



19th WEDC Conference

ACCRA, Ghana 1993

WATER, SANITATION, ENVIRONMENT and DEVELOPMENT

Sanitation research and other GARNET topics



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One of the difficulties in trying to investigate water and sanitation practice in developing countries is that field workers are usually too busy to write about what they have done. When they do find time to set pen to paper (or fingers to a keyboard) it is often to commend something that they have done or plan to do. Consequently the literature has many accounts of projects and methods that are claimed to have been successful.

There is also plenty of advice, for example on systems that *ought* to work or ways in which communities *ought* to be involved. I well remember in the early 1970s meeting someone who was then a young engineer, full of youthful enthusiasm for a particular technique. He then set out to prove the value of his method. For twenty years he has tried to show that his idea was a good one. At least he should be congratulated for persistence.

What is lacking is *objective* reviews compiled by those who do not have a cause to proclaim nor axes to grind. It is difficult for the people who are actually involved in programmes to describe their own failures, and anyway the 'actors' in projects often move on, leaving behind the supposed beneficiaries who have to live with the failures. But we need to know about methods that do not work if we are to make progress with systems that are likely to be successful.

One research project did seriously attempt to compare alternative sanitation systems. It was carried out by the World Bank in the late 1970s in preparation for the International Drinking Water Supply and Sanitation Decade. Field studies including cost estimates were carried out in several countries by Bank consultants. There followed a series of publications (Kalbermatten et al, 1981) which were widely distributed and have been so constantly referred to since that everyone who has done anything about sanitation knows them. However, in spite of the tremendous effort put into field studies (and the undoubted very high cost since this was a World Bank job), the research was far from world-wide. The data was from very few countries. This was probably an inevitable result of employing paid consultants. In retrospect it can also be seen that the Bank studies and the conclusions drawn from them reflected the economic optimism of the time. There are many mentions of upgrading progression starting with VIP and pour-flush latrines.

Yet there is evidence that the greatest need is less for upgrading sequences than for *lower cost* sanitation meth-

ods. My present research seeks to ascertain amongst other things the extent to which cost of sanitation affects coverage. I am trying to look at low cost sanitation thoroughly and objectively. I want to find out what really works in practice and, more importantly, what stays working - what is sustainable.

I have again 'reviewed the literature' (including of course the *Proceedings* of past WEDC Conferences) and found little objective research other than the Kalbermatten studies. However, notes I have made during nearly forty years of association with low-cost sanitation have been useful, as was also a lot of anecdotal information from WEDC students.

My next step was to start a postal survey, first directed at former WEDC students who have returned to their native lands. Early questionnaires covered a wide range of developing countries, but some of the less-poor countries had little interest in *low cost* systems. So I limited my list to the following countries with GNP less than \$1000 per person.

Bangladesh	Kenya	Philippines
Bhutan	Lesotho	Sierra Leone
Cameroon	Malawi	Sri Lanka
Egypt	Mozambique	Sudan
Ethiopia	Myanmar	Swaziland
The Gambia	Nepal	Tanzania
Ghana	Nigeria	Uganda
India	Pakistan	Zambia
Indonesia	PNG	Zimbabwe

I added Botswana, where there has been some interesting low cost work even though the GNP is \$2040 per person. Of these 28 countries I have been to 23 at some time or another and have some familiarity with their sanitation problems.

For most poor people low cost sanitation means some form of pit latrine. In Africa and other places where most people use solid anal cleaning material such as leaves or newspaper a simple pit is common. There are many improvements and variations including the VIP, the KVIP, the SanPlat with tight-fitting lid, raised latrines, step latrines, double pits, the ROEC and borehole latrines. Where people use water for cleaning themselves (including inhabitants of the Indian sub-continent and followers of the prophet Mohammed elsewhere) the pit is usually separated from the latrine by a water seal, with various forms of pour-flush arrangement.

In general pit latrines are accepted for rural areas. Most attention on low cost sanitation has concentrated on devising technology that is suitable for scattered communities. Even more effort has gone in recent years to the software side of rural sanitation such as health education for villagers and involving village women in sanitation management.

When it comes to towns and cities there is no consensus as to the desirability of low-cost sanitation. There are wide differences of opinion. Some condemn pits, or indeed any form of on-site sanitation, as unsuitable for all urban areas. Even so-called 'appropriate technology' seems prejudiced against built-up areas. For example it is recommended that VIP latrines should be in windy places or the sun should shine on their vent pipes. Moreover there is a lot of fuss about the build up of groundwater pollution when houses are close together.

Consequently my research tends to concentrate on town-dwellers, trying to discover the extent to which objections to on-site sanitation are justified. Conversely, what forms of low cost sanitation are as satisfactory for urban as for rural populations in both the short term and long term?

A limited postal survey was carried out during 1992. Questionnaires were sent to about three hundred contacts on the WEDC mailing list, most of whom are working in some aspect of water and sanitation, although few have a major involvement with low cost sanitation. Most replies came from Africa, so deductions are not globally significant. We hope to extend the survey considerably, to get many more replies, to get information from other regions and to involve more people who are actually working in or have a special interest in low cost sanitation.

Questions which I asked included those dealing with the following aspects

- **Types of household sanitation in use:** because of the African slant the most common type is the simple pit latrine, with WCs discharging to septic tanks coming a poor second. VIPs were reported for 11 per cent of households and other systems each had a mere handful of users.
- **Reasons for households having no latrines:** cost came top of the list; some acknowledged the problem of small plots; a few suggested that people prefer to defecate in the open; ignorance of how to construct a latrine is often a reason for doing nothing.
- **Emptying full pits** was reported for a substantial minority of households, with about equal numbers emptied by the householders themselves and by local government. Contractors do the job for about a sixth of the latrines that are emptied. Almost everywhere disposal of the contents is a problem.
- **Discharge of septic tank effluent to open drains** was only reported for a few towns.

- **Use of household latrines by children** was included because I have so often seen children old enough to look after themselves defecating indiscriminately even when their own family has a latrine. Two thirds of respondents replied that some adults object to children using adult latrines.
- **Householders' payment for latrines:** in only 29 per cent of places do the beneficiaries pay all the cost and in only 6 per cent is the cost of 'normal' latrines affordable by everyone.

The questionnaire asked about *multi-compartment latrines* - public latrines in markets and similar places; communal latrines used by people when at home where they have no household latrine; and institutional latrines in schools and similar places. Replies show that three-quarters of such latrines are cleaned by employees; a quarter by the local community themselves. In about half the towns someone is in attendance whenever the latrines are open, and in about half (not the same half) most latrines are open 24 hours a day. A fee is charged for use of some or all public latrines in about half the towns - again a different half - and in many towns this fee covers the cost of attendants' wages. In less than 30 per cent of towns is there lighting in most public latrines at night.

Multi-compartment latrines are renowned for poor maintenance, so it is not surprising that less than ten per cent of towns reported good conditions. Elsewhere latrines are dirty, floors are usually fouled with faeces and there is damage such as broken slabs and missing doors.

I am sure that much more information can be obtained by questionnaires, although without field work the replies have to rely on subjective opinions of respondents. Unreliability was demonstrated when I went to one of the cities in Africa from which the returned form had reported that five per cent of latrines were VIPs. I asked to see some of them. Five per cent meant there should be several thousand VIPs but the Council staff had difficulty in locating half a dozen and we found that most of these were not used.

Previous WEDC research on infrastructure for low income housing had been largely based on experience in the Indian sub-continent (Cotton & Franceys, 1991). From this we realized that a major obstacle to provision of latrines in some urban areas is small plot size. Some designs for twin pit pour-flush latrines are suitable for plots as small as 26 square metres (Ribeiro, 1985), but regulations may prohibit on-site sanitation with high population density. This whole question of sanitation for small plots needs thorough investigation.

WEDC has listed other topics for further study. This can be done by extending the postal survey and by fieldwork to give inter-country comparisons.

1. **Reasons for lack of household latrines:** the postal survey indicates that affordability is the main problem, followed by householders' lack of knowledge and several other factors; but some hard quantified data is needed.
2. **Fly and odour control:** more information about the performance of VIP latrines in urban areas is needed; how effective are tight-fitting lids over unvented pits?
3. **Pit emptying:** what are the best systems for emptying pits (and also vaults and septic tanks) and for the hygienic and low cost disposal of sludge?
4. **Operation of twin pits:** we plan to analyse the extent of and reasons for incorrect operation of twin pits. Some householders do not 'alternate' the pits properly.
5. **User satisfaction:** what do users like and why, problems in use and maintenance, and whether there are changes in use and satisfaction after latrines have been in use for some time.
6. **Groundwater pollution** is often used as an argument against on-site sanitation. To what extent is this justified? There is a need for technical, economic and social comparisons of removing excreta by sewerage so that extracted groundwater is unpolluted as against accepting groundwater pollution from on-site sanitation and obtaining piped water from distant unpolluted sources.

This is an ambitious list. We realize that even if we are well sponsored WEDC can only deal with selected aspects of these topics. However, networking of research may enable a great deal to be achieved. Sharing of information already exists to some extent. For example, topic 3 in the list (emptying and disposal of solids from pits and septic tanks) is already dealt with by IRCWD in Switzerland and WASTE in Tanzania and the Netherlands. It is the subject of papers at this Conference by Martin Strauss and by Muller, Rijnsburger and Kirango. So there is no need for WEDC to give specific attention to emptying and disposal. If we come across useful data or ideas, we will pass them on to Martin or WASTE.

It is sometimes stated that low cost sanitation should be 'site-specific'. In this it is poles apart from much conventional civil engineering. In particular it is quite different from piped water supplies or conventional sewerage, whose technology is more-or-less the same everywhere.

The variety of low cost sanitation makes it a particularly interesting field to work in. It is also difficult to suggest methods that apply everywhere. What is appropriate in South Asia may be completely unsuitable for West Africa. Many countries or districts have their own widely used type of latrine. Zimbabwe boasts wide coverage of VIPs, Ghana favours the KVIP and in India there are hundreds of thousands of twin pit pour flush water-seal latrines (Roy et al, 1984). Compost latrines have only been used in any numbers in Vietnam and Guatemala (Hunt, 1986). A

couple of years ago I visited Myanmar and found a commonly used latrine that I have seen nowhere else. Because both water and sticks are used for anal cleaning, this latrine has a pan like that for pour-flush latrines. A straight pipe goes from the pan to a single offset pit.

Even within one district or city satisfactory sanitation for some householders may be different from what should be done in the next village or another part of the city. The best solution for one family may not be best for the people next door. There may also be changes with time, so that what was acceptable five or ten years ago may be rejected now.

So advice on sanitation has to depend on many components. A good advisor may need to have at least some skills in social and cultural matters, in soil mechanics and hydrogeology, in construction techniques, management and economic/financial aspects.

This means that low-cost sanitation research has to relate to these same varied and site-specific matters. This in turn means that what is discovered by research on one site may have limited application elsewhere. So to get a global picture (or rather a picture that applies to the whole of 'the South') we need to have a very large number of studies covering all the varied social and cultural matters, soil mechanics and hydrogeology, construction techniques, management and economic/financial aspects.

Field studies can be very expensive and take a very long time, especially if conducted by expatriate professionals. Look, if you can get hold of it, at the report on household demand for latrines in Kumasi (Whittington et al, 1982). I noted above that the 1970s World Bank research only

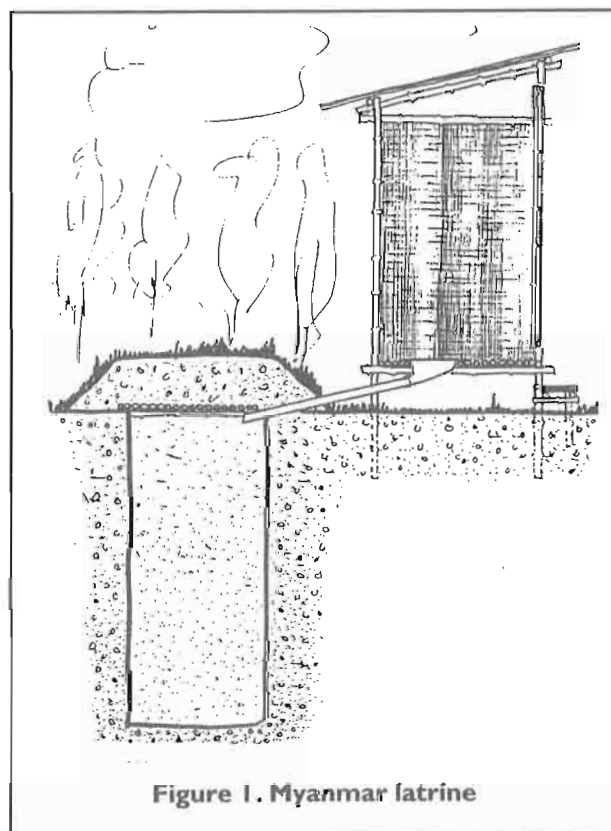


Figure 1. Myanmar latrine

covered a few countries. In fact it only covered a few areas in the few countries it investigated - for example, only the Ibadan core area and Bussa New Town in Nigeria (Feachem et al, 1979).

However, there are many small-scale investigations going on all the time. Some are conducted by agencies responsible for sanitation. Some by consultants. More in number are undertaken by people in universities and colleges, for example when undergraduate or postgraduate students look at local situations for course projects. All these result in reports of one kind or another, but virtually all count as 'grey' literature because they are not published. If the information gained in these studies can be shared there would be a vast collection of worldwide information.

Sharing the results of research is one objective of networks. Dan Campbell in his paper for this Conference outlines the ways in which networking operates and introduces the Global Applied Research Network for Water Supply and Sanitation - GARNET.



GARNET is an initiative of the Water Supply and Sanitation Collaborative Council and was set up to improve the flow of applied research information in the sector among institutions and individuals, between researchers and programme implementors and between industrial and developing countries.

Another advantage of networking is that it extends the possibility of working with other researchers. Collaboration between institutions in industrial and developing countries is already common as several papers presented at this Conference show. More joint efforts could be encouraged by networking.

Yet another benefit can be avoidance of duplicated effort. Too often there are several researchers doing more or less the same thing. Too often research can be criticised for 'reinventing the wheel'. It is far better if investigations can build on what others have done.

Within the global network there are about thirty topics, each with a coordinator. The following list gives the broad categories covered; some, like handpumps, have more than one coordinator, each dealing with a different aspect of the topic.

GARNET topics

- Eutrophication
- Groundwater pollution
- Guinea worm eradication
- Handpumps
- Housing and health
- Hygiene behaviour
- Health impact assessment
- Infrastructure for housing

- Institutional development
- Latrines
- Participatory monitoring
- Rainwater harvesting
- Separation processes
- Social science research
- Solar distillation
- Solar disinfection
- Solar disinfection
- Solid waste recycling
- Toxic substances
- Waste management
- Wastewater reuse
- Wastewater treatment
- Water (unaccounted for & efficient use)
- Water treatment

Those actively involved in applied research are urged to join GARNET. I will be pleased to answer enquiries and to put enquirers in touch with the appropriate topic network coordinator.

Part of the preliminary research undertaken by WEDC was funded by a research contract with ODA, whose support is gratefully acknowledged with hopeful anticipation of backing for the next phase of the investigation. ODA is also funding operation of the GARNET Global Network Centre at WEDC.

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