

Water-quality monitoring and NGOs

by Guy Howard

For NGOs, providing water in sufficient quantities has always been the priority. But if the quality is poor, they may be merely improving access to disease. Are they equipped to take on a monitoring role? And how do they involve the community?

NGOS HAVE PLAYED a major role in improving rural and urban water supply for many years. They have been at the forefront of new approaches to water-supply provision, through the development of innovative, appropriate technologies, and through participatory mechanisms for extending coverage in low-income areas. Many of the approaches developed by NGOs have now been taken up by donor agencies and governments as official policy, geared to the sustainable provision of services.

But — with some notable exceptions — water quality, and monitoring water supplies, have not always been high on the NGO agenda. Water quality is often seen as a low priority in comparison to increasing access, and one which requires funds which are not available.

Most international NGOs would perceive themselves as facilitators in water-supply provision — they provide otherwise unavailable capital and technical advice to communities. They then expect communities to take responsibility for ongoing operation, maintenance and management. As monitoring is often perceived as an expensive activity, it is felt that communities cannot be made responsible for this; at the same time, because it is clearly an ongoing activity which promotes good operation and maintenance, many NGOs are unwilling to undertake the routine aspects — it would seem to be against the ethos of community-based sustainability. Thus water quality and monitoring fall into a 'grey' area, where no one is willing to take responsibility.

What is monitoring?

But experience over many years shows that communities can monitor their water supplies, and that water quality can be made a priority issue for governments. NGOs have an active role to play: this article examines what this means for future water supply and quality monitoring.

There is a common misconception about monitoring: that it is merely the collection of samples for analysis in a laboratory, followed by the measurement of these against standards for specific parameters. But monitoring should be much broader in outlook, and take into account water-supply service parameters such as coverage, continuity, cost, and quantity. Monitoring should incorporate risk assessment, through sanitary inspection, as a means of reducing and managing risks.

With risk assessment comes the greater possibility of involving communities, as this requires a visual evaluation of sanitary risks, and simple quantification. The results suggest appropriate actions, and the techniques required are within reach of most people. Risk assessments should be seen as complementary to water-quality analysis; by doing this, NGOs, governments, and communities can define their respective roles.

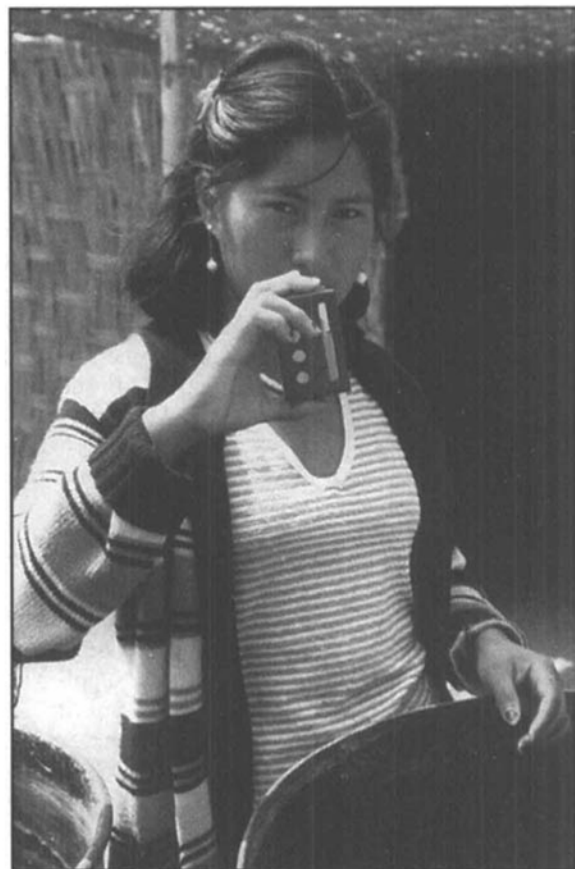
Why should NGOs monitor water quality?

NGOs may be involved in monitoring water quality for a number of reasons, in particular:

- to protect public health;
- for advocacy and demonstration;
- to carry out monitoring and evaluation;
- to ensure community involvement in, and improvement of, O&M; and
- to initiate health education.

Some NGOs undertake water-quality monitoring to protect the health of the

people living within their areas of operation, or in supplies they have constructed. So, for example, in refugee camps, NGOs may routinely monitor water quality to prevent the outbreak of epidemic diseases. In these cases, NGO staff may take regular samples from the water distribution system or from tankers. The costs of monitoring are often reduced when chlorinated water supplies are installed, by initially



WHO/PAHO/C. Gaggero

A simple chlorine test reduces the need for a bacteriological assessment.

carrying out chlorine residual and turbidity tests. If the free chlorine residual is above 0.2 mg/l and turbidity is below 5TU, it is very unlikely that thermotolerant (faecal) coliforms will be present and, therefore, a bacteriological test is not essential.

This activity may be relatively short-term and, if the camps become long-term settlements, monitoring may be reduced, but not in all cases. For example, NGOs working in Afghani refugee camps in Pakistan carried out routine testing in the mid 1990s as a means to control the quality of water supplied, despite the long time that these camps had been in existence.

Another key role for NGOs is

Parameter	Guideline Value
Thermotolerant (faecal) coliforms or <i>E. coli</i>	0/100 ml
Turbidity	Preferably <1 TU, consistently <5TU
Free chlorine residual	0.2 - 0.5 mg/l
pH	< 8

Table 1: Critical parameters for health

advocacy and demonstration, a role which many NGOs play effectively already. NGOs can apply pressure to regulators, water-supply agencies and health agencies to treat water quality as a important issue, and can advocate the establishment of monitoring programmes designed to improve water quality. They can advocate the empowerment of communities to monitor their own water supplies, and provide communities with the tools to lobby for investment.

Despite the high perceived costs of monitoring, NGOs can also demonstrate to governments, communities, and donor agencies that cost-effective monitoring schemes can be established. These approaches do not rely on the compliance-based models which are common in Europe and North America. Instead, they emphasize the use of risk assessment in the control of the sources of pollution, and limit the analytical range to those parameters of greatest relevance to public health. These are termed the 'critical parameters' and are shown in Table 1 above.

The monitoring of piped water supplies should be routine, and ongoing — water quality may deteriorate rapidly

during distribution.

Where minimum sampling frequencies are used for point-water supplies, such programmes should use sampling frequencies, the results of which provide workable conclusions, such as those shown in Table 2. Where minimum sampling frequencies are used, the samples should be taken in the dry season, during the onset of the wet season, and once the wet season is established. In many water supplies, with the onset of the rains comes the period of greatest contamination, as all the contamination that has built up in the surroundings during the dry season is flushed into the water source. Once the rains are established, quality may improve as the contamination level from the surrounding land drops.

Prioritizing

Given the need to collect routine data, such monitoring programmes often do not include all the water supplies constructed, but focus on priority supplies and regions where there is evidence of greater vulnerability to disease. These can be established from an initial assessment of water

quality, sanitary risk status, and the health of the users.

These monitoring programmes should be geared to produce practical, achievable, short-term measures to implement remedial action when required. These could involve, for example, refresher training for operators, or supplementary health education. Whatever is done, there should be a demonstrable output from the monitoring project, and this should be shown to lead to water-supply improvements.

A good example of an NGO playing an advocacy role in water-quality monitoring can be found in Mexico City, where the Mexican Red Cross is involved in a project to monitor water supply in two low-income, informal communities, in collaboration with the Robens Institute and the local government health unit. This project convinced them that monitoring could be carried out in these areas, and that data could be used to improve water quality in such communities; the district now carries out routine testing.

Capacity building in communities

Communities themselves can play a key role in monitoring, provided they undergo the necessary training in tools and techniques. In this way, the community will be able to improve the operation and maintenance of their water supply by detecting faults, and repairing them, rapidly.

The Mexican Red Cross funded the construction of a water supply in Zacualpan, a small community in Guerrero State, which incorporated a locally adapted chlorinator. The Red Cross also provided the community with a very cheap and simple chlorine-testing kit; in effect, a small bottle which had three gradings of chlorine as determined by the colour produced in reaction with tablets for testing chlorine presence (DPD1): 'add chlorine'; 'chlorine acceptable'; 'chlorine requires dilution'. The advantage of this was that it also provided communities with a tool they could use to manage their water supply more effectively.

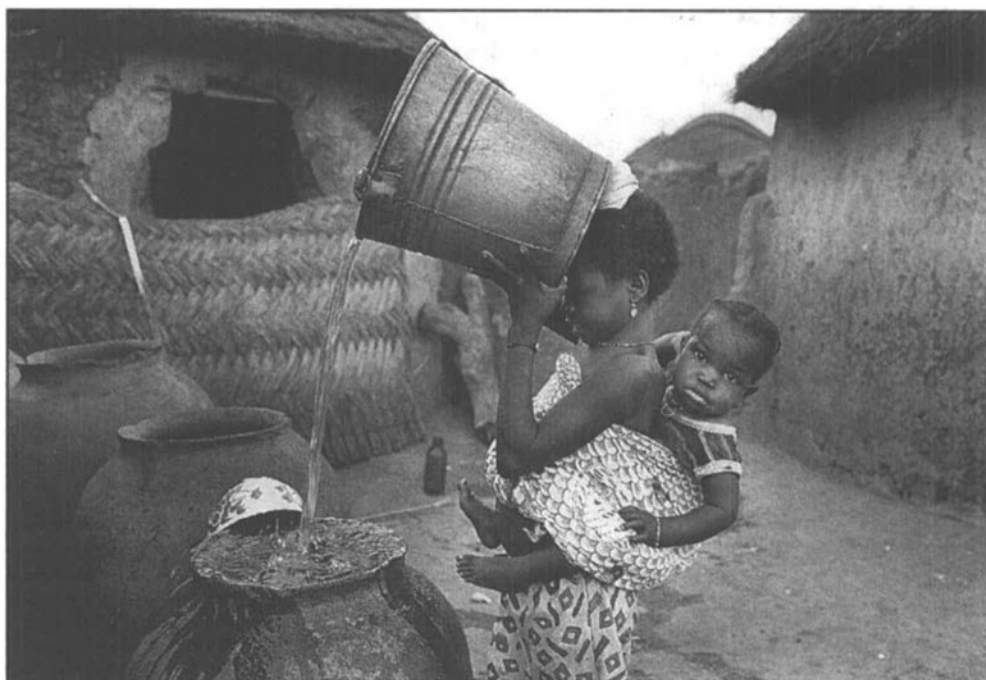
Communities can also carry out sanitary inspections — although

Table 2: Suggested sanitary inspection and sampling frequencies

Type of supply	Frequency of samples	Frequency of inspection	Number of samples
Piped water supply community-managed treatment	Monthly, by community. Quarterly to annually by NGO	If chlorinated: daily to weekly residual testing by community. Monthly to quarterly by NGO	<5000 people: 3-5 5 to 10 000 people: 7 (minimum) >10 000: 7 + 1 sample per 5000 extra pop.
Piped water protected spring	Monthly by community Quarterly to annually by NGO	Minimum quarterly plus two extra samples during onset of rains	As above
Protected spring Tubewell with handpump Hand-dug well with rope and bucket Rainwater collection	Quarterly by community, and always towards onset of rains. Annually/ bi-annually by NGO	Minimum of three times per year; preferably quarterly, plus additional samples during during onset of rains	1-2

with care. Very often, it is assumed that once in possession of a diagrammatic form, an illiterate villager will be capable of recording risk data accurately. This assumes, of course, that the person understands the picture — is visually literate — and recognizes the circumstances in which a component should be marked (usually when a risk is encountered). This is not always the case, and has led to problems in the past.

Carried out correctly — with the emphasis placed on problem areas — sanitary inspections are useful tools. The experience of programmes in Honduras demonstrate the effective results communities can achieve — if they receive adequate and appropriate training.



Jorgen Schytte/Still Pictures

Kodo, in Tamale, Ghana. The continuing contamination of water during transportation and storage makes rural hygiene education programmes essential.

Monitoring and evaluating NGO performance

Monitoring clearly has an important role in evaluating water-supply projects — most NGOs would like to be sure that their investment has provided a 'safe' water supply. But, as a monitor-

essential, ongoing activity. It can be used to provide data on technology selection, appropriate designs, construction quality, and whether health-education programmes have been successful. This, in turn, may

ity is carried out for these purposes, however, the results must be put into context. If water supplies show contamination, the automatic result should not be shut-down. The results should provide NGOs with the information

Technology evaluation

A group of NGOs in Ghana was debating the benefits of installing handpumps on all the wells they were constructing. Any installation had to be fully justified, as the overall cost of each water supply would significantly increase, as would the O&M burden on the community.

The author recommended a two-year study — with a minimum twice-yearly sampling to evaluate the benefits of handpumps. Such information would provide the NGOs with sufficient data to make an informed decision on whether handpumps should be installed, or whether the evidence of improved source water quality was limited. As the NGOs perceived testing to be expensive, it was recommended that they evaluated 10 per cent of their water supplies with handpumps, and 10 per cent of those without. Sanitary inspections were to be carried out at each well to ensure that any confounding factors in risk of contamination were identified and noted.

The NGOs were also encouraged to carry out routine testing on an ongoing basis throughout their areas of operation, to monitor construction quality. Significant problems in water quality could be used to indicate construction quality problems, and a more thorough investigation could then be undertaken. This would allow the NGOs to address issues such as staff training on a firmer basis of needs.

Health education

Testing water quality in the home, and from fingertip rinses, will help to indicate whether programmes have achieved changes in behaviour. It is obvious, for example, if recontamination during transport or storage is a major problem, as experience in Ghana, Mexico, Pakistan and many other countries indicates, there may be need for a fundamental reinforced-evaluation of the ways in which health education is provided.

Recontamination of household water and contaminated fingers may indicate that messages about hygiene risks are not being accepted and, therefore, that a review of the programme may be worthwhile. Equally, the difference in household recontamination and contaminated fingertip rinses of groups receiving hygiene education and groups which have not, may make a compelling argument for continued hygiene education programmes.

One approach to an evaluation of testing is to take a number of selected communities (between 5 and 10 per cent), and look at five households in each. Samples should be taken from collection and storage vessels, and utensils used to draw water from the storage container and from the drinking utensil. Container and utensil washing should be observed, together with the location of containers and utensils.

they need to improve their performance: a constructive mechanism. Below are two examples which can be widely replicated.

Hygiene education

NGOs can use water-quality results as a health education tool. The use of simple methodologies and technologies — which allow the results of testing to be shared with communities — can help greatly to demonstrate the need for good water hygiene. By showing communities the results of tests — at a basic level the presence of bright yellow colonies on a red background — allows communities to experience the reality of water quality. This experience-based learning exercise can assist the community to understand the role of water quality in their health.

The use of testing can support improvements in water handling in the home or in their water supply. The author's recent experience in rural Mexico indicated clearly that communities responded well to viewing the results of water testing as it has a great visual impact. Communities — be they in the industrial world or in the South — do not need to understand germ theory, or know what bacteria or pathogens are, to be able to understand

that yellow colonies on plates of samples taken from their water supply are bad for their health.

By demonstrating to communities that contamination exists, it may be possible to promote their understanding of how faecal contamination of their water may occur without any obvious sign of contamination. For example, in northern Sierra Leone, faecal contamination was demonstrated by mixing a stock-cube and bicarbonate of soda with a small amount of water to produce a ball which resembled faeces. This could then be dissolved into a bucket of water with no obvious change in the appearance of the water. If this had been explained with reference to actual water quality results, the impact could have been much greater.

Conclusions

It is clear that NGOs have an important role to play in water quality monitoring and can raise it as an important issue with water-supply and health agencies, governments, and communities. By adopting practical approaches to monitoring, which both produce useable results, and emphasize risk assessment, they will help to improve the sustainability of water supplies.

Water-quality monitoring can also be

a useful tool in health education, by providing experience-based learning opportunities to communities. Monitoring data will also assist NGOs to evaluate their own performance, and allow them to make informed decisions about design and construction changes.

Routine monitoring is a long-term activity designed to improve water-supply services; it is important that NGOs convince both governments and communities that they can operate effective monitoring programmes, leading to water supply improvements. This can be done by demonstrating that cost-effective programmes can be established — through community participation.

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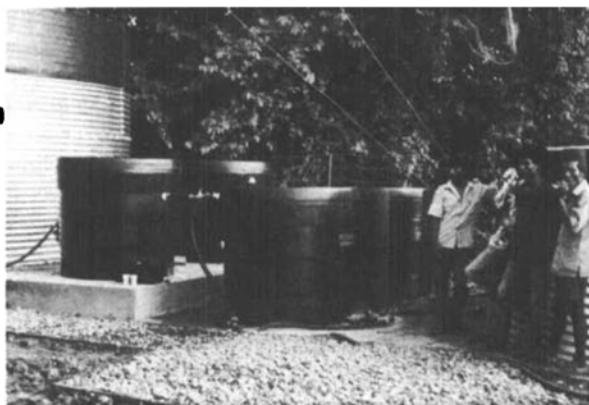
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