rural Tanzania, the 'growth point' strategy is a common strategy being adopted by the government to resolve water problems (Falkenmark 1982). This involves supplying areas where there are most economic activities first before spreading to other areas. In rural Brazil, the government has incorporated the

manpower training strategy into the policies of their water resource management. According to Falkenmark (1982), five years ago Brazil set the training of 60,000 people in six years as a national priority in order to bring a water supply service to 60% of its rural population.

This study attempts to analyse the water supply strategies already existing in the study communities. Better improvement measures will also be offered, to help resuscitate the water projects that have failed in some communities.

METHODS

For this research, questionnaires were designed and utilized. The data collection was conducted during the fieldwork. A questionnaire survey of 300 households in six study communities (Iheaka, Adaba, Obe, Akama Oghe, Ndi Offia and Eka Awoke) of Ebonyi and Enugu State was conducted. A total of 438 questionnaires were distributed, as there were four sets of questionnaires. The first set of questionnaires was designed for various sectors of the study communities (see Appendix A1). The second set was for water tanker drivers (see Appendix A2), while the third set was for chiefs or community heads (see Appendix A3). The fourth set of questionnaires was designed for heads of the zonal offices of the Water Corporation in the study areas (see Appendix A4). Of the 438 questionnaires administered, 344 questionnaires were returned.

For the survey, the six study communities were picked through systematic random sampling. Random samples of households, tanker drivers, commercial establishments, industrial and services establishments, plus zonal offices of the Water Board in the six study communities were served with the questionnaires. As a large number of the respondents were not literate, the interviewer had to complete most of the questionnaires after oral interviews with each respondent.

RESULTS AND DISCUSSION

Existing water supply improvement measures for water development in the study communities

Government participation

This exists in only three out of the six study communities. There are only three rural waterworks in all the study communities. The only one being controlled by the Enugu State Water Board is the Akama Oghe borehole scheme. The handpump operated scheme in Eka Awoke, though funded by the former Anambra State government, is presently controlled by Water and Sanitation (WATSAN), a governmental agency under the Ebonyi State Ministry of Health. Iheaka borehole is being funded jointly by the people and the African Development Bank (ADB), though it is not yet commissioned. After commissioning all its activities would be handed over to the Enugu State Water Board. The underlying improvement measure here is that based on the exploitation of groundwater resources in the development of the various communities' water supplies.

The borehole in Eka Awoke lacks a distribution network, it is a handpump-operated borehole so the people trek from various corners of the community to the borehole site to fetch water. Most of the government aided improvement measures existing in the study communities are more or less redundant. The people of Iheaka cannot experience relief from their water supply problems until the borehole that is yet to be commissioned starts functioning. While the borehole at Akama Oghe is barely functional, its high level service reservoir stands as a monumental white elephant structure.

Community participation

Some communities have made great efforts towards water development and maintenance on their own. Akama Oghe and Iheaka are two such communities. Iheaka has twice undertaken annual fundraising ceremonies for water supply improvement. Here, the rural dwellers, with their sons and daughters that are non-residents of the community, contribute what they can. The people of Akama Oghe, both resident and non-resident, pay levies quarterly towards funding their water scheme. Every taxable male and female adult, married men and women, are levied a fixed sum of money on a proportional basis. None of the study communities had its members contributing labour for a water project except for Akama Oghe. In the course of laying the pipelines for their water scheme, the adult males were compelled by the community head to volunteer themselves to supply labour for digging trenches.

An observation which should be mentioned is the fact that most attempts by the rural dwellers to improve their water supply have remained in the planning stage, this can be said of Adaba, Obe and Ndi Offia communities. In Obe, an attempt at a water supply project was aborted, as the money that had already been contributed was embezzled by some members of the planning committee. Another community contributory effort is the central ponds dug by the Ndi Offia community in three strategic locations within the community. These ponds are quite large, about 7 m deep.

Individual participation

Individual efforts at harvesting rainwater for storage abound. This can be termed individual participation, and is part of the existing water improvement measures for this study. Some individuals possess underground concrete tanks, plastered dug pits, metal tanks and drums, which are filled up for storage during rainfall by using channels from corrugated zinc roofs. This collected rainwater is used for domestic and non-domestic activities. It is commonplace in Obe and Ndi Offia for well-to-do members of the community to construct wells for private use. Some neighbours of these well owners benefit too, by going to fetch water in those compounds with wells. This has aided the reduction of water supply shortages in some communities.

Analysis of those water supply improvement measures existing in each study community

In some communities that have rural waterworks, there is no fixed distance for the installation of public standpipes. The standpipes are located in a scattered manner, over the entire community. The resultant effect is that a considerable number of the rural dwellers will still be trekking daily for distances up to 3 km in order to fetch water from the nearest public standpipe. In Akama Oghe, public standpipes are located in their present sites using the population concentration approach, where the most densely populated locations within the community are given a standpipe or two as opposed to the less densely populated areas.

The number of communities served with boreholes

Out of our six study communities three possess boreholes while the other three do not. Out of these three communities only one can boast of an efficient delivery of water to the people. One is hardly functional, while the third one is yet to be commissioned. This indicates a lag of functional schemes over non-functional ones. The Akama Oghe rural waterworks distributes water through 20 public standpipes situated in various parts of the community. The rural dwellers in Akama Oghe face serious water shortages at present, as the scheme is barely functional. The Eka Awoke handpump-operated borehole does not have a distribution network, hence no standpipes. The people of this community usually trek an average distance of 6 km daily to this community borehole water source to fetch water. Although the borehole has a constant flow, a lot of energy is expended in trekking to the source and back.

Problems associated with the boreholes

The Akama Oghe borehole suffers from lack of trained personnel to operate and maintain the scheme. Very often money for fuelling is inadequate, thus the issue of inadequate fuelling of pumping plants arises, which leaves the people with an unchanged water scarcity situation. At times, the pumping plant experiences breakdown and removal of parts by thieves, and the high level service reservoir exists as a monumental structure beautifying the scenery.

The public standpipes in Akama Oghe, 20 in number, are insufficient for a community that has a population of 7,138 (2002 population estimate). As a result of administrative bureaucracy and inefficiency of the workers/personnel of the State Water Board, the people of Akama Oghe are left to fund the operation and maintenance of their water scheme themselves, which should not be the case. Also, water tanker operators and vendors bribe borehole operators to abscond from

their posts and not pump water, to enable their water businesses to thrive.

Due to the absence of a distribution system/standpipes in Eka Awoke community, the people trek long distances daily to the handpump-operated borehole located to the east of the community. If ever they decide to embark on the provision of a distribution network, they would be frustrated by unfavourable topography. The relief of the area is too level, so that gravity cannot be employed to aid water distribution. On the whole the reason for the absence of boreholes and government wells in Adaba, Obe and Ndi Offia, is that the people have no governmental support that would enable them to develop their supplies. And since they lack adequate community participation to develop and maintain a water supply scheme, they are left with none.

Problems associated with other existing improvement measures

Communities with individuals who participate in water development improvement measurements by harvesting rainwater are usually faced with a problem of rainfall seasonality. Most of these rural dwellers, because they are often very poor, can only afford small unit containers such as pots in which to store water, which is very inadequate. By the time the dry season advances into its second month, all stored water is finished. Central ponds found in Ndi Offia are also beset with the problem of rainfall seasonality. Often algae and some aquatic weeds can be seen growing by the sides of the ponds. The people usually have to compete for these water sources with some of the domestic animals because they are not fenced.

Houses with thatched roofs are prevalent in Ndi Offia, Eka Awoke and Adaba communities. These thatched roofs are not effective for rainwater harvesting, thus the rural dwellers have their pots set under banana trees or coconut trees for water collection. Others set theirs in basins and earthen pots in an open field, and the villagers stay in the rain catching as much as they can. Wells constructed by the individuals for private use, equally suffer from seasonality of rainfall. With the dry season the water levels of most wells fall. Some of the wells even dry up, those that are shallow in depth often do. There are cases where children are seen throwing objects into these wells for fun.

Alternative improvement measures

High value improvement measures

These are: the development of surface sources of water supply, the construction and use of deep standard wells and boreholes/hand pumps, large scale rainwater harvesting and community participation. The most elegant method or water development improvement measure is not by pumping or even exploitation of underground water reserves, but by making springs and other surface sources flow under the influence of gravity to the people. The raw water from the available surface water source (rivers, lakes or springs) could be treated and circulated to the community through pipes: this could be applied by any of the five study communities that possess surface water. This approach will meet, on the short term, the same or even more difficulties than the use of a high service reservoir (white elephant). On the long term this might be an option to be considered. This measure is presently the only solution to the problem of water supply in Akama Oghe and Adaba communities, because of surface streams like the Ajalli and Adaba Rivers which have high water discharge rates and have been used by the people of the above communities.

The intensive large scale harvesting of rainwater should be encouraged in all the study communities. With sufficient storage facilities, especially large cemented wells (to store water during the rainy season), water will cease to be a problem. Households should endeavour to buy large metallic tanks and dig an underground tank/well. Thus rainwater harvesting, for the study communities that experience a minimum of 7 months rainfall duration, is indeed a worthwhile strategy. Those tanks below the ground should be fitted with a handpump. Tanks should be fully closed to prevent evaporation, while all apertures should be screened to prevent the access of mosquitoes, insects and rodents. Ideally tanks should be covered, this prevents the growth of algae, and helps to prevent contamination.

There should be a combination of efforts by the people and the state government. Villagers should be involved in both the financing and execution of the rural water scheme as well as provision of the unskilled labour needed during construction work. For it is with this

community participation that communities can generate the commitment for maintenance because they are involved. A general meeting should be organized for each ward where future water development is planned. They will need to discuss the objectives of the programme, and what role they will play in it.

Exploitation of underground water sources by the digging of deep standard wells, and the construction and use of deep standard boreholes is quite popular. Their success depends on the experience of the practising water engineer/contractor. For inadequate feasibility studies of the nature of the local geology, wrong site selection, and inappropriate exploitation methods are among the factors that will affect the lifespan of these water supply schemes. There should be a conscious effort to blend this strategy, when adopted, with other strategies.

When constructing wells for use, efforts should be made to dig the well when the water table is at its lowest. The months of October and November are appropriate. Proper siting of wells should be taken into consideration. Adequate knowledge of the nature and distribution of the aquifer through well-planned groundwater exploration helps prevent collapse of the well lining due to weakening of the ground around the well.

Installation of handpumps is encouraged, breakdowns will be reduced if enough are provided and they are evenly distributed. The consequence will be to make the people depend more on underground water than the untreated water from the rivers.

Low value improvement measures

These are the 'growth point' strategy, joint funding of water projects by the people and the government, training of manpower, construction of link roads to all stream sources and educating the people about water problems.

With joint financing the villagers would not shoulder most of the financial burden, nor the government, there will be a combination of the two. This strategy is dependent on the amount of financial resources available in the community. Educating the people on the effects of water scarcity in their community is an improvement measure. They should be made aware that water scarcity will continue as long as no improvement is made, this education should also mention the need for water supply conservation and storage.

Construction of roads to link all the sections of the river or stream in an area/community is an improvement measure. The 'growth point' strategy involves supplying water first to areas where economic activities are greatest, before spreading to other areas. The training of adequate and skilled personnel to run borehole stations, treatment plants and maintain open wells will help reduce cases of breakdown of machinery. The success of a project depends on the possibility of the project to adapt to prevailing socio-economic and environmental conditions and for the local community to absorb the changes resulting from the strategy.

CONCLUSIONS

From the analysis, it is conclusive and acceptable to say that Akama Oghe water supply scheme has an absence of effective supervision by the Water Board. Other conclusions to be drawn from the existing water improvement measures are: the lack of trained personnel for operation and maintenance of schemes, absence of storage tanks in some communities, high level service tanks that exist only as monumental structures and non-functional boreholes.

The per capita water consumption is 14.0 lpd for Eka Awoke, and for Akama Oghe communities with a borehole, which is very low. In relation to the Federal Government of Nigeria's recommended standard of 115 lpd, it is deficient by about 87.8%. Thus, supply from these boreholes barely meets water demands. The average water collection distance in Akama Oghe is about 2.5 km, while in Eka Awoke it is 6 km. These distances are quite great. For any strategy to be effectively felt in any rural area, the distance to a water source must be minimal.

REFERENCES

Aziz, K. M. A., Hoque, B. A., Huttly, S. R. A., Minnatullah, K. M., Hasan, Z., Patwary, M. K., Rahaman, M. M. & Cairncross, S. 1990 *Water Supply and Sanitation and Hygiene Education.*Report of a health impact study in Mirzapur, Bangladesh. *Water and Sanitation Report Series*, Vol. 1, 6–7.

Falkenmark, M. 1982 *Rural Water Supply and Health—The Need for a New Strategy*. The Scandinavian Institute of African Studies, Uppsala, Sweden.

Glennie, C. 1983 *Village Water Supply in the Decade: Lessons from Field Experience*. John Wiley, New York.

Morgan, P. 1990 *Rural Water Supplies and Sanitation*. Macmillan, London.

APPENDIX A1

Questionnaire for residential/service/commercial/industrial/agricultural sectors

1. How many persons are in your household?
   How many people are employed in your establishments?
   How many students/staff are in your school?
   How many bed spaces/patients are in your clinic?
2. Where do you get water from?
   (a) Stream
   (b) Ponds
   (c) Spring
   (d) Rainwater harvesting
   (e) Well
   (f) Borehole
   (g) Tanks
   (h) Plastered dug pits
   (i) Pipe-borne water
   (j) Water tanker
   (k) Water vendors
   (l) Others (specify)
3. What is the name of this source?
4. If you have pipe-borne water in your premises, do you pay water rates?
   Yes/No, if yes, how much?
5. How often does the tap run?
   And for how many hours each day?
   How many standpipes are in your premises?
6. If you buy water, whom do you buy water from?
7. If by water tanker how regular is the supply?
8. What quantity do you normally purchase? (Estimate in bucket full or drum full)
9. How much do you pay for this?
10. About how much is spent in a month on water?
11. Do you include money for buying in your daily/weekly/monthly budgets? Yes/No.
12. What quantity of water do you use per day?
13. What period of the day do you use water most?
14. What quantity of water would you like to use per day, in the face of adequate water?

APPENDIX A2

Questionnaire: interview schedule for tanker drivers

1. From what source(s) do you get the water you sell to the people?
2. What is the name of this source?
3. Do you make efforts to get treated water to the people?
4. How much is paid to fill a tanker lorry from the source of water?
5. If this price differs in the rainy season, how much is paid then?
6. How many trips do you make in a day from water source to the buyers?
7. Do you belong to a water union? Yes/No.
8. Are prices at which water is sold, influenced by the union?
9. What season of the year is the demand made on you by people (i.e. members of the community) greatest?
10. Do you have problem of water purchase at this period too?
    (a) Are the number of trips you make in a day to consumers satisfactory for you? Yes/No.
    (b) How many trips do you make?
        How many would you have wanted to make?
11. Do you consider this venture lucrative or a thankless task?

APPENDIX A3

Questionnaire: interview schedule for community head, chiefs, or members of committee in charge of welfare/water supply in the community

1. What water scheme exists in your community?
2. How is this water distributed from the source to the members of the community?
3. Was this water scheme made available to you by the government?
   Or by your own efforts?

Or by philanthropic organizations/individuals?

4. If governmental, which of these bodies is involved?
   (a) Federal Ministry of Agriculture and Water Resources
   (b) Better Life for Rural Women
   (c) State Water Board
   (d) World Bank Project
   (e) UNICEF Assisted Project
   (f) WHO Assisted Project
   (g) DFFRI
   (h) ADB

5. Is the water scheme a blend between your efforts and that of the government?

6. If so what aspects did your contribution come under? Is it in joint funding of the water scheme or labour provision only?

7. If all efforts are entirely those of the community's, then is it a co-operative/thrift society contributory effort?

8. If a philanthropic organization assisted in the provision of a water scheme, what is the name of this organization?

9. If is an individual's effort only, who is this individual?

10. Was the water scheme funding by:
    (a) Community levy
    (b) Government funding
    (c) UNICEF funding but labour for construction of scheme being community dependent.
    (d) World Bank funding
    (e) Others (specify)

11. If labour was provided, what type of labour?

12. About how much in all was realized from members of the community, if funding of the water scheme was by community levy?

13. How much was paid by each household?

14. Was this levy payment by equal participation? Or by stratification? i.e. were certain age groups alone involved in the payments, or was a particular sex, i..e. females alone levied for payment of water schemes, or were the educated members of the community with employment outside the community alone levied?

15. How co-operative were members of the community towards contributing funds for the scheme being used?

16. If reluctance was evidenced what reasons could be responsible for this attitude?

17. Is your present supply scheme a success story?

18. If no, why?

19. What method of water provision would you have preferred that the community had, other than what you presently possess?

APPENDIX A4

Questionnaire for public water board

1. What is the source of pipe-borne water supply to these six communities under study?

2. How much water is pumped daily?

3. What quantity do you distribute to the public daily?

4. For how many hours a day, and for how many days a week is water pumped?

5. How do you distribute the water from the source to the people?

6. What is the number of public taps in each study community?

7. What are the criteria for locating these taps where they are presently located?

8. What is the maximum amount of water delivered to the community weekly?

9. What is the reason for inadequacy in the maximum amount of water delivered?

10. What is the depth and rate of flow of each of the boreholes within the study communities?

11. How is this water distributed from the source to the people?

12. What is the depth and rate of flow of each of the hand dug water wells with handpump within each of the six study communities.

13. How is this water distributed from the source to the people?

14. How much does it cost to set up a village water supply?