INTEGRATED RURAL WATER SUPPLY AND SANITATION PROJECT

KARNATAKA

DRAFT WORKING PAPER

ENVIRONMENTAL SANITATION

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ENVIRONMENTAL SANITATION

Draft Working Paper

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SUMMARY

1. INTRODUCTION

The Plan of Operations for the Integrated Rural Water Supply and Sanitation Project, Karnataka, has given detailed consideration to the provision of water supply and health and hygiene education together with supporting institutional and administrative systems. Implementation emphasized involvement of village communities, especially in planning, operation and maintenance. Less detailed attention was given to sanitation, which is interpreted in the wider scope of environmental sanitation, although it was foreseen that the community would take a leading role in physical implementation.

This working paper considers environmental sanitation in greater depth in the context of the Project villages with a concluding proposal for a pilot study to demonstrate application of the approach outlined by the paper.

2. THE PROBLEM

The component of environmental sanitation deals with human waste, wastewater resulting from various uses of water, surface runoff during the wet season and solid wastes of household and animal origin.

2.1 Human Waste

Human excreta is component of concern due to the health risk from pathogens contained in it. Nearly everyone in the Project villages practices open space defecation resulting in exposed human faeces of adults around the fringes of the villages and of children more indiscriminantly throughout the villages.

In general, villagers do not perceive this to be a health risk or significant concern except for some women who identify various issues of inconvenience. Cost of change is also seen as a barrier. The Project is concerned with the health risk associated with exposed human faecal matter, especially for children. The effectiveness of individual hygiene behaviour and especially handwashing after defecation, is also a concern.

2.2 Wastewater

The use of water by the Project communities is varied and physically dispersed. The latter serves to minimise existing wastewater problems together with limited supply at present. Sources of wastewater are household discharges from bathing and kitchen washing areas either to soak pits of directly to lanes, hand and feet washing water together with other miscellaneous household wastewater thrown on the ground by the houses, clothes washing generally at source of water, cattle washing also at source and water point wastewater.

Village people perceive wastewater to be a problem when it is allowed to accumulate or cause inconvenience in open drains. The health risk is not readily recognized. While accumulations of wastewater do occur, it is generally observed that the existing practice of disposal is surprisingly effective at limiting adverse impact.

2.3 Surface Runoff

This is a seasonal problem which appears as ponding, especially on lanes leading to their deterioration and to problems of access. The condition of affected lanes is perceived as a major inconvenience by the village people. However, seriously affected areas tend to be localised, rather than widespread throughout villages, in relation to availability of natural drainage and intensity of lane use.

2.4 Solid Wastes

Solid wastes originate from the households and as cow manure and waste animal feed. Animal wastes are composted in simple compost heaps, sometimes adjacent to the houses but frequently around the fringes of the villages. This is a traditional practice of recycling waste. Household wastes are not a serious problem.

2.5 Health and Hygiene

A dominant feature of the Project villages is the significant incidence of diarrhoea among all ages, with particular significance for children. This is most prevalent during the wet season. The expected range of other water and faecal related diseases exists.

The villagers perception of the significance of diarrhoea appears to be low. This also applies for faecal related parasites such as intestinal worms.

There are widespread habits of bathing and washing hands but not necessarily in relation to direct control of faecal-oral contamination. Similarly, the significant health risk of young children's faeces (less than 1 year) does not appear to be recognized. There is substantial room for improving hygienic behaviour and thus health.

3. CONCEPT OF SANITATION

Improvements for sanitation should include several basic concepts. The most significant are:

- simplicity, for installation, operation and maintenance
- affordability, for both the user and the Project while being technically functional and socially acceptably (by users)
- sustainability, for long-term functioning and use

- replication potential for neighbours to copy without outside assistance.

To achieve these objectives, several key elements need to be included. These are community organization and active involvement, integrated hygiene education/training, sharing of responsibilities between the communities and the Project, involvement of women and strategic planning.

4. ALTERNATIVE IMPROVEMENTS

4.1 Human Waste

The primary objective for improvement is to hygienically contain human waste and so contain disease organisms. In the Project villages, this involves achieving individual behaviour changes and physical solutions for specific village circumstances. In particular, the lack of space for latrines in many households requires due consideration.

It is proposed that a range of options be made available and not a "standard" solution. The options would initially concentrate on behaviour with burial of faeces at the time of defecation or covering in simple pits, as an extension of the existing defecation practice. Latrines would also be introduced with direct dry pits with squat hole plug, direct pour-flush pits and off-set pour-flush pits. All systems should be used with twin alternating pits for functional sustainability. In situations where there is no household space for latrines, communal latrines (3-5 households) should be considered.

yes!

4.2 Wastewater

The proposed approach for continued wastewater control is to encourage the dispersed use of water presently practised. The objective is to avoid concentrating sullage water to the extent possible and so avoid community disposal problems.

Measures are the use of household soakpits, open space or garden disposal of small volumes of household wastewater, community clothes washing installations on the village fringe with water point and soakage drainage, similar other water point drainage and cattle washing facilities, if necessary. The existing practice of feeding kitchen scraps and first rinse water to animals can be encouraged.

who disposes manages manages?

4.3 Surface Runoff

With household sullage contained locally, it is proposed that lane runoff drainage be managed by surfacing and shaping lanes as drains (shallow vee form). Conventional side drains are costly and more of a problem to maintain.

4.4 Solid Wastes

It is proposed that the existing use of compost heaps continues with basic improvements only, together with tidier disposal of non-organic household waste.

5. IMPLEMENTATION COMPONENTS

A range of issues need to be considered when developing a community-based approach to implementation.

Community organization is essential with the community involved at all stages from planning through implementation to operation and maintenance. The nature of the organization needs to be representative of the social and cultural structure of the villages. It needs to operate in partnership with the Project with mutual responsibilities understood and accepted. The Project sets out to achieve this.

Promotion and hygiene education are both necessary integral components of sanitation improvement. The hygiene awareness campaign of the Project needs to be supplemented for sanitation with more structured and targeted deliveries, especially for household level. Before installation, both perceived needs and desirable improvements should be promoted and, after installation, specific use and care education given.

Installation of facilities needs to be simplified by design and choice of materials to make installation with minimum skills, even by household members alone, possible.

Cost sharing is necessary for objectives of affordability and "sense of ownership". A preferred basis involves Project supply of non-local materials and community/household contribution in kind, with no cash exchange. This assumes community/household responsibility for organizing and effecting the installation of facilities as intended by the Project.

Involvement of women is essential because of their responsibility for household management of water and wastes. Their participation in the community organization and implementation processes helps to ensure their needs are met. They need to be members of the village committees.

Environmental protection is an integral component of the design and installation of Project supported facilities.

6. SANITATION STRATEGY

The Plan of Operations provides for active community participation through village committees. This is largely a supportive role initially, but later with direct responsibility for operation and maintenance.

With the outlined approach for environmental sanitation improvement, it is proposed that more positive community management should be adopted, with the Project facilitating support. This is considered desirable for the greater community commitment needed for active sanitation improvement and to supplement the limited resources of the Project.

A variation of the implementation methodology of the Plan of Operations is outlined by the working paper. This provides for more active and earlier involvement of the village committees and, through them, community members. The committees, in particular, would be involved at all stages, frequently taking the lead role. An essential feature would be the preparation of Community Action Plans providing the basis for all implementation activity.

A further proposed implementation strategy is to identify positive performance features that community people can respond to, and even compete for, to their benefit.

There will be two levels of physical implementation and operation and maintenance responsibility. Some facilities are household responsibility alone, such as soakpits and latrines; others, such as water points and clothes washing areas, would be community responsibility requiring appropriate on-going community organization for sustainable operation.

The institutional capacity of the Project's organizational structure to support active environmental sanitation implementation was examined. The performance of village level workers will be particularly important, especially for supporting community organization and sanitation technology. The later in particular would need close monitoring. The ability of the Project to support the application of a range of low cost community implemented sanitation technologies may also need monitoring.

7. PROPOSAL

The innovative nature of some of the approaches outlined is acknowledged. These are based on experience with other projects outside India and following field assessment of the circumstances in a sample of Project villages. There are also the generalized observations of only limited sanitation achievements by other comparable projects in Karnataka and elsewhere.

The proposal for a pilot study of three Project villages over a twelve months period is made. The community management methodology outlined would be used. An indicative workplan is presented in the working paper. The full range of behavioural and technical solutions would be strategically applied in each of the pilot villages together with contract implementation of water supply. Sanitation implementation would be a learning process, adapting to the circumstances and responses of each village, as compared to implementation of a fixed methodology. Three comparable villages implemented according to the Plan of Operations would be monitored as controls.

It is proposed that a facilitating team of one Monitoring, Training and Promotion officer and one Junior Engineer be established for the Pilot Study and that, at village level, a Sanitation Technologist (from the village) is appointed and made partner to the Project Village Worker. The Sanitation Technologist would be for the Pilot Study only and not represent a general Project appointment as yet.

The Pilot Study would run concurrently with Project implementation, although to an independent workplan. Should Project implementation be delayed, it is proposed that the Pilot Study should proceed independently. Additional funding would need to be arranged.

8. CONCLUSIONS AND RECOMMENDATIONS

There is need to improve the Project village environmental sanitation. This will involve four basic activities contained within the working paper, viz.

- changing the perceptions and behaviour of community members
- installation of a range of socially and functionally acceptable, affordable and sustainable alternative technologies
- setting up sustainable delivery and operational community-based systems
- provision of necessary institutional facilitating support.

Towards achieving these targets, it is recommended that

a. the environmental sanitation working paper be selectively circulated for comment.

b. subject to acceptance of the working paper, a Pilot Study based on the working paper approach be set up and implemented during 1993.

1. INTRODUCTION

1.1 The Project

The Integrated Rural Water Supply and Sanitation Project (the Project) for the Karnataka State has passed through a conception stage (Report, June 1987), an inception stage (Report, August 1991) and now the preparation phase. The last is approaching completion with a draft Plan of Operations currently under consideration.

The Plan of Operations considers components of water supply, health and hygiene education and institutional and administrative development in reasonable depth, together with supporting issues of community organization and operation and maintenance.

The Plan of Operations considers village environmental sanitation in outline together with sociological assessment of village circumstances and attitudes. Neither the implementation approach, nor the mode of integration with other components of the Project were identified other than the strategy of community based implementation. This contrasts with contract implementation for water supply. The lack of detail with sanitation reflects the existing uncertainty of how to sustainably improve rural village environmental sanitation, the villager's relatively low perception of need for improvement and an institutional tendency to adopt "standard solutions" for most situations.

not fully contract: CP/WI to be included.

The purpose of this study was to assess the existing environmental sanitation condition of Project villages, analyze the "problem" and devise a conceptual strategy as a potential basis for implementation solution. Due consideration has been given to the Project structure identified by the Plan of Operations.

This Working Paper is the result of the conceptual study of environmental sanitation for Project villages.

1.2 Project Sanitation Objectives

The objectives of the Project described by the Plan of Operations, provide the basis for environmental sanitation implementation objectives. Within the scope of the overall objective to improve living and health conditions, the Project short-term objectives are in summary:

- to provide safe water and save time and energy for fetching water
- to improve environmental sanitation
- to provide education on proper use of new facilities

Secondary Project objectives are proposed for environmental sanitation. These are:

a. hygienic containment of human waste throughout each Project village

b. improvement of both the living conditions of households and physical environment for village communities

c. provision of sustainable household and community environmental sanitation facilities which they can easily use, care for and maintain.

Further objectives linked to the supporting provision of health and hygiene education are:

d. improvement of the health of community members, with particular emphasis on the children and then women of the village

e. for village members to adapt their perception of environmental sanitation in keeping with attainment of preceding objectives

but also sustainable programmes, see p. v.

Institutional sanitation objectives are also required. This is to enhance their capacity to support community based implementation of sanitation improvements in villages. These are:

f. for institutions supporting the Project to better appreciate the potential benefits of working in active partnership with communities together with use of strategic environmental sanitation planning and implementation (sanitation strategies, paragraph 3.3).

1.3 Definitions

A conceptual assessment of environmental sanitation involves the use of selected key terms. It is useful to describe the meaning applied to each term by this study as the basis for its use and contextual understanding.

Integration

For Project purposes, this is the more-or-less concurrent implementation of water, sanitation and hygiene education improvements with due consideration for the physical and social interdependence of component activities.

Community participation

This is community involvement and contribution to Project implementation activities, with the Project exercising the dominant organizational and directive role.

Community management

This is community involvement and contribution to Project implementation activities, with the community exercising the dominant organizational and directive role and the Project a supportive facilitating role.

Sustainability of installations - need check of provisions.

This requires that installations must be both socially and technically acceptable to users and provide long term performance. To achieve this, the installation must be functionally reliable, easily cared for and maintained and be reusable or relocatable if necessary, for continued use and function.

Replication

The ability for others to copy and install a facility on the same basis as the original with only the guidance of the owner(s) and/or those who installed the original. It is assumed institutional guidance is not available at the time of copying.

Affordability

The basic element is least acceptable installation cost with three aspects of greater potential coverage for finite Project funds, less overall expenditure for homesteads (cash and kind) and in the long term, greater potential for community replication when Project support is no longer available.

Cost sharing

This can be with cash, materials, labour, advice or any other form or combination agreed between the sharing parties.

1.4 Scope of Study

All components of environmental sanitation described by the Plan of Operations have been considered in an integrated manner, namely:

- human waste,
- wastewater involving household sullage discharges, miscellaneous household wastewater, clothes washing wastewater, cattle washing wastewater and water point wastewater,
- surface runoff of rainwater, natural village drainage and lane surface conditions,
- household solid wastes, animal manure and animal feed wastes.

Following a several day field trip to observe first hand the circumstances of a sample of eight Project villages, the existing situation of each environmental sanitation component and alternative solutions for improvement were considered.

The necessary activities for implementation of preferred solutions have been reviewed and strategies for a programme of implementation developed. A proposal for initial implementation activity is made.

2. EXISTING SITUATION

The existing environmental sanitation situation in any Project village is complex due to the combination of environmental sanitation components, the physical and socio-cultural circumstances of the village and the perceptions of village members. These issues are inevitably interrelated in an interdependent manner. Waste sources are used as a structure for assessing the existing situation.

2.1 Human Waste

2.1.1 Nature

Human waste comprises faeces and urine, with each having a different health and environmental significance.

Faeces have a high health risk with faecal-oral transmission routes of water and contaminated hands, food, flies and, for young children in particular, soil and domestic animals. Associated diseases of main concern are firstly diarrhoea, because of its common occurrence and the susceptibility of children and then the epidemic risks of cholera and typhoid, viral diseases of polio and hepatitis, amoebic and other forms of dysentery, the range of intestinal worm infections and mosquito borne filariasis. Additionally, direct faecal-skin contact transmits hookworm. By contrast, urine is not generally a significant source of disease.

All members of village communities are potential sources of contaminated faeces, however, young children are at particular risk and an important disease source once they start crawling about on their own.

Both faeces and urine will cause undesirable degradation of the environment if allowed to contaminate surface waters, primarily through biological oxygen demand.

Effective control of these problems requires that faeces be contained in a safe manner and urine contained and/or acceptably dispersed within the natural (and social) environment.

2.1.2 Existing practices

Virtually all members of Project villages, men and women of all ages and children defecate in open spaces in and about their villages. This is an individual activity. In general, men either defecate in the fields or community defecation areas such as the edges of village lanes. Women use a separate area on the fringes of the village selected for reasonable privacy. Young children defecate more or less indiscriminately within the village in open spaces and along the edges of village lanes. There is no effort made by anyone to cover faeces.

There does not appear to be any significant cultural difference in defecation behaviour pattern within villages, apart from a very few wealthier households which have installed household latrines, mainly for use by the household women. The only other "improvement" observed were walled defecation areas provided in a few of the larger villages by the Mandal. These installations are for women and are either an enclosed open space or an enclosed line of "drop holes" above open ground. They were observed to be used by women living near them.

In all villages there are no specific individual or collective measures taken to "clean up" exposed faeces. In many but not all villages, pigs scavenge much of the exposed excreta by eating it. This particularly applies with the enclosed spaces used by women. However, not all villages have pigs. In other cases, dogs eat faeces and particularly those of young children. Dogs in particular are a health risk to children as they touch the dogs or the dogs lick them, particularly on the hands and about the face.

All people use water to cleanse themselves after defecation except in extreme situations of water scarcity. With adults and older children, this is at the place of defecation. With young children who have just defecated, mothers or older children willcommonly wash them in the street or wherever they happen to be.

Both sexes and all ages urinate more or less indiscriminantly both within and around their villages, although with women more concerned to have some privacy.

2.1.3 Village environment

The result of open space defecation practice is that faeces are left exposed on the open ground, unless scavenged by pigs and/or dogs. There is no effective containment other than the zones of concentration provided by communal defecation areas. As a result, the potential for inadvertently standing on excreta is always present. This is of particular concern for barefoot children but is also presumed to be an aesthetic concern for everyone, especially at night in defecation areas. In the fields, the risk of contact is much less. Overall, the period of greatest risk is during the wet season when faeces do not have the same opportunity to dry out and can remain infective for much longer. Faecal matter can be spread more readily with larger areas of the village becoming contaminated.

In the villages visited defecation areas were clearly seen to be used and grossly contaminated. In the rest of the village, exposed excreta was only occasionally seen and presumed to be that of children. The situation behind houses in composting and fuel and feed storage areas was not fully observed. It is assumed these areas are used at night. There was no residual evidence of urination, as expected.

The spread shape of most faeces observed indicates a relatively extensive background incidence of diarrhoea with many (and possibly most) members of Project communities affected. This in part reflects the greater incidence of diarrhoea during the wet season.

2.1.4 Village perceptions

Information for this subject comes primarily from the in-depth and baseline community studies made by the Project, but supported by observations in village visited.

Why open space defecation?

This is a long standing cultural practice of Indian rural communities that has "generally" proven to be functionally effective for both the individual and the community. It appears there has been no need to consider alternatives, nor reason to change, in view of the generally low level of awareness of health risks associated with open defecation. There is also a lack of knowledge of alternative systems or methods. Even if alternatives were known, limitations of cost and how to install them would probably have resulted in little change. It are only the wealthier members of villages who have had been exposed to urban practice and have access to necessary resources, who have chosen in a few cases to install new systems.

Are village communities satisfied with open space defecation?

There first reaction tends to be yes, in that they do not have any acceptable alternative available to them. However, further discussion revealed that some limitations are perceived with open space defecation. At the same time, they also foresee difficulties with toilet systems. Although the extent of these perceptions was found to be relatively limited, they do represent an existing focus for change within Project communities.

Perceived limitations of open space defecation

The perceived limitations mostly apply to women. The issues are:

- Lack of privacy for women, which men also felt was desirable.
- Inconvenience of having to go so far from the home, especially for women (and older people?).
- Time and energy required is considered wasteful.
- Dirty and messy during the rainy season.
- Suppression of desire to defecate, sometimes required, is unpleasant.
- Need for company is sometimes felt.
- Safety at night is a concern in some situations.

- Health is not a perceived problem.

These limitations are potential promotion topics for the purpose of stimulating "improvements" in defecation practice. A further promotion topic identified is the status value of having a toilet.

Perceived concerns with closed space (toilet) defecation

These concerns need to be recognised and considered for the design and promotion of any intended sanitation "improvements". This is necessary for both technical and social sustainability. The identified concerns are:

- Affordability - target households must be able to afford their contribution to any "improvement".
- Lack of space is a serious physical limitation for many households.
- Greater need for other facilities and, in particular, water.
- Scarcity of water may limit proper use and care of "improvements".
- Extra time needed for cleaning and looking after "improvements".
- Extra water needed is a concern, especially if this has to be carried any distance.
- Latrines are "dirty", meaning smelly, is a common perception. This makes them unpleasant to use and undesirable to have in the house.
- Latrine concept is generally not part of village life, especially for men.

2.1.5. Project perceptions

The objectives of the Project and experience of Project members combine to establish the Project's perception of human waste management in the village situation.

The Project's primary concern is to ensure that human wastes are contained in an effectively hygienic and sustainable manner to enable related health benefits to be achieved and target groups reached. While health benefits particularly apply to children who are especially susceptible to sicknesses of faecal origin, this is necessary for all members of project communities. Community women are anticipated to be initiating focal points for promoting the adoption and acceptance of sanitation "improvements".

To achieve these results, "improvements" need to be fully functional, socially acceptable and effectively used and cared for. This requires the Project, with community assistance, to identify effective and affordable "improvements" and for the community, to adopt new forms of behaviour.

Effective containment of human wastes to meet health objectives will at the same time, provide effective protection for the surface community environment. Below ground, care would be needed to ensure underground granaries (and

shallow ground water if used) are not contaminated from latrine pit installations.

2.2 Wastewater

2.2.1 Nature

Wastewater in Project villages involves a several components of village environmental hygiene significance. They are only secondarily of health significance. Wastewater sources are:

- personal bathing
- hand and feet washing
- kitchen washing
- washing clothes
- washing animals
- household floor washing
- water point waste flow

These wastewaters are mostly contaminated with organic and inorganic (soil) matter. Contamination with human wastes is generally of secondary consideration. The main concern is to avoid wastewater concentration in ponding situations with attendant problems of physical inconvenience, smell and mosquito and fly breeding.

2.2.2 Existing practices

The generation of wastewater is directly related to the water use pattern in terms of quantity and location. The Project has investigated the quantity of water used for different purposes. On average, a range of 25 to 35 litres per person is collected daily. In Project villages there is an informal practice of water use dispersion involving the following general behaviourial pattern.

A personal bathing area is provided inside the house in the majority of households. Women in particular use this area together with other family members with washing water discharged outside directly through the house wall. Many of these discharges are directed to covered soak pits located in the lane. Significantly, these soak pits are concentrated in the central, often more crowded area of villages. They are installed by householders and appeared to function quite effectively.

Men will often bath away from the house when washing cattle or at an irrigation source. Poorer people bath outside, typically in small shielded enclosures which simply discharge to the adjacent open ground or lane.

Hand and feet washing is done outside the house near the entrance door (the back door if there is one) with wash water thrown on the ground. Water is kept

separately for this purpose.

Kitchen utensil washing may be done in the inside bathing area if there is one or simply on the street with wastewater thrown onto the ground.

In many households with cattle, the first rinsing of kitchen utensils and related organic waste is saved for feeding to the cattle. This significantly reduces the amount of waste organic solids in kitchen wastewater.

Clothes washing is almost always done at the source of washing water away from the house, mainly because it is easier to carry the clothes to water rather than the reverse. It is also a social activity for women.

Cattle washing is done at the source of water every one or two days. Preferably this is at surface water sources but during the dry season at well and pipe sources, provided sufficient water is available. Washing cattle appears to serve an important household hygiene function in that they do not attract flies and smell less when kept inside the house at night with the family.

Other miscellaneous household wash water is thrown on the open ground.

Water point wastewater is frequently a problem around existing handpump or piped water standposts. Without adequate soakage and/or drainage, spilt water typically ponds making the environment muddy and unpleasant to use. The ponded water also provides a breeding place for mosquitos.

2.2.3 Village environment

In general, there does not appear to be a substantial wastewater problem in the Project villages. Localised dirty household discharges from bathing/kitchen drains are seen in the lanes although with few cases of gross wastewater pollution. In the sample villages, in only one situation was a significant wastewater problem seen in an extended open lined drain receiving wastewater from several adjacent households. It is probable that limited water availability and, hence, use helps to reduce wastewater volumes discharged.

In one village, ponding of water was seen at the low point of the village although this was not grossly contaminated. Surface water ponding observed in some lanes of several villages showed no visual evidence of contamination with household wastewater.

The quantity of water presently used for bathing and kitchen washing appears to be small enough for simple on-site soakage disposal, especially when combined with the practice of feeding cattle the first rinse water from kitchen utensils. The volume used for "outside" bathing by poorer people also seems to be small enough not to cause a significant localised waste water problem.

That men often wash away from home also helps to keep waste wash water volume down.

The random disposal of other household wash water on the ground outside of houses would in principal appear to be an undesirable practice. However, this does not appear to be the case in project villages. It would seem that the volume is sufficiently small, occasions of disposal are spread sufficiently through the day and disposal pattern over a sufficiently large surface area for this waste water to be "lost" by ground soakage and evaporation. With this waste water, no significant health risk is normally to be expected.

By washing clothes and cattle away from the house, a significant household waste water problem is avoided. The environmental impact at the washing locations was only incidently observed but needs consideration in relation to environmental drainage.

It is concluded that the existing practice of dispersed water use and wastewater disposal is a surprisingly effective form of control. This appears to be largely due to self imposed household limits on the quantity of water being collected and carried (this takes time and energy). Those with household connections have in-house water storage facilities to counter the usual short period of supply.

2.2.4 Village perceptions

The perceptions of village people about the state of wastewater drainage (not surface water - rainfall runoff) in their villages does not appear to have been sought in depth. There is clearly recognition of the potential problem as evidenced by the use of soak pits. The substantial control of wastewater drainage being achieved is largely indirectly due to the pattern of water use.

2.2.5 Project perceptions

The Project clearly perceives the need for village wastewater to be controlled and not allowed to concentrate as an environmental and health hazard. However, the more conventional approach is to equate control with sullage drainage. In providing open drainage, it must be recognised that sullage is being concentrated and transferred to become a community rather than household disposal problem. Open drainage also introduces a significant maintenance requirement. The conventional view needs to be reassessed in view of the community's existing rather effective approach to the problem of waste water control.

A related issue is the provision of household connections through the Project and the resultant volumes of water use and wastewater discharges. This may need to be reassessed as water supply needs to be considered fully integral

community waste water management (not just drainage).

2.3 Surface Runoff

2.3.1 Nature

The basic need is for unrestricted natural drainage of surface runoff (due to rainfall) so that lanes are left free of water and the village substantially free of ponded runoff or, worse still, flooding of low lying areas. The achievement of this depends on the topography and natural drainage system within and immediately beyond the village. Runoff drainage is also influenced by the form and condition of lanes.

The quality of village access is largely dependent on the effectiveness of runoff drainage at village scale and the free draining capacity of each lane and sections of lanes at the individual and household level. Retained runoff leads to rapid deterioration of lane surface dependent on the level and nature of traffic. A muddy lane can be a major inconvenience and discomfort for village members. The form and quality of lane surfacing is hence an integral part of surface runoff control.

Surface runoff need not present a significant quality problem other than accumulations of silt, provided household and other sources of waste water are separately controlled and not part of the runoff flow. It is however, highly desirable to avoid runoff contamination with human faecal matter and, to the extent practical, with animal excreta.

2.3.2 Existing practices and conditions

There is presently little effort made to control surface runoff in Project villages other than a few unlined channels along the edge of some low lying lanes and the occasional sections of paved lane. Fortunately, most villages are built on sloping land which offers reasonably free surface water drainage although, parts of a few lanes hold pools of water after rain. This leads to the development of muddy sections which can be difficult to use on foot, but only occasionally a problem for wheeled traffic or animals. In the few places where village lanes are directly on black cotton soil with no other form of surfacing, access conditions can become very difficult during prolonged wet weather.

In the built up and older centres of a few villages there can be found sections of lanes paved with stone blocks to provide a stable although generally still muddy surface. On black cotton soils, lane surfaces are frequently quite slippery when wet.

2.3.3 Village perceptions

Village perceptions concerning surface runoff are primarily concerned with ease of access for moving about the village rather than runoff drainage specifically. This is their highest perceived priority for environmental hygiene improvement. Easy movement within the village is a continuous and significant requirement for purposes of:

- fetching water.
- defecation,
- going to work in the fields (with cattle),
- other daily business and social activities.

They see a need for free draining, reasonably surfaced and generally mud free, lanes during rainy seasons. Stone paving is their preference with a side drain or drains.

They also desire that lanes be free of household waste water drainage, especially during the dry months when lanes are otherwise dry and mud free. It is presumed they also wish to avoid flooding and long term ponding of runoff water within the village.

2.3.4 Project perceptions

The hygiene significance of poor surface runoff drainage is that ponded water provides opportunity for malaria carrying mosquitos to breed. The possible inclusion of household waste water and/or human waste contamination is a secondary issue best controlled at source and hence not included. However, should this be unavoidable in significant quantities, then measures should be taken to remove the contaminated runoff (and waste flow) well beyond the housing areas of the village.

Improvement of village lane surfaces and grades for access is an important village benefit but secondary to the primary objective of unrestricted surface drainage.

2.4 Solid Waste

2.4.1 Nature

Solid wastes are generated in Project villages from household members and from the cattle and feed of the more than half of village households owning cattle. These wastes need to be managed by individual households.

The major source of solid wastes are the excreta of cattle combined with feed residues. Substantial quantities are collected through the year.

There is much less household solid waste with much of this recycled as cattle feed. The residue is small and generally without the problem materials (eg. plastic bags) found in other and especially urban communities.

2.4.2 Existing practices and conditions

Cattle wastes are collected and heaped in household compost heaps throughout the year, while residual household wastes are disposed of variously to compost heaps, lanes and waste land generally. Observation showed there is scope for tidier disposal, but generally no serious household solid waste problem in Project villages.

Cattle dung is also used as a fuel, mostly as dry dung cakes and in the special case of a few wealthier households, to fuel household Gobar biogas plants. The latter is a useful activity but of little significance for the majority of poorer village households.

Cow dung, waste cattle feed and some residual household wastes are dumped on the compost heaps daily. The heaps appear to be left to rot with no significant effort to manage the composting process. Village management of compost heaps has not been specifically investigated.

Each household owning cattle has its own compost heap. Many of these are located around the fringe of the village on open space while other households have them adjacent to their houses. The heaps are often located in dug pits.

The compost heaps are not particularly objectionable but are expected to be a significant source of fly breeding. Heaps close to or in some cases next to houses are of greatest concern. Frequently this space is shared with stacks of feed for cattle and collected fuel wood. The basis of ownership of compost heaps and in particular the land involved is not known. That near houses is assumed to be part of the house property. The basis of right of use of land used on the fringes of villages should be established.

During the rains, some compost pits tend to collect water which can be heavily contaminated with dissolved organic matter. Runoff through and overflow from compost heaps may be similarly contaminated.

2.4.3 Village perceptions

The main perception of village people is the agricultural value of the composted waste used as an organic manure and cattle dung as a fuel. The extent to which they are satisfied with their current practices has not been determined.

2.4.4 Project perceptions

The existing practice of collecting animal and household solid wastes and recycling these is to be supported. It is reasonably functional and effective and disperses rather than concentrates the waste problem. There is however scope for generally tidying up the process and within available space limits for improved environmental hygiene about households. The pit leachate problem could also be largely controlled. Existing health risks associated are essentially indirect through flies and possibly rats. There is also opportunity to introduce active management of the composting process rather than the current relatively passive process practice.

2.5 Health and Hygiene

2.5.1 Nature

Good health is the objective and intended result of improved household and community hygiene. Hygiene is concerned with the quality of household and community environments and personal hygiene and for water and sanitation, control of disease transmission routes. These routes are classified as:

- water borne diseases found in contaminated water consumed
- faecal-oral diseases of faecal origin transmitted directly and indirectly with faecal matter
- vector diseases transmitted by insect and other vectors

A further group of diseases are skin diseases controlled by water washing, of concern in situations with serious water scarcity.

2.5.2 Existing conditions

The Project has a general, but incomplete picture of the health status of village communities based on their sociological survey of eight villages. Records from district health centres do not appear reliable when the recorded pattern is examined.

Water and sanitation related diseases are prevalent in villages with diarrhoea common, especially in children who are most susceptible. There is a greater incidence of diarrhoea reported during the wet season, probably due to less desiccation of pathogens during transmission. Other diseases such as malaria, cholera and typhoid are reported. Also expected are polio, hepatitis and other viral diseases.

Not commented on at all is the incidence of intestinal worm infections and other parasitic diseases such as hook worm and filariasis. All will exist in village communities and can be assumed to have a significant debilitating effect, even

though not readily detected by household members.

The level personal hygiene of village members has not been directly assessed, nor the variation between different cultural and socio-economic groups. In general this appears to be quite good with reference to bathing habits and the cleanliness of houses. However, cleanliness from faecal contaminiation is much more suspect with the incidence of diarrhoea supporting this observation. There is no reliable evidence of the extent of handwashing after defecation or after anal cleaning young children, nor the adeuacy of handcleaning methods. Washing adequacy of handcleaning methods. Washing with water alone, without using an agent such as clay, ash or soap, is largely ineffective.

The existing practice of open space defecation, remote from the hand washing water source, probably serves to limit the frequency of effective handwashing. It is difficult to establish and sustain a behaviourial habit if there is a significant time delay between separate activities which should be linked.

The environmental hygiene conditions of Project villages have been described in previous sections.

2.5.3 Village perceptions

The Project's sociological studies established that most villagers have little perception of the health risk associated with their unhygienic behaviourial practices and particularly that of defecation. They are generally not aware of the high health risk associated with the faeces of very young children (1 year or less). These frequently have a higher density of pathogen infection than the faeces of adults.

While regular washing is a part of community life, this does not in itself provide for control of disease transmission. Of more importance, is how and when hands in particular are washed. People generally wash hands before eating food knowing they are going to use their hands, although whether children do so is not clear. It is doubtful whether people appreciate the need to wash hands after defecation or cleaning children and that water alone is not adequate. There is ample opportunity for self-infection or infection of others between defecation and when next eating, especially with children.

A greater perceived village concern is the need for improved lane drainage in some areas. However, this is probably for reasons of convenience rather than recognised hygiene concern.

2.5.4 Project perceptions

The Project clearly identifies the need for improved health and hygiene behaviour for all village members and has built in hygiene awareness and education activities for this purpose. The need for improved defecation practice is recognised as also is the entrenched nature of the existing practice of open space defecation and the likely difficulty changing this.

2.6 Community Organization

2.6.1 Nature

Village communities are typically a complex of cultural, socio-economic and formal and informal organization. The relationships within and between these components willdetermine the nature of function and extent of operation of the village as a collective community.

2.6.2 Existing situation

There are variations between villages but the typical situation is as described in the Plan of Operations. In general, there may be three or four cultural groups in a village with each generally living in discrete areas. Those of higher social standing willtend to live in the centre and those of lower standing toward the periphery of the village. Economic status mostly, but not always, follows the social pattern. The nature of organization within each group has not been assessed.

Other organization involves the formal structure of village council and its relationship with the administrative Mandal. In most villages, there are also informal groups formed for a variety of purposes, although frequently found to be non-functional.

2.6.3 Village perceptions

The village perception of community organization is invariably dominated by their expectation of Mandal performance and responsibility, especially for services such as water and sanitation. There is also frequently a political element behind this expectation. In general, it seems the expectation of service is countered by the expectation of non-performance, based on repeated promises in the past which have not been kept. Related to this is the fact that village councils are seldom functional.

The formation of many informal groups in the past shows there is some appreciation of the potential value of group organization. Why these groups are frequently now inactive is not clear.

The perception of cooperation between neighbouring households or groups of households was not determined. Nor has this been determined between lanes or other similar groupings with physical, cultural and/or socio-economic bases.

2.6.4 Project perceptions

There appears to be no well defined and functional community organizational structure in most Project villages, although the elements of organization are there. The major limitation seems to be in the mind of individuals, based on past adverse experience. This attitude of mind needs to changed for effective community organization to be established. The Project has less perception of the nature and potential for subsidiary community organization closer to household level.

3. CONCEPT OF SANITATION

3.1 Primary Objectives

There are four primary objectives for a sanitation programme:

Simplicity

A simple design will in general result in a more reliable sanitation system, that is more easily built, more easily used and maintained and more suitable for community implementation.

Affordability

Sanitation installations need to be affordable for users while at the same time providing greater potential for Programme coverage.

Sustainability

Sustainability is central to any successful sanitation installation which must be both socially and technically acceptable to users and provide reliable long term performance.

Replication

The potential for replication by others without project assistance is the ultimate sanitation objective. Replication capacity depends on affordability as the key factor, together with simplicity and sustainability.

3.2 Design Compromise

To optimise these objectives, there will invariably need to be some compromise between simplicity, affordability and sustainability. In particular, structural over-design should be avoided.

For low-cost installations, designs based on empirical tests of "real life" physical loadings will generally be of greater relevance than calculated designs referenced to official standards. Structural design only needs to be "strong enough", but must be adequately functional.

3.3 Key Strategies

Key implementation strategies of particular relevance for the Project are:

a) Existing community practice, both current and past, provides initial behaviourial models from which to develop new methods and approaches

introduced as and when found necessary. Communities are a source of valuable experience gained over many years which has a practical and realistic basis.

b) Active community participation is essential for sustainable environmental sanitation development. Community participation is interpreted to involve:

- A functional village community organisation with acceptable representation of cultural and wealth classes and equitable representation of women and men.
- Collective acceptance through participatory procedures of a programme of integrated environmental sanitation improvement with the programme described in a Community Action Plan developed by the community.
- Community acceptance, through an established village organisation, of responsibility for organising, implementing and monitoring their programmed improvements.
- Community (and households) to accept responsibility for the ongoing care, operation and maintenance of sanitation facilities.

c) Integrated improvement of environmental sanitation components through solution design and concurrent implementation of components which allows for the interdependent practical and behaviourial relationships involved. Water supply and hygiene behaviour are also included.

d) Disperse sanitation problems to the extent possible with appropriate methods rather than concentrate them. Households management is generally easier and more sustainable than collective community management of concentrated waste problems.

e) Mutual responsibilities between community and Project need to be recognised and established on a basis of mutual respect and trust (primarily through initial PRA and follow on performance). Both parties should work to agreed performance targets that are measures of the contribution of each to the development of the village.

f) Cost sharing between household or community and Project is an important determinant of "sense of ownership" and more effective coverage with Project funds.

g) Involvement of women needs to be optimized to take full advantage of their involvement and influence in matters concerning water and wastes, especially within the household environment.

4. ALTERNATIVE SOLUTIONS

The consideration of alternative solutions relates to the existing situation described and in the context of the outlined conceptual view of sanitation. The concept of strategic planning and implementation is followed to provide a range of solutions responsive to the complex physical and social circumstances of many Project villages.

The need is for the most acceptable, affordable and sustainable solution for each situation. "Standard" solutions are unlikely to satisfactorily meet the needs of Project villages.

4.1 Human Waste

4.1.1 Options

Because of the relatively complex cultural and physical structure of the Project communities, there can be no single answer for the containment of human waste. This willapply to most, ifnot all Project villages. A range of solutions is required.

Of particular concern is the existing layout of villages and houses. Project villages are generally reasonably compact. In many villages, substantial parts are essentially urban by nature with almost all space fully utilised. This applies to all caste/class levels. Houses frequently occupy the whole of the plot with no or minimal courtyard space. Poorer households typically have only one room. In these situations of full site utilisation, the only available free space is the publicly owned lanes between houses. These typically range from 1 to 4 or more metres width. In some areas there is a further complication of below-ground grain storage pits located beneath lanes.

In smaller villages, space is often not so limiting with wider areas in front of houses and frequently space behind houses used for feed and fuel storage.

Alternatives considered for human waste disposal need to be socially and culturally acceptable, although with allowance for change of community perceptions and attitudes due to external influences and project promotion and hygiene education.

A range of methods is considered for the improvement of human waste disposal in Project villages. These are:

- Buried open space defecation (Cat method)
- Trench and open pit systems

- Pit latrines with:

substructure systems of:	superstructure systems of:
o single unlined pits	o simple pit
o double unlined pits	o covered pit
o double lined pits	o vented pit
	o pourflush pit
	o offset pourflush pit

- Compost latrine systems
- Communal latrines involving any of the above

Institutional latrines can use any of the pit latrine alternatives.

Water based systems including sceptic tanks and sewerage alternatives are not considered supportable due to water supply limitations, lack of space, cost and future operation and maintenance and environmental concerns. Human waste concentration must be limited.

Buried Open Space Defecation - "Cat Method"

The simplest improvement is for each person to bury their own faeces at the time of defecation. This provides effective containment and in other parts of the world is recognised as a significant improvement over uncovered open space defecation.

All that is required is a "tool" to dig a small hole and fill it in afterwards. A variety of tool options are possible:

- hands, pieces of wood or stone can be used in soft and cultivated soil,
- most households have digging tools for men and weeding tools for women available in the field and/or at home which could be physically used; cultural acceptance of this use needs to be determined,
- the community might be asked to design a suitable and acceptable tool (assuming they don't already have an answer),
- a further consideration would be Project provision of a suitable simple tool for each household.

As with ALL sanitation systems, the key element is to establish individual behaviourial change (new habits). In this case, instead of going with a water container in the hand, they would automatically pick up the container and digging tool together and use them both!

While at work in the fields, men (and women) will continue to defecate on occasions. This can be encouraged as a way of reducing the load on sanitation systems within the village. Probably this happens already, but the practice can be emphasised.

Within the village, buried defecation would provide substantial improvement over existing open space defecation, with particular benefit for children and women. Community organisation additional to the existing informal allocation of defecation areas and user social monitoring, would probably be needed. Issues for consideration are:

- areas for sole use of defecation (not used for other purposes like roads and lanes) with soil conditions suitable for digging and covering (eg. not rocky or too hard). The availability of "digable" ground in the dry season needs to be assessed,
- additional privacy through planting bushes or other simple means around allocated areas,
- organising that sub-areas be used rotationally to give buried excreta time to decompose,
- consider providing a greater number of defecation areas about the community closer to households for user convenience, especially women,
- provision of separate areas for children to use, if their use of adult areas is not acceptable. Supervision and training young children would be necessary to ensure proper use of defecation areas.

In those communities with pigs, the potential problem of pigs digging up buried faeces would need to be resolved together with the social significance of removing this food source from the pigs.

Buried defecation builds on existing community practice and behaviour pattern, although cultural and social acceptance has still to be assessed. It does not concentrate human waste and requires minimal amounts of water. Other perceived problems of open space defecation remain.

Trench and open pit latrines

This is a logical progression from the "cat method". It involves using the same "hole" repeatedly, covering the deposited faeces after each use with a handful or two of earth, previously dug from the hole. It is a simple and hygienic method, used properly, which was promoted in earlier times by Mahatma Gandhi. For convenient use, two squatting boards or stones which are readily moveable, are needed.

The system can be used at household level if there is space. A series of shallow, say half metre deep holes would be dug and used over time. This use of land represents some compatibility with the composting system used. After a year or two, the land can be reused if space is limiting.

For households without space or not wishing to have pits close to the house, the same system could be organised in the existing open defecation areas. This would require a minimum of community organisation for digging pits and

allocating areas for them. It may be easier to train children to use this system than buried open space defecation.

In all other respects, the system is comparable to buried open space defecation with the same considerations.

Pit Latrine Systems

Below slab (substructure) systems

Latrine substructure comprises one or more pits, lined if necessary, and a hygienic slab. These are common to all latrine systems. However, the hygienic floor slab is the fundamental component that must be easily cleaned and acceptable to the user.

The availability of space for pits in Project villages will often determine the type of household latrine system that can be used. Whether the latrine has one or two pits will depend on type of latrine and soil stability. In stable soils, single deep (5 metre) pits can be used with dry pit latrine systems providing, there is space for digging at least a second pit some 10 or more years later. In unstable soils, two lined pits 1 to 2 metre deep can be installed for all latrine systems. Sustainability is provided by alternating use of the two pits.

The lining for pits as a slab or cover support ring or for full lining can be with bricks, concrete and mortar blocks, stone and other similar materials. These materials mostly need a trained mason to install them. An alternative is trapezoidal blocks shaped to form a circle when in position. When backfilled they lock into position without the use of mortar. They form a circular arch. The major advantage of this system, is that it can be readily "assembled" by untrained householders, either men or women.

The use of single pits, when available space is very limited, can only provide a short to medium term solution unless they can be emptied mechanically or by hand when full. Suitable mechanical systems are available, but they are only as reliable as their operational and maintenance support. This is difficult to achieve in rural situations and is not favoured. Manual emptying is also not favoured due to the hygiene and social problems associated with handling undecomposed human waste. The only latrine alternative is communal latrines shared with neighbours.

The choice of a substructure system largely depends on the circumstances of each installation but within each village, the range would probably be determined by available space for each installation. This assumes reasonably consistent soil conditions within most villages.

Above slab systems

The components of the above slab systems are designed to provide smell and fly control and user privacy. Smell and fly control measures improve the environmental hygiene of the latrine and make it more attractive to use. The various methods of control can be combined with any of the substructure alternatives.

A physical superstructure above the latrine slab is necessary to ensure the latrine is used. A general principal is that the superstructure should be provided by the latrine users/owners to an affordable style of their own choice. This would normally be similar to their house but can range from palm fronds, bamboo matting through mud walls to brick and other permanent materials.

a. Simple pit latrine (direct)

This is the simplest system comprising unlined or lined pit, slab and superstructure. The system provides effective user (slab) hygiene but with no provision for smell and fly control. Frequently these pits do not have an objectionable odour providing the slab is kept properly clean. There is however no fly control. They are not recommended for Project use.

b. Covered pit latrine (direct)

This is a simple pit latrine with the addition of a plug which neatly fits into the slab squat hole. This effectively controls flies and smell. Only when the latrine is in use is there some potential for objectionable smell. Pit smells are most often associated with a high rate of usage. In this respect, the relatively small size of Project households (6-7 members) would be very beneficial. The extra cost of the cover is small while user training, in this case to use the cover correctly, needs to be a common requirement of all latrine systems.

This latrine has specific advantages for upgrading open space defecation:

- it is easy to keep clean,
- additional water required is small; only for daily cleaning the slab,
- there is no concern for unflushed faeces being left for the next user,
- the defecation procedure for the individual has not substantially changed, only the location,
- the system is suitable for communal latrine use (not institutional).

There is less to go wrong compared to other pit latrine systems. The technical and social simplicity of the latrine are important features for sustainability.

c. Vented pit latrine (VIP) (direct)

The Ventilated Improved Pit latrine is a simple pit latrine with positive control of smell and flies provided for. This is achieved with a combination of a screened pipe used to vent the pit directly combined with a superstructure design to ensure the open squat hole is kept continuously in low light. Installation design requirements are detailed and must all be met for effective operation. They are dependent on wind for effective operation. Consequently, performance is dependent on the wind regime of the village locality and the ability to get an unobstructed wind flow over latrines. This can be difficult to achieve in a congested building situation with trees about as found in many Project villages.

The VIP latrine may be used effectively in a relatively open situation such as is found on the fringes of villages. However, relatively demanding installation conditions and maintenance requirements suggest this system should be applied with caution. There is also a significant cost associated with the vent pipe (about Rs 200) and design requirements of the superstructure.

d. Pourflush pit (direct)

This system uses a latrine pan set into the floor slab with direct discharge through a gooseneck water seal. With the water seal intact, positive control of both smell and flies from or into the pit is achieved. However, the system is not without it's difficulties:

- because the pan is suspended over the pit, the water seal needs to be an integral part of the pan; this is not possible with commonly available pans in the market place,
- in both India and Bangladesh, a reasonably effective cement mortar pan has been designed which can be made at village level; alternatively, commercial manufacture of a suitable ceramic pan could be considered (as was successfully done by UNICEF in Pakistan),
- if the water trap is broken such as when trying to clear a blockage, it is not readily repaired,
- if the pan is not cleaned regularly or properly, including the water seal, objectionable smell can readily develop,
- there is a significant increase in the amount of water needed for flushing, additional to that for personal and daily latrine cleaning,
- if faeces are not flushed (at all or incompletely) by the previous user, they can not be avoided by the current user unless she/he uses their own flushing water first; this of course means collecting more water for flushing,
- a sustainable and affordable system generally requires that the slab (with pan) be relocated over a second pit when the first is full; this puts the pan at some risk of damage.

The pourflush pit latrine is a functional option for Project application provided a suitable pan can be made available. Although this can be organised at village level, the process is significantly more difficult than making a simple slab (with plug). The several potential user related constraints also need to be considered. Advantages of the system are that it is cheaper than the offset pourflush system and requires less space.

e. Offset pourflush pit

This is in principal the same as the direct pourflush system but with the pan set into a permanent latrine floor and discharging to an offset pit. With this system, the pan is secure. Commercially available ceramic pans can be used although many of these are of inferior social and hydraulic design. The ceramic pan design of UNICEF, Pakistan, is generally preferred, although it's use would require local manufacture to be established. The user concerns of the direct pourflush system also apply.

If properly used and cared for, the system is a very effective latrine although costly, particularly with two pits installed which is necessary for a fully sustainable system.

For Project circumstances, this latrine is not considered an automatic choice, although commonly considered so for communities practising anal cleansing with water. The functional logic of this argument based on water use is not supported by costs nor necessarily by user benefits as discussed above. Its use is further constrained by availability of space in many village situations.

Location of Pit Latrines

Household owned latrines would normally be located on the household premises. Typically, latrines are installed in an open compound area. This would be possible for some households, especially in the smaller villages and the fringes of larger villages. However, many households have no open compound space at all or that available is already fully utilised.

Direct pit systems are not generally accepted within house buildings. Although the offset pourflush latrine can be used with pan inside the house, this is not likely to be socially acceptable in Project villages. The acceptability of household latrines installed in public areas has not been established.

Compost Latrine Systems

Human waste is composted in some countries where this is culturally acceptable and the compost recycled as a fertiliser and soil conditioner. In the Project communities, animal and feed residue wastes are composted and reused in the fields, although the composting process used is very basic.

In principal, Project village human wastes could be composted together with the animal and feed wastes and the mixture returned to the fields on the normal seasonal basis. This would be a tidy recycling system based on existing practices of waste recycling. A system comparable in principal to the open pit latrine might be developed using cow manure and feed wastes to cover freshly deposited human faeces. Water use for defecation (latrine) purposes would remain more or less at current levels.

However, some issues would need to be investigated and changes in the composting procedure probably implemented. Issues of concern are:

- cultural acceptance of mixing cow and human waste and handling the decomposed product,
- need to improve the composting procedure for reasonable pathogen and where relevant, for pig scavenging control,
- design of a means/structure for directly combining human and animal wastes (bucket or similar collection systems are not acceptable).

More than half of village households make compost, each with it's own compost heap or pit. The suggestion of combined use is new. It would need separate investigation, design and operational assessment with sample communities actively involved for ideas, views and acceptance.

R&D.

Communal Latrines

Because of the compact physical structure of parts of some Project villages coupled with the lack of space in many houses, it would not be possible to build individual household latrines. The only option apart from buried or open space defecation is some form of communal (not institutional) latrine.

The two primary considerations for communal latrines are user organisation (and associated latrine use and care) and latrine functional (technical and social) design.

Users for each communal latrine should be of the same social group and live in the same localised area. In Project villages, this tends to be the case for adjacent households in each lane. There would need to be full agreement between members of the group of households as to who is entitled to use the latrine(s) and how they intend to organise latrine cleaning and maintenance among themselves. There must be no reliance on people outside the group. If these issues can not be initially resolved, then there is a high probability of failure and return to open space defecation. Without initial organisation, communal latrine(s) should not be built in the first place.

compare group owned & managed latrines in Indonesia. (ARWI)

The design of a communal latrine needs to provide for user acceptance with the least potential for abuse, meet ground soakage conditions and provide for long

term sustainable operation. For many Project village situations of black cotton soil, soakage may be a limiting factor. For this reason together with simplifying use, the direct pit system with single deep or twin shallow pits and using a simple superstructure would be favoured. Even with good ground soakage, this system should be considered for more reliable communal use. Offset pourflush latrines with greater cost and water use can also be considered.

The location of communal latrines will be determined by available space but, in principal, should be as close as possible to the served households. The issue of ownership of land (private and public) for communal latrines would need investigation while the whole concept would need to be considered in detail with each village and, in turn, community group.

The combination of communal latrines with the existing composting process is a further potential consideration.

4.1.2 Preferred approach

Project sanitation improvements should "build on" existing community practice while providing a range of alternatives to meet the relatively complex physical and social circumstances of each village. This combination should be able to potentially provide for the safe containment all human wastes in the village community. It is proposed that the following alternatives listed below should be promoted to provide the required range of systems.

Single pit latrines are only considered suitable as a temporary measure with a more sustainable system to be installed in the future. Vented pits are also not included because of the potential problems of proper installation and performance while compost based systems would require to be investigated.

Buried (and open pit) defecation within villages is proposed as a realistic option to be used in association with other options.

Sanitation Method	Application	Significant Features
1. Buried - field	Men & women working in fields	Simple and effective Reduces load on village systems
2. Buried - village	All village members	Simple Needs some community organisation Problem with scavenging pigs?
3. Trench/open pit	Household & village	Relatively simple Some household/community organisation
4. Communal latrines a) covered pit b) offset pourflush	Household groups with NO household space	No alternative Local household organisation User cooperation and maintenance Siting issue to resolve
5. Covered pit latrine	Households with space for two direct pits	Low cost, especially unlined pits Minimum water use Preference for poorer households Alternating pits for sustainability
6. Offset pourflush	Households with latrine space and permissable pit space on site or in street	Higher cost More water use More prone to user abuse Wealthier households may prefer Alternating pits for sustainability

The selection and application of listed alternatives would require the full cooperation of the community for implementation and the behaviourial change of community members. It can only be achieved with a structured community based and organised programme of promotion, implementation and user hygiene training/education, facilitated by a supporting institution. Positive progress would require deeply entrenched behaviourial practices to be changed.

4.2. Wastewater

4.2.1 Options

Household wastewater management depends on interrelated issues of:

- how much water is used for each purpose,
- are the different uses physically dispersed or concentrated in one place (eg. the house),

with disposal options, which are dependent on the quantity of wastewater and soil permeability, being:

- on-site soak pit systems for small quantities, which is typically a household concern, and
- lane drainage and/or off-site soakage or disposal, which is invariably a community problem.

These issues are considered in combination, on the basis wastewater volume and source, in respect of disposal method, cost and maintenance requirements. These are summarised:

Quantity and Source	Disposal Method	Costs	Maintenance
Low volume, dispersed use (hand washing and washing in bowls)	Surface absorption and evaporation	No cost	Minor maintenance
Moderate volume, dispersed household use (bathing, kitchen washing)	Household soakage systems	Low (household) cost	Simple periodic house-hold maint-enance
Higher volume, dispersed community use (clothes washing, communal bathing, water points)	Local soakage (or dis-posal) systems	Moderate (commun-ity) cost	Periodic community maintenance
Higher volume, concentrated household use (water used mostly in the house; no house connections)	Lane drainage probable with community disposal	High (community) cost	Regular community maintenance
High volume, concentrated community use (household connections with little control on volume used)	Permanent drainage; community disposal required	High community cost	Frequent community maintenance

4.2.2. Preferred approach

An integrated approach is proposed for village wastewater management based on the first three of the above five situations. It is proposed that the last two are to be avoided to the extent possible. The combination of proposed activities are:

Dispersed water use - maintain and encourage the existing pattern of dispersed water use to minimise the volume of wastewater water generated at houses.

Household discharges - encourage the installation of simple low cost soak pits for all houses for disposal of bathing and kitchen wastewater discharges. These may need to be in lanes and installed before lanes are paved.

Kitchen waste collection - encourage continued collection of kitchen wastes and first rinse kitchen washing water for feeding to cattle or other animals.

Miscellaneous household wastewater - introduce the use of small evapotranspiration beds (or gardens), where there is space, for disposal of hand and feet washing and other incidental and relatively clean wash water. Alternatively, encourage the existing practice of throwing this wash water over as large a surface as possible for evaporation and to avoid puddles.

Clothes washing slabs with wastewater disposal - community to install with Project assistance clothes washing slabs at acceptably convenient locations together with a water point installed for this purpose. The installation of a sustainable wastewater drainage and soakage or other acceptable disposal system to be installed. Clothes washing slabs are expected to be mostly located on the fringes of villages and need to be separate from water points used for water supply.

Cattle washing areas - community to provide similar cattle washing facilities with Project assistance when there is no other existing surface water option. A sustainable soakage/disposal system would need to be installed. These facilities should be on the fringes of villages.

Water point wastewater - each water point will be located for user convenience and the ability to provide an acceptable form of soakage disposal of spilt water and other wastewater, for instance from rinsing containers before use. The provision of sustainable drainage and disposal needs to be an integral part of all water point installations.

The primary objective of these measures is to avoid the need for formed sullage drainage in village lanes, as much as possible, if not altogether.

Sullage drains are often more of a problem than solution. They MUST be routinely cleaned and maintained to avoid becoming a hygiene problem. Even if well maintained, they only move the community wastewater problem "downstream" and frequently concentrate it with some form of community disposal management required.

For this reason, it may be desirable to reconsider the provision of individual house connections at all, or alternatively providing ways of managing and minimising future sullage problems as preconditions to having house connections. Sullage is basically a community problem and should be managed as such; not as an individual household concern, unless it can be managed entirely on-site.

Some alternative approaches could be no connections, controlled restriction of water supply flow and communal installation of sullage drainage and disposal with maintenance system as a precondition for household connections in any lane.

To implement this package of proposals involves a combination of physical installation and behaviour changes. Active community organisation is needed together with supporting hygiene and maintenance training and education for all users.

4.3 Surface Runoff

4.3.1 Options

Not all village lanes are in need of improvement. Some lanes are already well formed with suitable surface material. Other unformed lanes with a reasonable surface and relatively uniform grade at higher elevations may only need minor surface shaping.

At lower levels with greater runoff flows, the conventional approach in built up areas is to install an open drain along the side or sides of the lane to collect and channel surface runoff water to a safe discharge point. The drain needs to be on grade and can be unlined but is generally more structurally secure and easier maintained if lined, although costly. Drains directly in front of buildings may be covered. Pipe drains should only be used in special situations due to the problem of clearing blockages.

If there is no household wastewater water drainage (sullage), the common informal existing practice of using the road as a drain can be improved for those lanes with an existing drainage problem. Where the lane is bordered by housing, the surface can be shaped to a shallow vee and the surface paved or stabilised. This has the advantage that the investment in lane surfacing serves this purpose and drainage at the same time.

Lanes without housing close by are better treated as open space roads with convex shape and suitable surfacing. Side drainage should be avoided unless necessary to protect adjacent property from runoff flow.

In general, lane runoff should be led off through side drainage slopes and drains, if necessary, to natural drainage channels at frequent intervals rather than carrying increasing flows further down the lane. Again there is substantial benefit associated with dispersion of the problem although the ability to lead off excess flow of course depends on the density of housing and the availability of natural channels in the village.

4.3.2 Preferred approach

Provided household wastewater is managed on-site, it is proposed that surface water runoff from built up parts of villages should be managed by using the lane as the drain with appropriate shaping and surfacing. The need for permanent surfacing will depend on the conditions and use of the lane.

Lane drainage needs to concentrate initially on those sections of lanes with the greatest existing drainage problem. Longitudinal regrading should be kept to the minimum necessary, transverse shaping done as required and surfacing with the most appropriate available material. For lane drains the surfacing

material should be reasonably permanent, such as laid masonry slabs. This work should be a community organised and implemented activity. They have the ability and resources required for doing this work with Project guidance and supply of materials not available locally.

4.4 Solid Waste

4.4.1 Options

With the existing management of compost heaps, little improvement is possible other than better location, simple bunding to keep runoff water out and avoidance of leachate problems. The village fringe is clearly a hygienically preferred location. The disposal of residual household wastes on compost heaps should be encouraged although with inorganic material being separately disposed of. The latter should be buried in household or communal disposal pits.

The only substantial improvements could be to introduce a practice of active compost management to produce a higher quality and more useful product, improve the hygienic condition of the compost and largely control indirect health risks associated.

Active compost management would represent a significant change in existing practice, would require household organisation of responsibility and need village demonstration of usefulness for acceptance. A realistic, practical and affordable "system" would need to be developed to meet the particular circumstances of the Project villages.

The earlier suggestion of recycling human waste in combination with animal waste would necessitate adoption of active composting to provide a reasonable level of pathogen control.

4.4.2 Preferred approach

For residual household wastes specific measures proposed are:

- Household training/education to further improve disposal of organic wastes to their own compost heaps or by arrangement to neighbours heaps.
- Encourage the burial of non-organic household waste and the option of communal disposal pits.

For animal wastes and compost management the only active measure proposed is to:

- Encourage households to "tidy" up their existing compost heaps or pits where there is a problem.

In the longer term, an investigative approach in a sample of villages is suggested involving:

- Further observation of existing compost management practice to establish an effective baseline.
- Assess the feasibility of introducing an active approach to compost management leading, if appropriate, to the development and demonstration of an acceptable process with a secondary objective of the feasibility of introducing human waste into the process.

Such investigations would need the active cooperation of households and the community. Special purpose Project support would also be required.

5. IMPLEMENTATION COMPONENTS

5.1 Community Organisation

The intended village committee will represent the community in its functional partnership with the Project. It may be that this is sufficient organisation for water supply planning, implementation monitoring and system operational maintenance (and management).

For environmental sanitation implementation, involving planning and design, organisation and building sanitation facilities and following care and maintenance of installed facilities, a more extensive level of community organisation is likely to be necessary. The form and detail of such organisation would be for the community to decide in response to the needs arising.

It is necessary that the Project recognises the levels of community organisation likely to develop in response to identified needs and intended improvement activity. These could be:

- community groups, concerned with community facilities eg. standposts, clothes washing slabs etc., based on ethnic origins, class, wealth and the physical structure of the community.
- lane groups concerned with collective facilities eg. localised drainage, solid wastes etc.
- household groups concerned with communal facilities eg. shared latrine, bathing facility etc.
- individual households concerned with eg. household latrines, soak pits etc.

There could be other levels or forms of community organisation of relevance in individual villages.

Community organisation already exists in an informal but often non-functional status in many villages. Apart from the village committee, the activation or establishment of lower level organisations is likely to be localised initially, in response to specific felt needs of individuals or groups of households. Community organisation would expand in relation to the extent of interest in environmental sanitation improvement.

An important function of village committees will be to motivate village members regarding the need for environmental sanitation improvements, invite members to identify specific areas of need and encourage them to work with the Project and correct "their" problems. It is suggested that competition within the community for Project resources and support should be encouraged with performance rewarded by some means.

Development of community organisation is necessary for the support of Project orientated activities but this development must originate from within the community. The Project will have the essential role of supporting and guiding this activity. This latter includes:

- village committee training
- community organisation
- planning and work organisation
- community sustainability

The support would be provided through structured training, participatory discussion and on-the-spot guidance by Project staff and others working with the Project.

5.2 Promotion and Hygiene Education

The combination of promotion and hygiene education involves three basic and separate activities in water supply and sanitation programmes. These hygiene activities are:

- awareness
- promotion
- behaviour change

Each needs to be separately addressed with all household (community) members as potential individual targets. It is desirable that each activity be considered in proper context. The Plan of Operations generally combines these activities.

5.2.1 Awareness

The objective of hygiene awareness (education) is primarily to establish knowledge of hygiene issues and the relevance of these to health in the mind of individual community members. A secondary objective is the decision and physical action leading to improvement. An awareness campaign may be directed to the community in general or at members or sections of the community who are expected to be more responsive. The latter may be more immediately productive where there is very little initial awareness amongst the target group, as is generally the case in Project villages.

Importantly however, hygiene awareness does not in itself necessarily result in action and awareness of health significance is not necessarily needed for positive action to be achieved. Action is frequently based on issues other than health.

5.2.2 Promotion

The precursor to any hygiene improvement action is decision making. Household sanitation facilities require a household decision to adopt and install them. These are private, not community installations. The same applies for communal installations. The collective decision required for community installations may be more complex.

The significant issue is why decisions are made. Decisions are based on the current perceptions of decision makers and not necessarily what others may consider important. For this reason a marketing approach to decision making (promotion) is desirable.

For household and community hygiene improvement, it is nice if decisions result from a preceding awareness from whatever source. However, it is just as important to "sell" the need for improvement using the users perceptions. For instance, privacy, inconvenience, safety and other issues of dissatisfaction that have been identified in Project villages regarding open space defecation. Other supporting information such as cost, how to implement and long term consequences such as sustainability and maintenance, must also be available at the time of decision making.

The initial objective is that target households and individuals make decisions and commit themselves to making acceptable hygiene improvements more than why.

A hygiene promotion package of simple direct messages tailored to account for both community and Project perceptions of needs for improvement can be used to achieve this objective. A promotion programme should be taken initially to the community in general or community groups, either as part of a general awareness campaign or as a specific subject. However, unless the demand is very high and/or initial promotion particularly persuasive, specific follow up household visits may be needed for significant response to be achieved. Experience indicates that for impact this should be a planned and organised activity - not a random process combined with other activities.

Hygiene promotion should be taken to the people.

5.2.3 Behaviour Change

The ultimate objective of household and community hygiene improvements is NOT to just provide physical improvements (latrines, drainage etc), but rather that water supply and sanitation facilities should be used and cared for properly. This involves the behaviour change of individuals with establishment of new habits. They do not necessarily have to fully understanding the reason for the behaviour change although this is of course desirable.

To achieve behaviour change, facility installation needs to be followed up by practical hygiene education or hygiene education training. This is best achieved with an interactive approach based on participatory demonstration supported by simple explanation. This training can be made with household or community groups and needs to be associated with the demonstration value of new installations. For some topics, this will be more effective at household level and in all cases, there should be repeated reinforcement sessions if available resources will permit.

5.2.4 Health Education

Health education covers a variety of topics additional to the hygiene issues of water and waste sanitation. It is desirable to avoid including these additional topics in Project awareness, promotion and hygiene education activities. A limited number of simple and concise messages are more likely to received and retained by people who are busy and who may have limited retention and attention time capacity. Additional health messages can be presented by existing health workers as a follow-on activity.

5.2.5 Conclusion

A clearer distinction between the three components of hygiene awareness, promotion and behaviourial change and their phased inter-relationship would benefit the Project. An initial awareness campaign should be followed by a structured promotion programme with subsequent organised hygiene training programmes tied to completion of water supply and sanitation facilities.

5.3. Installation of Facilities

The range of environmental sanitation facilities of relevance to the Project can be grouped together with relevant levels of community organisation. These are:

Household	latrine, bathing/washing place with soak pit, compost pit
Communal household	shared latrine, shared bathing place with soakage
Local household	lane drainage and surfacing, solid waste disposal, (special case channelled drains)
Community	clothes washing slabs with wastewater disposal, water point wastewater disposal, cattle washing areas

It is possible to build sanitation facilities with the following:

- Experienced masons who may live in the village.
- Project trained masons living in the village.
- Village members (women and men) with guidance rather than training.

For objectives of facility affordability, operational sustainability and replication potential, it would be desirable for village members to organise and do as much installation work as they can. This reduces dependence on trained masons, who would still be expected to work on more complicated and costly installations.

To enable village members to install their own facilities, technical designs need to be simple and yet reliably functional and make full use of local materials. Designs based on "assembly" of components (earlier described for direct pit latrines) rather than "construction" of units in place make this possible. Rural village people have many of the necessary skills such as digging and handling masonry stone while other simple skills can readily be learned, by both men and women.

Superstructures for latrines and bathing slabs should in principal be of similar or less costly style to that of the owners house. It is assumed that people can do this themselves matching their choice of material to their expenditure capacity and available materials. Permanent superstructures, which many households can not afford, should not be promoted as a preferred solution.

Those who are not able to do installation work for cultural, sickness, lack of time and other similar reasons can engage others to do the work for them. This may involve employing labour, skilled masons or by agreement with neighbours or others in the community willing to do the work. In this way more costly and sophisticated facilities can also be installed by wealthier people at their own cost.

Community installations may be , but are not necessarily, more complex and require more substantial structures needing the services of an experienced mason. This would be considered for each situation but only after the community found this necessary. Whether the mason receives cash payment or should the community do this is firstly an issue of affordability and secondly policy.

The installation of communal and community facilities would require effective organisation among those associated with the building and subsequent use of the installation. The building of all sanitation works in the village would be supported with guidance and periodic supervision from visiting Project staff. Establishment of a broad based community resource of simple sanitation expertise is desirable for the sustainability of village environmental sanitation.

5.4. Operation and Maintenance

The use, care and maintenance of all sanitation installations should be the responsibility of the village community. This responsibility will however be spread over the community on the basis of ownership and use of each facility. All users have a responsibility to properly use and care for installations at the time of use as their contribution to the essential need for sustainable operation and maintenance of environmental sanitation installations.

Following is an outline analysis for operation and maintenance of sanitation installations for practical village organisational levels. Actual operation and maintenance organisation in each village will be generated by the community according to the development pattern followed in their village. This will vary between villages.

5.4.1 Households

Households must be solely responsible for their own installations and involve all members for use and some for care and maintenance. This involves user training, their knowledge of system components and how to maintain them. Responsibility for organising and doing the original installation work provides the basis of this knowledge while the Project through supporting village workers can provide additional guidance and user training.

5.4.2 Communal household

Installations for groups of neighbouring households should be used, cared for and maintained on the same basis as individual household facilities. The additional feature is the need for an ongoing organised cooperation among user households for cleaning and maintenance. This needs to be an extension of the cooperation needed for planning and building.

5.4.3 Local lane

Environmental sanitation improvements for individual lanes (or groups of lanes) needs to include the care and maintenance of improvements. This should initially be the focal point for development of a wider concern for the quality of their collective local (lane) environment. All local village members, as users of the lane should be encouraged to considered themselves as caretakers. This could be extended to each household being responsible for the care of that part of the lane environment in front of their house, especially for lane drainage and solid wastes, but also general appearance.

The same local (lane) organisation that implements improvements could monitor the use and care of the lane and its surrounding environment with this having a collective social basis rather than the responsibility of one individual.

This need should be promoted and actively encouraged.

5.4.4 Community facilities

The same principals of use, care and maintenance should apply to community facilities. In general, users are expected to belong to the same group (and area) within the village. Users need to be encouraged to be collectively responsible for the care and operation of facility(s). The group should also establish an organised caretaking capacity from among their members.

5.4.5 Village committee

The village committee has two basic options of guiding and monitoring the use, care and maintenance of community installations and the community environment by user groups within the village community or assuming direct implementation responsibility. The devolution of responsibility to user groups is more sustainable in the long term.

Either way, the community should be responsible for organising and carrying out repair work including, if necessary, raising money within the community for cash expenditure required.

5.4.6 Village development

A functional decentralised operation and maintenance system with organised direct user responsibility for environmental sanitation (and water supply) could provide the basis for achieving additional improvements within the village. This should be encouraged as a long term objective for increasing community self-reliance.

5.5 *Manufacture of Components*

5.5.1 Purpose

Sanitation installations are conventionally built by making components on-site as part of the installation process. In general, this involves an experienced mason doing the work.

An alternative approach is for components to be manufactured off-site at a suitable location and then be transported to the installation site for use. This increases the potential for community members to "assemble" their own installations using manufactured components. With suitable component design, unskilled community people can be trained to make components such as blocks, latrine slabs and other similar items.

Experience in other countries has demonstrated that community members can organise themselves and manufacture sanitation components and that households can assemble installations such as pit latrines. Both men and women, together or separately, are capable of doing this work. Indian men and women should have the potential capability to do the same work.

The combination of manufacturing with assembly provides for quality control of components, reduced installation costs and improved operational sustainability. The latter results from households and the community being responsible for the provision and operation of their own installations.

5.5.2 Organisation

A range of options is available for community choice when considering setting up a manufacturing operation. They may identify other approaches. On the basis that the Project provides non-local materials delivered to the manufacturing site, obvious options are:

Self-help community groups make the components needed for their own use, organising their own labour and time. There is no payment involved. These community groups could be neighbouring households, members of a section or area of the village, members of an existing informal community group or any other group responding to their collective felt need.

Community income generation groups can establish themselves to provide or market a supply of manufactured components to all or part of the community. This could be a short term activity to meet immediate or longer term needs, if an ongoing demand for components develops. It would be a demand driven operation.

Existing informal groups or new groups could take up this activity. There is no practical limitation to who could do the work - men, women alone, youths groups etc. Separate payment for the labour input would be required. While this could be paid by the Project, direct payment by benefiting households is in principal preferable as a sustainable method.

Private contract can be a basis of manufacturing components with the Project, or possibly community, as the retaining client. The work could be done by an experienced village mason, other suitable person or a community group (with initial training). They would manufacture a stock of components to meet a future demand and be paid for their labour on a piece rate basis, subject to acceptable product quality. This would be a supply driven operation but with the organisational support of the village committee required.

Private enterprise involving community groups, established business or individual masons could also manufacture components entirely at their own cost and sell these to the project or community members on a demand and supply basis. Key issues would be acceptable component quality and affordability for purchasing users. Manufacturing could be at a central location or at the installation site.

5.5.3 Conclusions

If manufacturing with installation assembly were adopted, there is a range of options for both the community and Project to consider. An essential requirement is ability to meet the needs of the poorest sections of the village at an affordable cost to both them and the Project. It is possible to achieve this through community based manufacture with benefits of improved sustainability and greater replication potential.

5.6 Supply of Materials

The Project will support both the manufacture of components and on-site building of sanitation installations with the supply of non-local materials such as cement, aggregate, reinforcing steel, masonry stone, bricks etc. as required to each village. The procedure for this is outlined in the Plan of Operations. If materials such as sand, roading material and stone are available locally, then the community should be encouraged (or even required) to collect these themselves.

The care and security of materials and components within the village should be the full responsibility of the village committee, community group or households using or making them. The Project should not need to be responsible. Similarly, organisation and transport of materials and components within the village to the place of storage or use should be the responsibility of the user(s) or household(s), using local means. Organisation through the village committee may be necessary in some situations.

5.7 Cost Sharing

5.7.1 Basics

The costs of water supply and sanitation facilities comprise, in general:

- materials for installation
- labour for installation
- supervision of installation
- installation use and preventive maintenance
- repair maintenance

For water supply,the community is only expected to be responsible for costs relating to use and preventive maintenance and may be, simple repair maintenance. Installation costs covered by contract implementation are a total subsidy to the community.

The Plan of Operations provides for environmental sanitation to be implemented as a partially subsidised community based process although this is not detailed. The Project needs a clear policy for environmental sanitation cost sharing with communities.

Issues of relevance for Project/community cost sharing policies are:

- operational sustainability of installations
- affordability and hence replication potential
- administrative simplicity and funding security
- target groups and wealth distribution within villages

5.7.2 Assessment

Project implementation is much simpler if there is no cash exchange between the Project and community or community members. This can be achieved if the Project pays for materials and arranges for their delivery to the village according to implementation activity needs while the community provides required skilled and non-skilled labour from their own resources. The Project can provide training. Additionally, community organisation and management of implementation activities can be encouraged to supplement Project supervision of the dispersed range of independent household, communal and community mini projects.

The nature of household community involvement involves time and effort rather than cash, although this does not preclude wealthier community members hiring others to work for or on behalf of them. Facilities installed by households or communal groups will be owned by them and need to be maintained by them at their own cost.

In the same way, the section of the community using a community facility should be encouraged to accept responsibility for the organised operation and maintenance of the facility. This could also included structural repairs. This arrangement is desirable for sustained operation of the facility. The potential conflict between village interests, local tax and Mandal responsibilities would need to be resolved.

A primary Project objective is to benefit the poorer members of each village, who may be classified as those with annual incomes below the official poverty line. For this purpose, basic household installation designs could receive full materials subsidy. Households wanting more expensive designs would pay the

extra cost by direct purchase of additional materials (and mason charges). A simpler but less equitable approach would be full materials subsidy for all designs for all households. Cross subsidy within the community introduces problems of handling money which it is better to avoid if possible.

A clear policy is necessary for household installations, with additional assessment of alternatives required, desirably involving the community. Community installations are best handled with a basic cost sharing policy of Project responsible for materials and guidance and community for labour and installation on the basis of agreed installation design and location. Installations should however be prioritised on the basis of greatest hygiene need.

The cost for manufacture of components, if required, would preferably be met by households or as community contribution, if components were to be used for a community installation. This is also in the interests of implementation sustainability. The alternative of Project subsidy would be an additional operational complication.

5.8 Involvement of Women

The involvement of women as active participants (and preferably as community managers) in village projects is essential for effective and sustainable implementation. In the household, they have the greatest influence on the hygiene behaviour of all members, especially children and the overall hygienic status of the family house.

In the community, the involvement of women in the planning, implementation and management of community water supply and environmental sanitation is very desirable. It is they who are mostly concerned with use. This means that women need to be part of controlling community organizations as committee members at least (half) and as office bearers (including as chairpersons). This should include village committees and informal sub-group committees and organizations.

The active involvement of women in village project organization will additionally assist them to organize project activities in relation to their existing daily and seasonal work patterns. That women can be effectively involved in both organizational and physical project implementation activities is possible and culturally desirable. It is however important that this be in parallel with men and not in competition.

5.9 Environmental Impact

Most of the study is concerned about eliminating or controlling potential environmental impact. Dispersion processes are intended to spread the wastes to an extent that enables them to be acceptably contained by the environment. Point source disposal aims to achieve this without degradation of the surface environment. Below ground, contamination of groundwater willnot in principal be a concern with piped water supplies. There may however have to be some care to avoid contamination of any existing wells.

6. IMPLEMENTATION STRATEGIES

6.1 Plan of Operations

6.1.1 Work planning

The draft Plan of Operations is currently (September 1992) under final review and expected to be approved shortly. Environmental sanitation proposals need to be reasonably compatible. Overlapping water supply implementation contracts dominate the work planning of the Project with a tight timetable. Village cluster and, to a lesser extent, individual village is the focus of this planning.

There is no structured environmental sanitation implementation built into the Plan of Operations. For lack of suitable guidance, this was left open-ended with the intention of involving active community implementation. This working paper aims to provided a more structured basis for implementation of Project environmental sanitation. This is necessarily focused on the village and household level.

6.1.2 Community organisation

The Plan of Operations provides for an implementation approach of limited community participation for the first 6 to 9 months with more intensive participation, tending to community management, thereafter. It is believed this initial low level of community involvement may tend to compromise the establishment of the "sense of ownership" necessary for the sustainability of village projects.

Community based implementation is more sustainable with a basis of community management rather than participation. This provides for the greater community involvement and commitment required for effective implementation of integrated community based projects. This commitment needs in turn to be consolidated with a continuity of activity expressed in regularly updated project Community Action Plans. This is particularly relevant for community implementation, operation and maintenance of environmental sanitation installations, but also for water supply and hygiene education.

The proposed composition of village committees has a project operation and maintenance orientation. A management rather than an operational structure would be more appropriate for an integrated programme, with equitable social and sexual representation of the community in accordance with the mandatory regulations. It may be better for water supply operators to work for the committee and not be elected/appointed members to avoid potential conflicts of interest.

Informal extension of the village committee's influence through community groups and individual villagers with varying interests and motives is a necessary aspect of community organisation development. This informal village network needs to be actively stimulated and members encouraged to work with the project as they represent direct linkage with the household level. The basis for this network, which will reflect the complicated socio-cultural structure of village communities, probably already exist in most communities.

The Plan of Operations considers community organisation under headings of health and hygiene education and operations and maintenance and, in one instance only, under its own heading. These and other project activities depend on effective community organisation rather than the reverse. In view of the primary significance of community organisation to the Project, it may have been better organised under its own heading in the Plan of Operations.

6.1.3 Hygiene education

Health and hygiene are used synonymously in the Plan of Operations. It is observed that Project activities are mostly concerned with hygiene improvement and, only in special situations, with health directly.

Intended hygiene education has been formulated as a hygiene awareness campaign for the general community involving a combination of awareness creation and promotion, with subsequent follow-on activities throughout the Project period. Following the initial awareness campaign, a more structured approach of promotion and hygiene training/education such as that outlined below would be preferred.

Sections of the community responding to the awareness campaign and expressing felt need for some form of environmental sanitation improvement can be systematically targeted with Project specific promotion for all aspects of village environmental sanitation. The object of this is for households to commit themselves to the installation of sanitation improvements whether community, communal or household. Following installation, the same people should again be targeted with reinforcement hygiene training/education, initiallyconcentrating on facilities installed. This targeted approach aims to influence individuals directly and does need more organisation on the part of Project and village workers.

The new Anganwadi Buildings willprovide a needed physical base for existing health orientated and project village workers and related non-project activities. It will however be important to ensure these workers continually "take the Project to the people" and do not base their project activities passively around the centre. This is a question of attitude and organisation.

6.1.4 Operation and maintenance

The authority for village committees to collect money to be spent on the maintenance of community installations is highly desirable to give them operational independence. Without this authority, communities would be forced to rely on the Mandal and in so doing, the essential community "sense of ownership" of facilities may not be sustained. It is to be hoped this authority will be established for implementation of the Project. adm. skills + accountability to be assured

There is of course nothing to stop groups of households from informally purchasing or otherwise obtaining materials to make simple repairs to local community and communal installations.

6.2 Outline Implementation Methodology

The following outline implementation methodology demonstrates the sequence of activities expected for the establishment of a village project and the following community based implementation of environmental sanitation. The activity sequence broadly follows that outlined in the Plan of Operations with some variations and additional detail. It necessarily touches on activities relating to water supply. Hygiene education is viewed as an integral part of environmental sanitation.

Community organisation and village project establishment

1. Identify village workers and in particular, the Project Village Worker (PVW?) through discussion with village members.

2. Initial training of village workers with emphasis on PVWs in view of their full time coordination responsibility for the Project.

3. First Planning Meeting, held over 3-4 days using PRA methodology and relevant techniques, will involve:

   - introduction of the integrated Project to the community, its components and the roles and responsibilities of both the project and community,
   - social mapping with the previously prepared survey map checked with and in the community and required social and additional physical information added with other information recorded,
   - water supply requirements discussed, preferences for source and location of water points considered, together with the need for and location of other community water use facilities,
   - implementation of the water supply should be discussed, the community's monitoring role during implementation and responsibility for subsequent operation and maintenance and costs considered,
   - environmental sanitation problems in the village discussed, general

perceptions of both community and project established and agreement on the need and general nature of future activity established,
- scope of the hygiene education component is explained and the importance of this for supporting water supply and sanitation improvements discussed, together with preferences for location (and design?) of the anganwadi centre

4. The First Planning Meeting needs to establish the village's acceptance of the Project, not just water supply, and should conclude with an outline Community Action Plan (CAP). This should incorporate decisions made on all of the above issues, together with a timetable of agreed actions starting with immediate establishment of the Village Committee.

   Preparation of the CAP is a firm expression of commitment and agreement. It needs to clearly outline the responsibilities of all parties. Alternatively, these could be contained in a written Memorandum of Understanding established between the Village and the Project prepared at the same time as the CAP. The desirable need is that there be a clear written statement available for future reference, against which to monitor progress and in the event of differences of opinion arising.

5. Form the Village Committee according to accepted procedures with necessary and agreed representation. [This component is brought forward to establish full community involvement and responsibility from the outset of the Project]

6. Follow-up immediately with orientation training for Village Committee members to enable them to actively participate in all non-contractual project activities to follow. Specialist training for committee members and village workers would take place later at appropriate stages.

Hygiene awareness campaign and environmental sanitation planning

7. Baseline survey for hygiene behaviour, perceptions and physical sanitation conditions in the village carried out with active community support and involvement. Sanitation observations would supplement those made during social mapping.

8. Plan environmental sanitation hygiene awareness campaign with village committee support. Give additional attention to problem topics and agreed problem areas in the village.

9. Carry out environmental sanitation hygiene awareness (and promotion) campaign with active community support in accordance with an established campaign strategy.

10. Reassess physical sanitation conditions in the village. Community assesses environmental sanitation priorities for the village with reference to the outcome of the awareness campaign. Project assists.

11. Up date the CAP with planned environmental sanitation activities. Identify work to be done, how it will be organised and implemented by the community, resources required and an implementation timetable taking into account existing community activities. The village committee need to be responsible for this activity with Project support.

Environmental sanitation implementation

12. Plan, organise and initiate targeted sanitation promotion in prioritised areas of greatest felt and accepted need. This is expected to be a combined project/community activity.

13. Community sets up manufacturing operations if required and arranges for supply of materials (and equipment) in coordination with Project staff.

14. Village committee receives first materials (and equipment). Manufacturing is initiated with any training required organised by the Project.

15. Community organises and carries out installation of programmed community sanitation works and with Project support, guides the installation of communal and household sanitation facilities.

16. Village committee assists Project to monitor implementation progress. This activity should be done for both water supply and sanitation.

User hygiene education

17. With completion of each installation, follow-up user hygiene, care and maintenance training/education is taken to user households and community groups.

18. Long term use, care for and maintenance of sanitation installations in a sustainable manner by households and community.

Steps 11 to 17 are the components of a cyclic process with current installation works being completed and new works initiated in other parts of the community.

Several other parallel activities will take place including contract implementation of water supply, follow-on establishment of operation and maintenance and anganwadi centre activity.

6.3 Alternative Implementation Strategies

Two implementation strategies for environmental sanitation demonstrate a range of potentially acceptable alternatives incorporating active community involvement.

6.3.1 Generalised community participation

This strategy is compatible with the Plan of Operations. Overall it tends to be directive while at the same time encouraging active community participation.

The strategy aims to respond to the "felt needs" of the community for environmental sanitation improvement in accordance with their priorities. Following initial establishment of the village project, Project Village Workers guide environmental sanitation implementation with the active participating support of the village committee. CAPs should be a continuing part of the implementation process supported by an ongoing community orientated campaign of hygiene awareness and education. The Project would monitor implementation and operational progress.

While working to prioritised environmental sanitation needs, it is probable that implementation would tend to be dispersed throughout the village with community installations dominating. Pressure for household level improvements will mainly come through the awareness campaign and follow-on activities.

6.3.2 Focused community management

This strategy involves community management of sanitation implementation and related activities. The Project provides active facilitating rather than directive support. Both parties would work to the achievement of agreed village CAP performance targets. The strategy follows the methodology earlier outlined (section 6.2).

The village committee would be involved in all aspects of the village project from its inception and have specific responsibility for establishing, organising and directing community based implementation activities. Implementation would follow regularly updated CAPs and be supported by programmed hygiene promotion and education taken actively to the people.

Implementation would be in accordance with the current CAP and concentrate on priority topics and areas of sanitation need. These priorities, determined by the community and confirmed by the Project, should proportionately cover the poorer sections of the village in accordance with Project objectives. Implementation areas would be focal points for structured sanitation promotion and hygiene education covering all environmental sanitation topics, with the objective of maximising local project impact and benefit. It would be hoped that

neighbouring households would be stimulated to improve their sanitation conditions and behaviour.

The objective of concentrating effort within the village would be to benefit those sections in greatest need, more effective use of limited project resources and to establish focal points for behaviourial change replication. Dispersed implementation would be limited to individual households and general hygiene education to community groups and village institutional centres.

6.4 Performance Management

The need for an alternative approach to sanitation is based on existing community attitudes to environmental sanitation and particularly defecation, coupled to the frequent failure of other sanitation programmes to make substantial beneficial impact.

The Project sets out to establish a trusting working relationship with each village and not simply delivery of a service. This involves mutual respect and agreement on implementation methodology and the responsibilities of each party.

Respect involves acknowledgement of debt when receiving assistance and giving in return. The Project willgive assistance to Project villages and both the Indian and Dutch governments have a responsibility to see that assistance given is productive. Productivity means performance, both by communities and the Project.

In this context, it is appropriate to seek positive ways of stimulating performance in the preferred direction. Ways can be sought for "rewarding" members of areas of a village that show best overall or selective environmental sanitation improvement. For instance, providing trees other community facilities perceived to have particular value to the community or have the priority status of felt sanitation needs, such as drainage. It might be possible to stimulate competition between sections of the community. This would be of particular value if poorer community groups could be stimulated to become involved.

In other situations, activities with a clear technical relationship may be tied as a condition of installation. For instance installing soak pits in lanes as a precondition for lane paving.

A particular concern is the near universal practice of open defecation in Project villages. While the order of health risk is very difficultto quantify, there is clearly some significant risk, especially to children and from existing indiscriminant spread of children faeces which are generally more heavily contaminated with pathogens. Special effort should be made to identify and encourage communities to apply positive ways of rewarding sustained, reasonable

containment of human excreta by identifiable sections of the community. The acceptability of pigs scavenging human excreta in some villages is a special situation. The effectiveness and health implications of this need further consideration.

It is a necessary objective that the hygienic behaviour of project staff and village members working with the Project (and village committee members), should be of a similar standard to that aimed for in the community. Difficult though it may be, there should be some simple monitoring of their hygiene behaviour. Ideally, they should also be among the first to install household sanitation facilities in their houses as a local demonstration to others and of their commitment to the Project.

The Project needs to support performance potential by identifying simpler and more easily implemented systems and methodologies. Additionally, better programmed and structured implementation activities will generally result in better performance without being restrictive to the community. Preceding sections of this working paper have addressed these issues.

6.5 Institutional Support

The adequacy of the proposed institutional staffing and community worker organisation for the implementation of environmental sanitation has been assessed. An alternative presentation of the organisational structure directly relating to village level activity is shown by Figure 6.1. This highlights activity levels. The relationships between activity levels (and positions) with implementation activities is compared in matrix form in Figure 6.2.

Two areas of concern are identified regarding support for community based implementation of environmental sanitation.

- the capacity of PVWs to handle their quite extensive work load and responsibilities,
- the capacity to provide the community with adequate technical support.

6.5.1 Project village worker

Each PVW is described as the person full-time in charge of the village project (representing the Project) for proper health and hygiene education activities. This appears to understate the situation as the position will also involve community organisation, supporting project organisation, management and liaison with the village committee (the PVW's effective counterpart) and district Project support staff. Issues concerning environmental sanitation technology and materials supply will also inevitably arise.

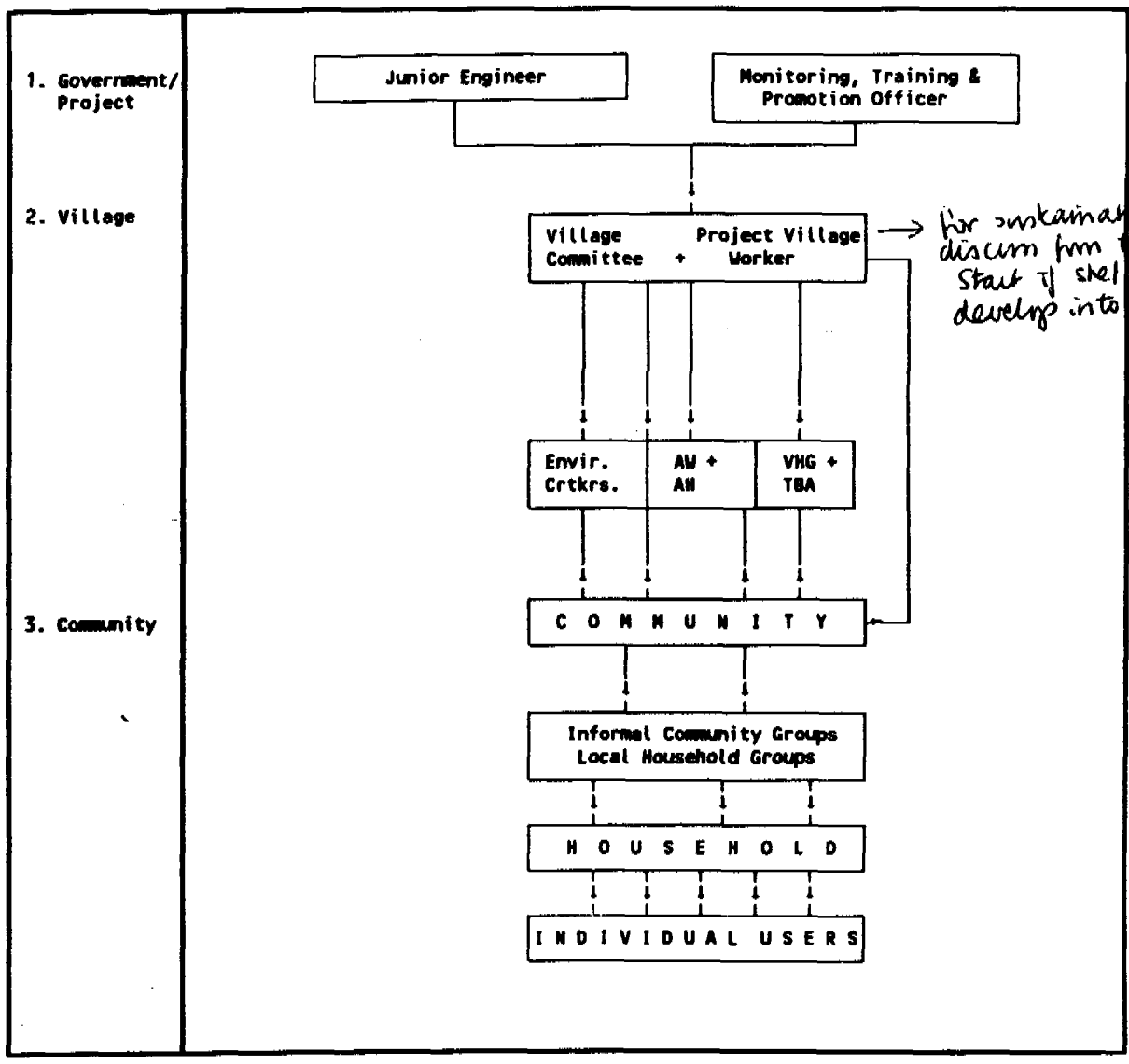

FIGURE 6.1

VILLAGE PROJECT ORGANIZATIONAL STRUCTURE
(Plan of Operations)

POSITIONS/GROUPS INVOLVED	MTPO	Junior Engineer	Village Committee	PVW	AW + AH	VHG + TBA	Environ. Crtkrs.	Commu-nity	Informal Com. Grp.	Local H/H Group	House-holds	Users
Village project planning and design (PRA)	*	*	*	*			O	*	O	O		
Community organization	*		*	*	*		?		*	O		
Implementation organization and management	O		*	*	O		?		*	*	*	
Awareness campaign & promotion	*		*	*	*	*	O		O			
Materials supply and comm. manufacture	*	*	*	*			?	*	*			
Building/assembling installations		*	*	*			?		*	*	*	
Hygiene education	*		*	*	*	O						
Operation and maintenance	*	*	*	*	O	O	*		O	*	*	*
Monitoring	*	*	*	*	*	*	*		O	O	O	
Training	*	*	*	*								
Basis of employment	Proj.	Proj.	Volun.	Proj.	Govt/Vln.	Volun.	Volun.		Volun.	Self	Self	Self

Legend: * Primary involvement
O Secondary involvement
? Need not provided for

FIGURE 6.2
AREAS OF PROJECT RESPONSIBILITY

The position is intended to be filled by a village woman who may have little initial experience working in this way. The support of the other health orientated village workers, providing they are in place and functional, will be very important. The situation also emphasises the importance of the village committee's intended planning and implementation management role. The committee and the PVW will need to actively support each other. Effective PVW training and Project support will be vital requirements.

6.5.2 Technical support for sanitation

Of greater concern for environmental sanitation, is the Project's capacity to provide technical support at village level. This will be the responsibility of a Junior Engineer. He is responsible for all engineering needs of some 20 villages and for those that are project villages, he will also follow-up water supply contract implementation. It is additionally intended that he supports the environmental sanitation activities in the same.

Support for environmental sanitation will involve issues of site specific design and planning, implementation guidance and problem solving, organising supply of materials, verifying use of materials, installation quality control and overall monitoring performance. However, unlike the water contract, sanitation implementation will involve a collection of scattered mini-projects down to household level, with issues often to be resolved at that level.

The capacity, ability and interest of Junior Engineers to effectively support active implementation of low-cost innovative environmental sanitation has not been assessed in detail. Allowing for a reasonable level of sanitation implementation activity, it is considered necessary for the Junior Engineer to be supported by a minimum amount of organised village level assistance. The Plan of Operations does not specifically provide for this.

A minimum proposal is that voluntary village Environmental Caretakers proposed by the Project be given additional responsibilities. With appropriate training, they would guide and assist other community members to install household or community environmental sanitation facilities. The village committee would need to provide organisational and management support. Environmental caretakers would additionally retain their original responsibilities for operation and maintenance and environmental supervision.

An additional option would be to appoint and train a village person to a position of Project Sanitation Technologist as one member of a two person Project team with the Project Village Worker. They should be recruited on the same basis and conditions. The Sanitation Technologist would work with the village committee, guide the Environmental Caretakers and liaise directly with the Junior Engineer. It is suggested that the cost-benefit of this option is worth serious consideration, even though Project policy and finances do not presently

provide for additional paid workers.

Fundamental issues are, how serious is the Project about achieving a significant level of environmental sanitation implementation activity and just what support will be needed to achieve this. Much dependence is placed on the establishment of productive village committee driven community based implementation. It is clear that the performance of sanitation technical support should be closely monitored during the initial period of Project implementation. It will also be necessary for the Project to be responsive to findings and find ways to adjust resources if necessary.

6.5.3 Source of sanitation experience

There is no specific provision for a source of environmental sanitation expertise within the proposed Project staffing structure. This is desirable if the broad community based approach using a range of low-cost technologies discussed in this working paper is to be followed. This need is highlighted by the general lack of experience in this area among the technical members of the Project and organisations associated.

It is proposed that one assistant engineer and one member of the Social Wing in each District Project Unit be together given particular responsibility for Project environmental sanitation technology and its implementation along with their normal duties. This two person team would need to be chosen on the basis of interest and attitude. They would be expected to provide a focal point for sanitation activities and source of influence and advice for others in the District Unit.

7. PROPOSAL

7.1 Need

The Plan of Operations represents a fresh approach to the design of sustainable low-cost water supply and sanitation projects for rural villages of Karnataka. This is in response to observations of other projects which have not achieved expected improvements, especially in sanitation and hygiene behaviour. The principle new features of the Plan of Operations are:

- the active involvement of the community in planning and some aspects of implementation,
- project response to community felt needs,
- community responsibility for operation and maintenance,
- sanitation in the wider context of environmental sanitation.

For water supply, the technology to be used is essentially conventional, with contract implementation.

This working paper has discussed additional changes for sustainable and affordable environmental sanitation design and implementation with the objective of reaching Project target households more effectively. New features, additional to those of the Plan of Operations, are:

- wider conceptual approach to environmental sanitation,
- a range of solutions for the different environmental sanitation issues, yes!
- community managed and implemented installation of facilities, yes! incl. costs from
- separately targeted hygiene promotion and post-installation hygiene training/education.

There is little experience in India with this broader approach to environmental sanitation, while the need for improvements in rural village sanitation is clear. The necessary experience can only be achieved by putting new ideas to test.

It is proposed that this be done with a small number of pilot villages during the initial Project implementation period. Experience and lessons from the pilot study should be of immediate benefit to the Project and also of potential benefit for the sector in general.

7.2 Pilot Study

7.2.1 Objective

To demonstrate (an) alternative implementation methodology(s) for the achievement of sustainable low-cost water supply and environmental sanitation improvements in rural villages.

7.2.2 Scope

The study would emphasise environmental sanitation coupled to hygiene promotion and education but also include water supply development. Active community involvement would be supported by facilitating Project based staff and institutional systems in general accordance with the Plan of Operations.

7.2.3 Design

Pilot study methodology would be designed to enhance performance potential within each pilot village by emphasising Community Managed Implementation. This emphasises community responsibility for and involvement in the development of their own community with commitment, performance and implementation efficiency.

Additional emphasis on pilot implementation may produce results that would be difficult to achieve in more normal project circumstances. However, the primary objective of pilot studies is to demonstrate what can be achieved and secondarily, but necessarily, how the methodology can be best applied in more typical project circumstances of limited resources.

Control villages should also be selected. In these villages, the implementation methodology outlined by the Plan of Operations would be used. The Project would respond to community felts needs but with no special emphasis on performance and enhanced community management. The only special activity would be closer monitoring of progress.

An extended range of environmental sanitation solutions would be available for both pilot and control villages.

Proposed supporting design features are:

a)	Village number:	3 pilot villages; 3 control villages
b)	Village size:	1500 to 3000 persons spanning the average Project village size of 1800
c)	Village location:	Pilot villages reasonably grouped for logistical benefit - same cluster.
d)	Water supply:	Pilot villages to have separate schemes for quicker preparation.
e)	Study duration:	One year

7.2.4 Implementation

Pilot studies of this nature need to be managed as a learning process rather than to demonstrate a fixed methodology. This necessitates operational flexibility to accommodate community ideas and experience. It is also necessary to incorporate implementation feedback experience with appropriate modifications and changes made. However, constraints of time and resources necessitate that previous experience be used to establish a starting methodology incorporating principal implementation features.

Significant features for the proposed pilot methodology are listed together with comparable features for control villages:

Pilot Villages	Control Villages
Village committee formed immediately after first planning meeting with specific involvement in all aspects of the project - planning, implementation, operation and monitoring.	Village committee formed no later than start of environmental sanitation planning.
Community manufacture of components and facility installation specifically encouraged.	Community implementation.
Prioritised felt needs of community responded to. Households associated with each area of need targeted with programmed promotion of all environmental sanitation issues.	Prioritised felt needs of community responded to without special household-targeted promotion.
Households which have installed sanitation facilities or contributed to local communal or community facilities targeted for hygiene training on completion of installation.	No special attention to post-installation household hygiene training.
Burial or other simple containment of human waste specifically promoted and emphasised.	No special attention to the containment of human waste.
Project village workers expected to exercise desirable hygiene behaviour at all times.	No special attention given.
One village Sanitation Technologist working with each Project Village Worker. (?2)	No Sanitation Technologist; only one Project Village Worker.
Water supply contract for each village prepared and awarded as soon as possible independent of rest of cluster group.	Water supply contracts handled without change.

cost + effectiveness of 2 approaches.

Other implementation features would be common to both methodologies. These include:

- Range of environmental sanitation solutions
- General hygiene awareness campaign
- Installation of facilities
- Operation and maintenance
- Materials supply
- Cost sharing
- Performance monitoring

7.2.5 Pilot workplan

This would be comparable to that for village clusters developed in the Plan of Operations (Barchart 5.4-1) except that the time scale would be significantly compressed. This is necessary to ensure an acceptable level of implementation activity is achieved within the twelve month period of study. Within this time period, pilot studies would aim to assess and demonstrate:

- methodology "process",
- ability to positively influence behaviour change and
- capacity to produce acceptably functional and used sanitation installations (numbers of installations would be a secondary objective).

For pilot purposes, village committee establishment would be brought forward immediately after the First Planning Meeting (Plan of Operations, Barchart 5.4). Environmental sanitation assessment and planning activities would also be brought forward to directly follow on from the baseline survey. This could have a physical component together with community hygiene perceptions and behaviour. Water supply preparations would also be given special consideration for faster design and contract preparation.

An outline workplan is shown by Figure 7.1.

7.2.6 Monitoring

A structured system of monitoring and reporting would be essential to provide a full record of progress and performance. Clear indicators would be identified and procedures established. All activities of each pilot study would need to be selectively monitored with emphasis on performance, together with results. Of particular significance would be:

- community perception of the village project,
- community organisation,
- hygiene awareness and promotion and resultant community response,
- organisation and installation of facilities by the community,

S.nr	Activity	Oct-Nov'92	Jan-Mar'93	Apr-June'93	July-Sept'93	Oct-Dec'93	Responsibility
1.	Pilot decision, approvals and planning organization	**********					Project and government departments
2.	Pilot preparations - project/village staff recruitment orientation & training		**** ---	----------	----------		
3.	Village project planning - PRA & CAP		*****				Community and Project
4.	Community organization - village committee establishment		*****				Community
5.	Hygiene awarenss campaign - environmental sanitation planning		****	****			Community and Project
6.	Sanitation manufacture + implementation			---------	**********	********----	Community
7.	Anganwadi building		*** **	----********	***		Project and community
8.	Water supply preparations		***...***	**********	******		Project and community
9.	Water supply implementation				******	**********	Contractor and Project
10.	Hygiene education/training			---	**********	********----	Project and community
11.	Community operation & maintenance of installations				**********	**********	Community
12.	Monitoring and evaluation		---------***	---------***	---------***	---------***	Project and community
13.	Reporting					***	Project

FIGURE 7.1
PILOT STUDY OUTLINE WORKPLAN

- behaviour change of village members and associated hygiene training and education,
- care and maintenance of installations,
- project performance at both village and district levels.

7.3 Pilot Organisation

7.3.1 Project integration

If there are no delays with approvals for the implementation phase of the main Project, pilot study establishment should preferably start as one of the first activities. This would follow the Project's initial training activity phase but working to a separate implementation timetable, largely independent of other Project activities.

If there are delays in implementation of the main Project, then consideration should be given to setting up a separate one year pilot activity, although technical support could be difficult to organise and/or finance.

7.3.2 Project support

It has been proposed that a Village Sanitation Technologist be recruited from the members of each pilot village, to ensure that technical support is readily available within the community. The Sanitation Technologist and Project Village Worker would work as a team together with the village committee.

It would be desirable if a district pilot team of one Junior Engineer and one Monitoring, Training and Promotion Officer could be appointed. This team would guide and monitor the three pilot villages together with monitoring (not supervising) the three control villages. It would be a particular advantage if the Junior Engineer had an open-minded interest in sanitation.

Overall district supervision of the pilot study would be best done by the district social wing. Additionally, consideration could be given to using a district based NGO to provide local advisory and monitoring support, preferably an NGO with community organisation experience and involved in Project training. The state level Project Support Unit would take a special advisory and evaluation interest in the pilot study.

7.3.3 Financing

Much of the implementation financing for a pilot study should be covered by implementation finance available for each pilot village. There would be additional funding required for special implementation features and for additional supervision and monitoring requirements. The allocation of Project staff for pilot duties only could also represent an additional cost.

A special pilot study allowance may be needed for these extra costs. The relatively small allowance for research and development under environmental sanitation, may not have enough spare capacity for this purpose.

Should start of implementation of the main Project be delayed, then pilot study financing would require special consideration. If this occurs, there is believed to be substantial advantage in proceeding with the pilot study to gain the experience expected. This can only be of advantage to the Project (and the sector).

7.4 Results and Evaluation

7.4.1 Reporting

Regular progress reporting is required for management and monitoring purposes. These should be supported by structured field observations with the objective of finally reporting each pilot village study as a separate Case Study. These together with evaluation findings would make up a final report.

Evaluation

A final evaluation of the pilot study should be made involving both Project and community and preferably, one or more outside observers. Emphasis needs to be on performance of the methodology together with results. This would cover all aspects and lessons learnt involving:

- community and institutional performance, separately and together,
- sanitation solution acceptance, sustainability and replication potential,
- community benefits and behaviourial change of members,
- negative impacts,
- adequacy of methodology and desirable variations.

7.4.2 Application of findings

It would be essential that the experience and findings of a pilot study be incorporated into the methodology of the main Project. This should not only happen at the end, but also during the course of the pilot study, if particular observations are of sufficient significance. Availability of results for the benefit of other programmes is a further consideration.

8. RECOMMENDATIONS

a. This working paper is distributed to:

- all parties directly involved in the Project
- organizations working in the sector in Karnataka State,
- other selected persons and organizations working in the sector

for comments.

b. Subject to acceptance, the proposed Pilot Study be organized and implemented along the lines outlined.