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A Model for the Development of a Self-help Water Supply Program

Colin Glennie

TECHNOLOGY ADVISORY GROUP WORKING PAPER—Number One

e International Drinking Water Supply and Sanitation Decade

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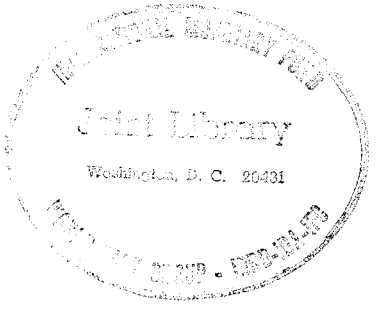

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PREFACE

This paper is one of a series of informal Working Papers prepared by TAG1/ on various aspects of water supply and sanitation programs in developing countries. The papers were originally prepared as internal discussion documents; their wide distribution does not imply endorsement by the sector agencies, governments, or donor agencies concerned with the programs, nor by the World Bank or the United Nations Development Programme. Comments and suggestions on the papers should be addressed to the Project Manager, Richard Middleton, at the World Bank, 1818 H Street, N.W., Washington, D.C., 20433.

"A Model for the Development of a Self-Help Water Supply Program" presents one version of a practical model for developing, with high community participation, water supply programs in developing countries. Consideration is also given to sanitation program development. The crucial role and training requirements of field-level personnel is focused on, together with the need to phase developments in sector programs where self-help strategies are adopted. The paper includes practical guidelines for program development.

1/ The Technology Advisory Group, established under UNDP's Global Project GLO/78/006, executed by the World Bank; in January 1982, this project was renumbered INT/81/047.

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The approach and techniques described in this paper have been developed over a period of ten years in the field by a team under the leadership of L.H. Robinson. Others who have made major contributions to this team are my former colleagues, A.B. Chiwongola, L.K. Ngwira, and W. Gomiwa.

I am also grateful to Geoffrey Read for his comments on the draft.

A MODEL FOR THE DEVELOPMENT OF A SELF-HELP WATER SUPPLY PROGRAM

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SUMMARY AND CONCLUSIONS

Summary

(i) According to this model there are four phases of program development: the initial, consolidation, expansion and maintenance phases.

(ii) The principal objectives of the Initial Phase are (a) to establish the confidence of Government and potential donors; (b) to stimulate demand in target communities; (c) to test practical aspects; and (d) to train field staff.

(iii) The Initial Phase should involve as many features as possible that will favor success. The principal features are (a) small project size; (b) a suitable community; (c) technical simplicity; (d) good quality field staff; and (e) the accessibility of the project area.

(iv) The principal objectives of the Consolidation Phase are (a) to develop a cadre of trained staff; (b) to develop standardized procedures and techniques; and (c) to define the technical standards of construction.

(v) In the Expansion Phase the program should select a limited number of specific areas with high-growth potential rather than try to provide rapid coverage nationwide. In this way the growth of the program is controlled within the managerial and manpower resources available.

(vi) Completed projects enter the Maintenance Phase, which should be a specific part of the program. Long-term project benefits are realized and the assets created under previous phases are preserved by sound maintenance.

(vii) The principal conditions essential for the success of a self-help program are (a) genuine popular demand; (b) self-help components within the capacity of the community; (c) appropriate methods of engaging community participation; (d) close supervision of the self-help component; and (e) institutional support.

(viii) A self-help program is a partnership between Government and the community; the role of each partner must be clearly defined at the start.

(ix) The role of the community and its leaders may include the provision, organization and supervision of self-help labor, cash and material contributions and the selection of individuals for special responsibility.

(x) The role of project staff lies in design, planning, ensuring the availability of materials, engaging the participation of the community, supervision and management of labor and providing the necessary inputs of skilled and semi-skilled labor.

(xi) Six levels of field manpower are proposed in this model, the most important being the Supervisor and Field Assistant levels. These are the key personnel who work continuously with the community and must, therefore,

come from the community or a similar community. Field Assistants are taught some technical skills and perform various semi-skilled functions. They are able to offer practical first hand advice and physically demonstrate the work to be done as necessary. They are not merely community relations personnel.

(xii) The manpower requirements will clearly vary according to the phase of the program. The Initial Phase should start very small, with sufficient staff just to manage one or two initial projects. The manpower requirements for the subsequent phases will depend principally on the nature of the program and the policy adopted by the program manager as a result of the Initial Phase. The priority must be to maintain a high level of supervision and to limit the rate of expansion of the program to match the rate of production of trained staff.

(xiii) Selection and training of staff for self-help projects should be more rigorous than usual. The process relating to Field Assistants is described here in some detail. A particular point is that people with a higher education than is normal for the type of community to be served should not be recruited as Field Assistants. Final selection should be by a rigorous two-week selection course which also serves for initial training.

(xiv) Some of the factors favoring motivation of staff are considered. The best approach is to start with a very small Initial Phase team led by a highly-motivated program manager.

(xv) Quality is affected by the following factors: (a) the task must be within the technical capacity of both the community and the staff; (b) a specialist team should be developed to carry out each specific technology or repetitive task; (c) designs and (d) procedures should be standardized as much as possible; and (e) a high level of supervision must be maintained.

(xvi) The maintenance of completed projects is affected by the technology chosen, the quality of design and construction, the degree of community involvement and the technical and material support provided. It is stressed that, while community involvement during construction can facilitate maintenance, the responsibility for maintenance should lie with the program itself, which must provide the necessary institutional support in the form of a Maintenance Unit.

(xvii) The overall organization of the program will develop from a small project team in the Initial Phase, dependent on an "umbrella" organization for administrative support, into a self-contained headquarters staff, managing and servicing a large number of field projects. The headquarters staff will include units responsible for training; monitoring, evaluation and technical development; drafting; maintenance; and administration.

(xviii) A self-help project should have two parallel organizations, one for project staff and one for the community. The community organization should be set up by the authority that in practice has the genuine support of the community.

(xix) This model postulates that the program must develop gradually at a rate within the limits of its own competence. The program should develop its competence to meet needs as they arise, and should rely on its own accumulated experience rather than on external inputs.

(xx) In this way, the vital issues of training, manpower and institutional requirements are automatically and naturally developed as inherent features of the program itself, and are not features added on to a program in an effort to make it "complete".

(xxi) The most important features of this model are that the program must start small and develop slowly initially. The rate of development will accelerate once sufficient confidence and expertise has been generated, and it is very possible to develop a strong national program within ten years.

(xxii) The efforts of the International Drinking Water and Sanitation Decade should be directed towards the creation in each country by 1990 of strong national water supply and sanitation programs, with realistic and proven development policies, operating within well-organized institutional frameworks, with cadres of well-trained and experienced staff and with the confidence of the communities to be served. If this situation can be reached these programs will then be able to sustain adequate growth rates to serve the remainder of their populations, perhaps within the following decade.

I. INTRODUCTION

1.01 This working paper considers the manpower, training and institutional requirements of self-help water supply and sanitation programs. It is not possible to consider these issues in isolation from the overall nature of the program itself. The recommendations here would be of doubtful value if they were made sufficiently general to be applicable to any program in any country.

1.02 Accordingly, the approach has been to consider a practical model for the development of a self-help program, and examine the issues of manpower, training and institutional requirements in relation to this model while discussing issues of parallel importance. This exercise provides a basis for considering what features of the model are applicable to other program models, and how they may be adapted accordingly.

1.03 The paper describes a model which has taken a decade to develop in the field. Although the model has developed from a rural water supply program, many of the principal features are applicable to sanitation program development.

II. PROGRAM DEVELOPMENT

2.01 According to this model there are four definable phases in the development of a national program:

- the Initial Phase;
- the Consolidation Phase;
- the Expansion Phase; and
- the Maintenance Phase.

It is important that the program is not forced to expand too rapidly, and that it is given time to accumulate its own competence and experience. In most countries any attempt to establish an "instant" program, or to proceed rapidly from a hasty initial phase is likely to be unsuccessful. There is some danger that the sense of urgency generated by the International Drinking Water and Sanitation Decade will lead to short-cuts and excessively rapid program development.

Initial Phase

2.02 The successful implementation of this phase is crucial to subsequent development. The Initial Phase usually takes the form of one or more pilot projects.

2.03 The principal objectives of an initial project can be summarized as follows:

(a) To Establish the Confidence of Government and Potential Donors

If the Government is to continue its support it must be satisfied that the program can be successful and fulfils a genuine need. Similarly, potential donors will be encouraged to support a program which has already proved itself by a successful Initial Phase.

(b) To Stimulate Demand in Target Communities

The strength of a program depends on the intensity of public demand. Target communities who are able to see the results of an initial project, and who can talk to the beneficiaries, will be far more impressed than they could ever be by listening to Government propaganda or the exhortations of their leaders.

(c) To Test Practical Aspects of the Proposed Program

The experience gained in the Initial Phase may show up social, technical and organizational shortcomings of the proposed program. It is better that these come to light during this phase,

when it is still relatively easy to rectify the situation. If problems arise during a major project they could lead to a breakdown of confidence in the whole program.

(d) To Provide Experience and Training for Field Staff

It is unwise to launch straight away into a major program relying on staff who have no previous experience of the particular social, technical and organizational requirements. The initial phase is therefore a period when field staff can become familiar with the program itself and gain some experience in preparation for the next stage.

Some Essential Conditions for Success of an Initial Phase

2.04 The program cannot develop until the above objectives have been achieved. It is, therefore, imperative that each project in the Initial Phase is successful. To facilitate this it is logical to choose a project with as many favorable features as possible. The most important are listed below:

(a) Project Size

The success of an Initial Phase project is dependent upon the maximum possible supervision of all project activities. Bearing in mind that the numerical strength and experience of field staff is likely to be limited it is important that the project is kept as small as possible.

(b) Suitability of the Chosen Community

It is important that the community selected for an Initial Phase is known to be responsive and willing to cooperate with Government. It should also be as representative as possible of the type of community which the program is likely to encounter in later phases. It should have strong local leadership, be as free as possible from factions and animosities within the community, and have a real need for the services offered by the program.

(c) Identification of Principal Social and Cultural Features of the Community

Certain relevant social and cultural features of the community will indicate what technical design and what community organization structure is likely to be most successful. If local knowledge is not already available, it will be necessary to determine relevant customs, attitudes and beliefs before drawing up the design (see para. 5.02).

(d) Project Promotion Campaign

The promotion campaign for an initial project (see also para. 5.05) will need to be especially intensive. This is particularly important for the beginning of a sanitation program. In this context, it is important to stress the suitability or receptivity of the chosen community for an initial project (see [b]).

(e) Technical Simplicity

If the tasks to be carried out by the community are complicated and arduous, the community's enthusiasm is likely to flag and the initial project will run into difficulties. Ideally, the people should be able to see the results of their labor within a relatively short time. More difficult projects can be undertaken once the initial phase has been successfully completed.

(f) The Quality and Experience of Field Staff

An Initial Phase is a particular testing time for field staff who will have to cope with unfamiliar situations. They should therefore be experienced enough to foresee and avoid difficulties, particularly of a community nature, and be persevering enough to guide the project through the problems that arise.

(g) Accessibility of Project Area

The project itself depends on the guaranteed supply of all materials and on the regular supervision and support of the controlling ministry. If the project is situated in a remote area, communications will be difficult, supplies will be jeopardized and the project may receive inadequate supervision and support. Furthermore, the first two objectives listed above depend upon the project being reasonably accessible to Government officials, politicians and donor officials as well as being adjacent to target communities. If this is not possible, it will be necessary to execute two initial projects consecutively, one to achieve the first objective and the other to achieve the second.

Consolidation Phase

2.05 During this phase the lessons of the Initial Phase are acted upon and the true character of the program becomes defined. There are three principal objectives of this phase:

(a) To develop a cadre of well-trained and motivated field staff with the experience and self-confidence to proceed to the next phase.

(b) To develop standardized procedures and techniques for all operations required within the program.

(c) To define the technical standards of construction and installation.

2.06 It is important that this Phase is included during program planning. It is unnecessary to make elaborate plans for the expansion of the program until the experiences of the Initial and Consolidation Phases are sufficient to indicate future program policy. It is difficult to predict the character of the program in advance - it is better to let the program develop from within.

Expansion Phase

2.07 The Initial and Consolidation Phases will necessarily be fairly localized activities. The Expansion Phase is the period during which the program develops into a nationwide activity.

2.08 The policy adopted for the Expansion Phase is crucial. If the program tries to spread itself too rapidly in an effort to provide nationwide coverage, it will be impossible to maintain an adequate level of management and supervision, rendering many projects prone to failure. This would be very damaging to the whole program - failures must be avoided at all costs. In addition, a policy of expanding to provide nationwide coverage by appointing program staff to every district is likely to stimulate popular demand to a level that is both impossible to resist politically and yet far beyond the capacity of the program to satisfy in the short term. Once such political pressures are unleashed it becomes very difficult to ensure the orderly and controlled expansion of the program.

2.09 It is better to expand the program by selecting specific areas of high growth potential and starting with relatively unambitious demonstration projects to stimulate local demand in these areas. Once these projects are successful, a number of new projects can be initiated in adjacent areas, each with the appropriate level of field staff and supported by supervision, management, supplies, transport, administration, etc., at the area level. In this way the growth of the program can be controlled within the managerial and trained manpower resources available.

Maintenance Phase

2.10 Completed projects will enter the Maintenance Phase. Ideally, the program should retain responsibility and control for this phase. As the program develops, an increasing proportion of resources will need to be devoted to operation and maintenance. Again, the policy for this Phase will develop out of the experiences of the earlier phases.

III. ESSENTIAL CONDITIONS FOR A SELF-HELP PROGRAM

Technical, Social and Cultural Compatibility

3.01 According to this model the compatibility of the technical, social and cultural features of the project should be resolved in the best possible in the Initial Phase of the program (see paras. 2.04 [c] and 5.02). Nevertheless, it is important that the program remains sensitive to these features, especially where there may be marked regional variations in social and cultural patterns. This sensitivity should come from within the program itself, and it is particularly important to recruit field-level program staff from the type of community to be served (see para. 6.12 and 8.01 [b] [i]). The program must ensure that the particular technical features and the method of engaging community participation are compatible with local circumstances. On the other hand, standardization of technical designs and project implementation procedures is extremely important and variations from agreed standards should be introduced only when absolutely necessary.

Genuine Popular Demand

3.02 The intensity of demand is a crucial factor for the success of self-help program. The demand must be sufficiently high so that the self-help effort can be sustained over a period of time, even in the face of problems and difficulties.

3.03 For a water supply program it is important that the demand is not overestimated or taken for granted. For example, a community with a severe water problem will probably respond very positively to the Government's invitation to participate in a self-help project, but this may be more an expression of interest than commitment, and should not be taken as a guarantee that the people are genuinely committed to the project. Similarly, for a sanitation program, it is important that the results of an intensive promotion campaign are not overestimated. This campaign may succeed in raising the general level of interest and awareness, but may not stimulate sufficient demand.

3.04 In both water supply and sanitation programs the general interest must be converted into a sufficiently high level of genuine popular demand (i.e., not just demand as expressed by the leaders) if the program is to be successful. The most effective way of achieving this is by means of a well-executed demonstration project. In the Initial Phase the initial projects will themselves act as demonstration projects. In the Expansion Phase small demonstration projects should be carried out when expanding to new areas (see paras. 2.08 and 2.09).

3.05 The implication of this is that during the demonstration project the program itself is the main motivating force and must therefore guide the project through to a successful conclusion. However, once the demonstration,

education and promotion have together succeeded in stimulating genuine popular demand, the community itself becomes the principal motivating force. This is the breakthrough point in a self-help program.

Project Promotion

3.06 Particularly for initial and demonstration projects, there will be a need to undertake various promotion activities. The objectives of this work are to help stimulate demand, where necessary, and to ensure the physical success of the project, that is, that the facilities are properly constructed, and used and maintained by all.

3.07 The intensity of the promotion effort will depend on existing levels of awareness, on the rate at which facilities can be provided at the particular stage of the program (it is important not to disappoint people by arousing false expectations) and on the nature of the program itself: a sanitation program is likely to require more promotion than a water supply program. Promotion activities should concentrate on a few fundamental and essential points, and should be focused on a particular project area. Usually, specialist advice (which may be available in-house or within other branches of government) will be required on choice of media, design or materials, timing of activities and monitoring of their effectiveness.

3.08 There is also a need for a secondary promotional effort, which should continue after the physical completion of the project, aimed at helping the community to derive maximum benefit from the facilities constructed. This secondary campaign should cover a wider spectrum of subjects, such as sanitary and health education. This campaign may be outside the competence and scope of the program itself and ideally the relevant extension agencies should be responsible (particularly where increased water availability makes possible changes in, for example, nutrition or agricultural practices). This will require integrated planning between agencies; if this pose major problems then the implementing agency will need to assume responsibility and undertake to work itself with specialist advice as necessary.

Self-Help Component Within Capacity of Community

3.09 There is a danger of expecting too much of a community. The realistic contribution will vary according to circumstances. In the majority of communal water supply projects it will be in the form of unskilled labor. In some rural communities cash contributions may seem realistic but these can lead to serious problems of collection, especially if required on a routine basis.

3.10 Urban sanitation projects will tend to involve individual householders rather than communities. In this case it is important that the self-help labor component (e.g., digging the pit) is within the capacity of the family concerned, and any loan repayments for hardware must be realistic. In many cases heavily subsidized hardware may be necessary if the program is to succeed.

Close Supervision of Self-Help Component

3.11 It is essential that self-help contributions in the form of labor or cash are very closely supervised. In the case of self-help labor this means the provision of adequate numbers of field staff to supervise the labor and ensure that technical standards are maintained.

Institutional Support

3.12 Institutional support is an essential feature of self-help programs. This relates to staff training, monitoring and evaluation, the supply system, administration, maintenance organization, etc. However, according to the model discussed in this paper, this institutional support grows in response to the needs of the program, and is not imposed as a separate "package".

Linkages to other Programs

3.13 The program design should take full cognizance of the strengths and weaknesses of programs and resources in other related sectors, thereby avoiding inefficient overlapping and duplication and achieving a cost effective interface.

IV. ROLE OF THE COMMUNITY

4.01 A self-help program should be considered as a partnership between Government and the community. Any partnership works best if the role of each partner is clearly defined and understood from the outset. Overlapping responsibilities should be avoided as far as possible.

Labor

4.02 In most low-cost water supply and sanitation projects for low income communities, the easiest and most useful contribution the community can make is in the form of unskilled labor. In a shallow wells program, for example, self-help labor can be used for well excavation, collection of construction materials, manufacture of bricks, preparation of drains and soakaway pits. In a piped water program, self-help labor can be used for excavation of trenches and tank sites, distribution of pipes, backfilling, collection of materials, preparation of aprons, drains and soakaway pits. In a latrine program, self-help labor can be used for excavation of pits, collection of construction materials, manufacture of bricks and construction of latrine superstructures.

4.03 The labor may be performed by the whole community (men, women and children) or by different groups according to the customs of the society; self-help labor should also be used not only for construction, but also for operation and maintenance duties (see para. 11.04).

On-Site Supervision of Labor

4.04 The on-site supervision of labor is essentially the responsibility of the project staff, who have the technical knowledge necessary. However, in practice, the community leaders must also be involved in the supervision process to exercise the necessary authority over the people.

Cash Contribution

4.05 The community may participate in the form of cash contributions towards project construction, operation and maintenance. The feasibility of such contributions must be assessed very carefully in relation to the community's ability to pay and the practicality of collecting the cash, particularly if it is to be collected on a regular basis and if there are, for example, large seasonal fluctuations in cash incomes.

4.06 Experience has shown that communities who were unwilling to contribute cash for construction purposes may be prepared to contribute cash to effect repairs that directly affect them. For example, if a tap breaks on a community standpipe, the community can raise the relatively small amount of moeny to effect the repair. However, if a pump breaks down, or a pipe gets washed away, the community may not be able to raise sufficient cash. The

program should therefore make clear what items the community must pay for (usually those items at the consumer end) and what items will be paid by the program.

4.07 In an urban sanitation program, where the individual household is the consumer unit, and where a cash economy prevails, the consumer may receive a loan for the latrine materials, which he must repay over a period. The method of effecting repayment is clearly a crucial issue and detailed considerations have already been made by others more competent in this field. The issue is beyond the scope of this paper.

Contribution of Materials

4.08 The community may also be asked to contribute materials which are locally available. These may take the form of bricks, grass, sand, stone, roofing sheets, timber, or tools for excavation.

Individuals Given Special Responsibility

4.09 There may be certain tasks in a self-help project which can be carried out by a selected individual who may be given a simple training course. For example, in a shallow wells program each village or group of villages may select an individual to be taught how to strip and reassemble a handpump and how to carry out simple repairs, or in a gravity water scheme one member may be selected to clean the intake screen daily. The individual should be selected by the committee and is likely to be more accountable to the community if he receives a small honorarium (say, on the basis of one hour's work per day). However, payment from public subscription is inherently unreliable as failure to pay could lead to the breakdown of the whole system. He should therefore be paid by the program (as part of the Maintenance Phase) or by the local council. Such recurrent costs are best borne out of local or national tax revenues.

Community Organization

4.10 A vital role of the community is to provide the organizational structure to manage the community activities and contributions. In genuine community projects the community will normally elect or appoint a committee or number of committees to do this. These committees may organize the labor roster, the cash or materials collection, the selection of individuals for special maintenance duties, etc.

V. ROLE OF PROJECT STAFF

Technical Design

5.01 The technical design of the pit-latrine, well or reticulation system is the responsibility of the project team. It is essential that the design is not only robust technically, but that it is appropriate to the situation. An over-sophisticated design with a high maintenance requirement of skilled personnel is clearly inappropriate in a society where such skills are absent.

5.02 In addition, the design itself must be one that is acceptable to the users. This requires investigation before the design is carried out and thorough testing of user-acceptability during the Initial Phase. It is therefore essential that the project team includes people from the community or type of community to be served (see para. 8.01 [b]).

5.03 It is not advisable to engage formal community participation in all stages of producing a design. Such a procedure can be unnecessarily time-consuming, can lead to divisions within the community if different factions support different designs, and can actually result in a completely inappropriate compromise design which satisfies no one. The procedure should be to carry out preliminary investigations to determine the principal factors which will affect the design, then to carry out the design work itself, then to test this design during the Initial Phase.

5.04 The design must not only be appropriate to the technical and cultural conditions in which it will function but must, in the case of a national program, be capable of replication nationwide without putting an intolerable load on supervision. It may be easier to make something work on a pilot scale with close supervision than to reproduce the same design on a massive scale and still maintain the necessary standards. This factor must be considered at the design stage.

Project Promotion Campaign

5.05 The program is also responsible for the promotion campaign focused on each project area. Some of this may be carried out by central program staff producing educational and propaganda materials for use by, for example, local schools or health centers, etc. In addition, project field staff should carry out a program of group meetings and house visits. It should be stressed that, except for the initial projects and demonstration projects in a new area, these promotional activities are not carried out in a "vacuum", because, according to this model, a nearby community will already have been served by the program. In reality, it is this nearby community who will be the most effective promoters. This paper does not describe the details of such a promotion campaign as this subject has been widely discussed elsewhere.

Project Planning

5.06 The planning of individual projects should be the responsibility of the officer in charge of the project. The plan must take into account seasonal factors such as wet and dry seasons, agricultural patterns such as preparation, planting, weeding and harvesting, as well as religious and cultural activities. A Project Schedule should be drawn up to cover all critical operations, such as staff appointments, delivery of materials, motivation of self-help, commencement of excavation, construction, installation, etc.

5.07 It is the responsibility of project staff to maintain progress in accordance with the Schedule and to take up the matter with the community committees if progress lags behind. Committees may not maintain progress without encouragement. This concept of maintaining momentum is crucial in self-help projects.

Provision of Materials

5.08 The project team must ensure that supply channels are available for all materials required, except those that are to be supplied from within the community. The project itself may supply some items free, or sell them to the community. In some cases there may be adequate existing channels of supply (e.g., nails may be available at the local shop); in others the project may encourage a local trader to stock the necessary materials. The role of the project is therefore to ensure that the supply of materials, from whatever source, is not a constraint.

Engaging Community Participation

5.09 It is the project team's role to engage the participation of the community in an appropriate manner. The method used will depend on local circumstances, the nature of the traditional or political authority and the nature of the program itself. As with the technical design, preliminary investigations must be undertaken so that a suitable method can be proposed, and the method must then be tested and modified in the Initial Phase.

5.10 In addition, project staff should advise and provide general support for the self-help committees. This may take the form of feedback of information, pointing out particular problems that must be resolved, suggesting the need for a meeting, etc. Project staff are, however, only advisers to the committees, and it is important that the committee makes its own decisions, and is, therefore, responsible for them.

On-Site Supervision and Management of Self-Help Labor

5.11 The project team must provide the necessary supervision and management of self-help labor in order to maintain technical standards and productivity. When mass labor is at work, e.g., for the digging of trenches or tank sites, a project Field Assistant (see later) must be present, all the

time. Where smaller units of labor are involved, such as for well or latrine digging, each site should be visited daily in order to maintain momentum on the task as well as to check standards. In addition, regular supervision avoids the problems that occur when a job has been done incorrectly and has to be done again. This can have a very adverse effect on self-help motivation.

5.12 The supervision and management of mass labor teams requires a great deal of preparation if effective use is to be made of the labor. It is important that the required technical standard and procedure is established on the very first day, as it will be very difficult to raise standards later.

5.13 The project Field Assistants, while themselves being responsible for technical standards, must involve the authority of the local leaders on site if the standards are to be effectively enforced. For example, as people arrive for work, the Field Assistant should identify the leaders and appoint one leader to manage each section of the work. He should explain to the leader what work is to be done and what standard is to be achieved. He may give the leader some practical symbol of his authority, such as a measuring stick or tape to measure the depth of a trench, well or latrine.

Skilled and Semi-Skilled Labor Inputs

5.14 It has been stated that in most cases it is only realistic to expect a community to provide unskilled labor. It follows that all the operations requiring skilled or semi-skilled labor must be carried out by the project staff, who must therefore include, for example, builders, plant operators, and pipe layers.

VI. LEVELS OF MANPOWER IN THE FIELD

6.01 The levels of manpower in qualitative and quantitative terms will vary according to the nature of the program and its phase of development. Nevertheless, it is possible to identify the general levels of manpower likely to be involved in the field. The nomenclature may vary, but the roles are common. Sample job descriptions relating to a rural piped water program are given in the Annex I. Reference should also be made to Figure 3.

Project Engineer Level

6.02 The term "project" is used here to mean a specific area in which program activities are being concentrated. Such a project should have its own specific project team. The Project Engineer is the head of this project team 1/ and may be a professional engineer on a large-scale project, or a sub-professional (diploma engineer) on a smaller project.

6.03 The Project Engineer should prepare the detailed designs for the project, while conforming to standard program design procedures where these are applicable. There are considerable advantages in combining the roles of design and construction engineer for simple technology projects. This ensures automatic feedback of field experience to show up design shortcomings and encourages extra flexibility and speed with which design can be adjusted. It is also a powerful motivating factor that engineers can identify themselves personally with both design and construction processes and cannot blame the "design office" for all problems encountered. The Project Engineer should also make out the Project Schedule and be responsible that all preparatory work is carried out satisfactorily.

6.04 As has been stated above, a self-help project is a partnership between the Government and the people. The Project Engineer is responsible that the Government fulfils its side of the partnership in terms of technical design, supply of materials, technical supervision and upholding of standards. He is required to inject a sense of urgency into the execution of the project that may otherwise be lacking; since the project staff form a team, the Project Engineer, as head of the team, has special responsibilities for staff motivation and morale.

6.05 One officer at the level of Project Engineer may be made responsible for a number of smaller projects, each managed by an Assistant Engineer.

Assistant Engineer Level

6.06 This level of manpower refers to newly-qualified professional or technical officers who join the program early in their careers and may be expected to spend some time with the program, being promoted to more senior posts as they gain experience.

1/ On-site sanitation projects need not be managed by an engineer.

6.07 These engineers may be given responsibility, after some field training, for smaller projects, or may serve as Assistant Engineers to more experienced Project Engineers on larger projects. For example, a diploma engineer, after about six months training, could be given responsibility for, say, two or three small piped water projects serving 5-10,000 population each. He must however be well supported by experienced field staff and also receive support and regular supervision from a more experienced engineer in charge of a number of small projects.

6.08 Most developing countries produce relatively few graduate engineers and even those few are generally attracted to other jobs in the engineering sector. While this shortage lasts, many countries will continue to use diploma-holders from technical colleges as Assistant Engineers.

Supervisor Level

6.09 These should be field personnel particularly experienced in both the technical supervision of field staff and in the management of self-help labor. They will be the key men in engaging the participation of the community, liaising with committees and leaders, and advising the engineers on tailoring the details of the program to ensure maximum community participation. This level, along with the Field Assistant level, is probably the most crucial level of staff for the success of the program. The Supervisors should be drawn from the more experienced and able Field Assistants. It is of course essential that they are genuinely familiar and identify themselves with the type of community in which they work, whether rural or urban. They are essentially "blue-collar" staff, should not be too highly qualified, should have outstanding personal qualities of leadership and integrity and be able to command the respect of the community and leaders. Their status may be enhanced by, for example, issuing them with bicycles or motorbicycles as appropriate, or other special items of equipment. It is possible to find such people by employing rigorous selection procedures at the Field Assistant level.

Field Assistant Level

6.10 This level of staff constitutes the backbone of any program. The Field Assistants work at the interface between the technical requirements of the project and the self-help activities of the people. They must therefore have technical as well as social skills.

6.11 Their technical skills should be related to those specific technical tasks in which self-help labor is to play a major part. For example, such skills may include the excavation of trenches or pits to the proper standards and the connection of pipes or installation of latrine superstructure (unless building skills required). Field Assistants are semi-skilled and are not expected to carry out major construction or mechanical work for which artisans are more appropriate.

6.12 Their social skills should be related to the on-site supervision of self-help labour and to assisting self-help committees and community leaders in their duties. For example, if one section of the community is beginning to lose its enthusiasm, the Field Assistant may visit the leader to encourage a better turn-out next time, or he may decide to inform the committee if necessary. In order to fulfill this role it is essential that they belong or have belonged to the type of community in which they work.

Artisan Level

6.13 This level of personnel applies to builders, pump attendants, plant operators, etc. They have a much more specific task than Field Assistants and generally are not involved directly in the self-help labor program. They may be trained artisans with technical qualifications or they may be trained within the program to carry out specific functions, e.g., casting of latrine slabs, lining wells, building tanks, maintaining pumps, etc.

6.14 To encourage a homogeneity among project staff it is desirable that this level of personnel also be oriented towards the community to be served. For example, a graduate from four years in technical school in a large city is probably more suited to urban projects than rural ones. A local unqualified but experienced self-taught builder who has been building houses in rural areas is more suited to work on rural projects than urban ones.

Field Support Staff

6.15 This level refers to, for example, storemen, clerks, drivers, and watchmen. They are likely to be based at project headquarters. Most field projects involve numerous items of stores and tools and it is essential to have a storeman to keep stock records and to receive and issue stores. He is also a useful permanent presence at the headquarters. If it is necessary to run a small office, the storeman could double as a clerk/typist if the right person is chosen. Project headquarter personnel should be kept to a minimum commensurate with the job to be done. An excessive number of underemployed headquarters staff can be detrimental to morale of field staff. It is also important that the clerk/storeman level is not given more seniority or prestige than the Field Assistants level. The clerk/storeman is there to serve the Field Assistants, not control them.

6.16 As with all levels of staff, these personnel should also be oriented towards the communities in which they will work.

VII. MANPOWER DEVELOPMENT BY PHASE OF PROGRAM

Initial Phase Manpower Requirements

7.01 For the Initial Phase the manager of the program must select as competent a team as possible. The emphasis should be on quality of staff rather than quantity, which means the Initial Phase must be kept on a small scale. As the program develops, the members of the team will gain experience on the job and become the trainers for the Consolidation Phase.

7.02 The selection of staff for the Initial Phase is clearly of utmost importance; Project Engineer and Assistant Engineer levels should be selected in a manner similar to that described in Paragraphs 8.03 to 8.04. Field Assistants should ideally be recruited direct from field staff of parallel organizations. For a rural program, experienced field staff could be sought from the rural extension ministries, such as Health, Agriculture, Community Development or Water Supply; for an urban program, staff may be recruited from local government, water or sewerage boards, roads maintenance, health, social welfare workers, etc. They should (for the Initial Phase) have a minimum of five years field experience and be young enough (say 30-40 years old) to be able to adapt to a new program while being able to stay with the program for at least a further five years. They should all be suitable material to become the Supervisors for the Consolidation Phase, as they will be required to train the new inexperienced Field Assistants.

7.03 An initial project may have, for example, one Project Engineer, one Assistant Engineer and possibly two or three experienced Field Assistants recruited from other agencies. Such a project team, together with artisans and field support staff as necessary, may serve, for example, a rural community of 3,000 people with piped water or wells, depending on the level of service, or an urban sanitation project for, say, 300 latrines.

Consolidation Phase Manpower Requirements

7.04 The Initial Phase will result in a small number of field staff with at least some experience in the program. One of the principal purposes of the Consolidation Phase is to develop a manpower base for the subsequent expansion phase. The most important level of staff to be developed is the Field Assistant level. These can now be recruited and trained in the manner described in paragraph 8.01(a) et seq. They should then be posted for field training to the projects constituting the Consolidation Phase (which will be larger than projects in the Initial Phase).

7.05 To maintain a high level of supervision with the relatively small number of trained field staff, it is advisable to limit this phase of the program to one or two projects in the vicinity of a successful initial project.

7.06 In numerical terms, a reasonable project team for this Consolidation Phase would be one Project Engineer, one Assistant Engineer, two Supervisors and fifteen Field Assistants (Trainees). Such a team could execute, for example, a self-help rural water project for 50,000 people. Two such projects would serve to train 30 Field Assistants who after, say, two years will form a substantial trained pool of manpower for the expansion phase.

Expansion Phase Manpower Requirements

7.07 As the program expands, the trained staff can be appointed to execute demonstration projects in the new areas and new trainees should be recruited. After initial training, these new recruits should be appointed in groups to larger projects for field training. The larger projects thus become the training ground for the whole program.

7.08 By this stage, it should be quite clear what levels and numbers of staff are required for the program and the head of the program can plan accordingly.

7.09 It should be stressed that a limiting factor on the rate of expansion of a program is the rate of production of trained staff. In the Expansion Phase, there may be political pressure to take on more work than can effectively be supervised and relatively inexperienced staff may find themselves in situations beyond their competence. A policy of cautious and gradual expansion should reduce this problem.

Maintenance Phase Manpower Requirements

7.10 The manpower requirements for the Maintenance Phase will clearly depend on the maintenance policy adopted by the program and on the technology. It is logical to transfer trained personnel from the Expansion Phase of the program to form field maintenance units. A Project Engineer level officer could become in overall charge of maintenance, with Assistant Engineers (experienced rather than trainees) at regional levels, Supervisors and experienced Field Assistants at area level.

VIII. STAFF SELECTION, TRAINING AND CAREER STRUCTURES

Field Assistants

8.01 The Field Assistant level is the most important level of staff and will therefore be considered first. It is also considered in the greatest detail, as it is a level of staff with which many engineers and planners may be unfamiliar. The success of any program is so heavily dependent on the quality of field staff that it is essential to employ a rigorous selection procedure to screen out unsuitable candidates.

(a) Selection Criteria

The following basic selection criteria are applicable:

(i) Age. Field Assistants should be old enough to command the respect of the community and their leaders but they should not be too old to be trained and absorbed into the team. A suitable minimum age is 25 and the maximum may be about 40. Candidates should be physically fit and active.

(ii) Education. Primary School education is sufficient. Government regulations usually stipulate the minimum education requirements for the grades of post and a grade should be selected for which primary school education is acceptable. In general, staff of a higher education than is normal for the type of community to be served should not be recruited. (There are, of course, exceptions to this generalization.) The candidate should be able to speak and write in the language of Government, as well as in the local language.

(iii) Previous Employment/Experience. It is preferable that the candidate has some previous work experience; this experience need not necessarily be in construction skills.

(b) Recruitment Procedure

The following should be considered:

(i) Catchment Area

It is best to limit recruiting activity to local areas of current or proposed projects. If recruiting is done nation-wide the response will be unmanageable, and many applicants will be unsuitable, being from a totally different type of community or cultural group.

This does not mean that Field Assistants necessarily work well with their immediate home community - sometimes this can arouse jealousies. It is best if they belong to the general area, but their place of work should generally not be their home community. Field Assistants themselves are often reluctant to work in their own home community.

(ii) Advertisement Procedure

Notices may be displayed in public places, e.g., markets, local administration offices, bus stops, post offices, health centers, etc.

(iii) Applications

Application forms should be liberally distributed to the same centers. They should be simple to complete - only one side of a sheet of paper - and should request basic information such as name, address, age, education, occupation and previous work.

Applications received should be sorted according to the selection criteria above and the most promising should be selected for interview, say, six or seven times the number of vacancies.

(c) Interview

The following factors should be considered:

(i) The interview should preferably take place in the project area to maintain a project orientation throughout (rather than in ministry headquarters or the capital city).

(ii) The interview board should consist at least of the Project Manager and/or an experienced Assistant Engineer, a Supervisor/Foreman and one or two invited interviewers with appropriate experience (e.g., the District Agriculture Officer or the local Works Foreman). For rural programs rural experience is essential. The ideal number for the board is four or five, one of whom must be the chairman.

(iii) The purpose of the interview is to form an initial impression as to whether the candidate is the right material to proceed to the selection course. Therefore, the interview need last no longer than about five minutes, which will enable as many people to be interviewed as possible. It is possible for a board of experienced individuals to make a reasonably accurate assessment quite quickly as to whether the candidate is likely to be suitable.

(iv) The candidate should be encouraged to talk about himself, his home, his previous work, etc., so that he can display his personality. For a rural program particular effort should be made to assess the candidate's attitude to rural work.

(v) A simple marking system, say on a scale of 1 to 5, should be used as a means of grading each candidate, each interviewer giving a score. After the interviews the top-scoring candidates should be called for a selection course. About twice as many candidates should be chosen as the number of vacancies.

(d) Selection Course

An interview alone, however thorough, is not sufficiently rigorous to eliminate unsuitable candidates. By contrast, a candidate's true qualities can be revealed in a remarkably short time during an intensive selection course. The purposes of this course can be summarized as follows:

(i) To give all candidates time and opportunity to display their true qualities.

(ii) To give selection staff time and opportunity to get to know each candidate.

(iii) To teach the basic technical and organizational skills required.

(iv) To impart a spirit of motivation.

(e) Organization of Selection Course

The following factors should be considered when designing the course:

(i) The site of the course is very important. For a rural program, the course must be held in a rural area, preferably in a project area (not in a modern training institution in town). A temporary campsite is an ideal situation. For an urban program it is relatively easy to find a small institution suitable for the purpose.

(iii) The ideal number of candidates per course is about twenty. The candidates should be divided into, say, four groups of five with the leadership of each group passing in rotation around all the candidates in the group. This gives them the opportunity to display their qualities of leadership. The group system also encourages competition on the course, heightens the team concept and is also administratively convenient, so that instruction may be given either to the whole course or by groups as appropriate.

(iv) The course instructors should include the Project Engineer plus three experienced Supervisors (or Field Assistants) who should all live on site.

(f) Components of Selection Course

The course should be divided into three components:

(i) Practical Experience of tasks to be carried out by self-help.

The Field Assistants will be expected to supervise self-help labor and must have confidence that they know what they are doing. They must therefore have first-hand practical knowledge of the work to be done. Occasionally, when a particular obstacle must be removed, they will be expected to join in and lend their own muscle and expertise. They must therefore learn how to use all the tools efficiently. The most effective way of achieving this is for the trainees actually to dig and construct a latrine, trench or well, etc.

In addition, the experience of working in a small group on a specific task in competition with other groups helps to develop a team spirit.

(ii) Technical Instruction

Candidates should also be taught the basic technical skills they will be required to perform, e.g., pipe-laying, standpipe construction, well-pump installation, latrine installations, etc.

(iii) Classroom Instruction

Candidates should be instructed in project organization, labor management, work programming, reporting, interpreting plans, stores system, standard procedures, etc.

(g) Test and Final Selection

At the end of the course candidates should undergo a series of practical tests to assess their technical expertise. Marks awarded should contribute to the general assessment of each candidate by instructing staff, and a list of candidates should be drawn up by the instructors in order of merit. Only those candidates considered to have reached the required standard should be selected for employment, even if this means passing fewer people than required. Doubtful candidates should not be selected - it is usually very difficult to dismiss unsatisfactory staff once appointed and it is better to be short-staffed than to engage sub-standard personnel who may be a liability to the success of the whole program.

(h) Training Materials

It is necessary to have tools and equipment required in the course of normal duties as a Field Assistant, as well as forms, sample plans, maps, aerial photographs, etc., as required for classroom instruction. Blackboards, prepared drawings, etc. are essential. Lesson notes covering each lesson should be issued to avoid the necessity of candidates writing notes of their own. Other aids may also be useful, such as tape-recorders to improve communicating techniques in sanitation programs. Visits to completed and current projects are particularly instructive. Appropriate films are also popular and instructive.

(i) In-Service Training

The following factors should be considered:

(i) The selection course provides initial training, mainly of a technical nature. The main bulk of the Field Assistant's training, especially the development of community-related skills, comes on the job. For the first two years of employment they should be classed as trainees. Each trainee should be assigned to a more experienced Field Assistant for about a year, and can work on his own in the second year as long as he continues to receive close supervision and support.

(ii) During the project it is important to have regular project staff meetings as often as practicable, e.g., every week or two. This helps to foster the team spirit of staff and is also a prime opportunity for informal training of all staff when particular points of detail may be elaborated or revised.

(iii) Depending on the type of career structure (see next paragraph) upgrading courses should be held annually. Those Field Assistants eligible for upgrading to the next grade should take a test at the end of the course. These courses may be about two weeks in duration. Numbers permitting, all program staff (i.e., from all projects) should meet together and the opportunity should be taken to revise all standard techniques and procedures, to update and introduce new techniques in the light of collective experience, and to discuss problems of general concern. This annual meeting, when combined with the upgrading courses, is an important boost to morale and helps to keep the program staff together as a team even when they may be working in different parts of the country.

(j) Career Structure

For a national program lasting several years it is important to have a suitable career structure for Field Assistants. The Field Assistants are most likely to be Government employees, and so will have to fit into one of the existing categories of employment. It is advisable to look at similar levels of manpower in other similar development departments but beware of choosing a category that requires a higher educational qualification for progress than really necessary. It may be advisable to slot Field Assistants into an artisan scale in which promotion is governed by proficiency and ability tested by trade tests rather than by academic qualification. A possible career structure may be:

(i) Selection after two-week field selection course.

(ii) One to two years as ungraded trainee.

(iii) Two-week upgrading course and Grade III test.

(iv) One to two years as Grade III.

(v) Two week upgrading course and Grade II test.

(vi) Two to three years as Grade II.

(vii) Two week upgrading course and Grade I test.

(viii) After further years as Grade I, outstanding personnel may be selected for a Supervisor course.

(ix) Successful candidates promoted to Supervisor.

An outstanding employee could reach Supervisor in a minimum of six years.

Supervisors

8.02 The above career structure shows how Field Assistants may reach the rank of Supervisor. External recruiting of this grade of staff should be avoided except during the initial Consolidation Phases when no Field Assistants have yet attained the necessary experience. Some Governments have mechanisms whereby an outstanding senior Supervisor can transfer to the more permanent career structure with the title of "Technical Officer" or equivalent.

Assistant Engineers

8.03 A national program will need more and more engineers at professional and sub-professional level as it expands. It is important that these engineers have a thorough training in practical field work within the program before reaching senior positions. Their promotion is likely to be rapid in any case, because of the shortage in many countries of this level of staff, but degree graduates should gain at least two years field experience before joining the headquarters staff or becoming Project Engineer on a major project. Diploma graduates (e.g., from Technical Colleges) should have at least one year in the field before proceeding to further education. Those not selected for professional training can continue in charge of smaller project areas.

(a) Selection

The following factors should be considered:

(i) The Government is likely to have specific selection procedures for recruiting this level of staff. However, for self-help programs, particularly for rural areas, a more rigorous selection procedure is essential. This should include some form of preliminary familiarization course to enable candidates to see what the work involves and also to enable programs staff to get to know and assess the candidates. This course should last a few days, during which the candidates should preferably live on a project site. They may be given some simple technical tasks, such as surveying or setting out, and one or two relatively arduous tasks to see how they react under pressure of work.

(ii) By the time of the formal interviews by the Government selection board, the program manager should have formed an assessment of each candidate's suitability and should advise the interview board accordingly.

(iii) The problem arises when there are insufficient applicants for the posts available, which may happen in a country with limited production of degree or diploma graduates. In such cases it is impossible to apply a rigorous selection procedure and there is no alternative but to take the candidates that apply. In such cases it becomes of paramount importance that the newly-appointed graduates are given the utmost support and supervision to ensure that they make the most of their training period.

(b) Training

Newly-appointed graduates should have about three to six months of training before being given responsibilities of their own. The first half of this time should be spent on attachment to a specific project. It is best to appoint the trainees in pairs for mutual support and companionship, but not more than two should be appointed to each project. Their field training should be supervised by the officer in charge of the project, but they will gain most insight into the workings of the program if they attach themselves to the Supervisor on his daily routine work. They should spend reasonable time on all important activities, particularly to learn the routine work procedures of Field Assistants whom they will one day manage, and to learn the technical activities of artisans for whom they will also be responsible.

(c) In-Service Training

The Trainee Assistant Engineer should complete at least two years in a responsible field post in order to appreciate the problems encountered in the field and acquire the necessary self-confidence and experience to play a useful part in support of field operations; the post should carry as much responsibility as possible and not merely be attached to a more experienced engineer. The graduate should be given a reasonable project area of his 1/ own to manage. However, it is absolutely essential that he receives regular support and supervision and that he can exercise his responsibility within an established framework of routine procedures and standard methods. For example, instead of being told to place and construct a water supply intake he should be told to survey, say, three possible intake sites, submit sketches, plot ground and hydraulic profiles of each, and explain his reasons for choosing the best site. The engineer in charge should then visit the sites and either confirm the choice or point out other factors to be considered. The process thus becomes educational and the construction of an unsuitable intake may be avoided. This method will help develop his engineering approach and build up his self-confidence. Some mistakes will always be made, but as long as these are relatively minor they will not upset his self-confidence. If he is left without supervision he may feel unsure of himself, his mistakes may pass unnoticed and the project may run into serious technical difficulties. In this situation it may be understandable if he decides to seek a less demanding job.

(d) Career Structure

After two years in the field, degree graduates may be promoted to more responsible posts either in the field as Project Engineers or into program headquarters. Eventually, one such graduate engineer will become head of the program. Selected diploma graduates may proceed to a degree course after one year's field experience if the possibility exists. The program

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1/ The male gender in no way implies that engineers or other project staff are, or should be, exclusively male: gender equity is fully recognized by TAG.

may negotiate scholarship arrangements for this purpose. The remainder of diploma graduates will continue as sub-professional officers and will fill posts of higher responsibility as the program expands. A large program may require such experienced sub-professionals as training officers, maintenance officers, etc.

Project Engineers

8.04 Once the program is established, Assistant Engineers will be promoted to the level of Project Engineers.

(a) Selection

In the initial stages, the program may have to recruit engineers from other sectors, or, in view of the general shortage of experienced professional engineers in most developing countries, expatriate engineers may have to be recruited. In both these cases, the engineers must be personally interested in the objectives of the program and must be particularly sensitive to local technical realities and cultural conditions. It is unrealistic to expect such engineers to have detailed knowledge of the local situation but they must be willing and able to seek and interpret local advice effectively.

(b) Training/Familiarization

A promoted Assistant Engineer needs no further training, but an experienced engineer coming from outside the program will need a period of familiarization at both field and headquarters level. A new Project Engineer should be given a month, preferably working on a current project with another Project Engineer, to learn the techniques and procedures involved. He must also learn the language and the important cultural factors.

Artisans and Field Support Staff

8.05 This final category, although broad, forms the technical core of the project:

(a) Selection

The principal criteria for selection should be technical competence and reliability. They may be recruited directly by the program from within the project area or from other Government or private sources. It is preferable to select people who are familiar with the type of community to be served. It should be quite possible, for example, to find local artisans with experience in concrete and brickwork who can be taken on temporarily by the program to carry out various simple construction works. Alternatively, artisans may be employed on a contract basis, e.g., to construct a number of tanks or latrine slabs. In this case the project self-help committee may be asked to suggest a suitable builder.

(b) Training

Normally artisans should only be selected if they have reasonable previous experience in their trade. Once selected they should be attached to similar artisans already experienced in program work for, say, one month. For example, a builder could join a building team on a current project for as long as it is necessary to learn the standard designs and procedures, and then return to his own project to start work. A new pump attendant could be attached to an experienced man for a similar period. There is no real need for formal training though there is a need for close supervision to ensure the correct skills are being imparted.

IX. MOTIVATION OF STAFF

The Motivation Process

9.01 The motivation of staff is a key factor that may determine the success or failure of the program. The key person in this process is the program manager who is given the task of developing a national program. Every effort should, therefore, be made to select a highly motivated individual for this job.

9.02 Assuming such a person can be found, it is then necessary to create as many favorable conditions as possible for the motivation process to flourish.

9.03 A motivated individual will be more effective in motivating a small group of people, with whom he or she is working closely, than a large group with whom it is impossible to keep personal contact. This is another important reason why the Initial Phase of a program should be kept small. During the Initial Phase, the program manager has the opportunity to motivate a small team of staff. During the Consolidation Phase, this small motivated team selects and trains a limited number of new staff who, during the course of selection and training, are exposed to the same motivating process. This process can be repeated until a formidable, highly motivated team is gradually built up and motivation becomes self-generating.

9.04 This is a simplistic description. In reality the process takes time and patience and depends considerably on the leadership and charisma of the program manager. But the model of program development described in this paper is one that does favor this process.

Factors affecting Motivation

9.05 Some of the factors that create favorable conditions for motivation of staff can be identified as follows:

(a) Impressions Formed While Under Training

This refers to the fact that a staff member is most receptive to the motivation process at the early stages of his engagement. If his recruitment and interview are carried out efficiently and quickly, if his selection and training course are well organized and prepared, if the pace of work is set fairly high from the beginning, if his early work is supervised by the best quality staff, then he will get the impression that he has joined an impressive, dynamic, operational organization with high standards and he will find himself aspiring to achieve those standards.

(b) The Encouragement Inherent in Belonging to a Team

This refers to the team spirit which is initiated during the selection course and is fostered later by good field management, regular staff meetings and good communications between all levels of staff.

(c) A Career Structure with Promotion Prospects

Staff are naturally concerned about their job security and future prospects. Staff can quickly lose their motivation if they consider that they are in a "dead end" job. On the other hand, the prospect of gradual promotion through the grades is a motivating factor, especially if promotion is dependent on proficiency tests.

(d) Loyalty and Support from Superiors

Field staff are often faced with special domestic problems, arduous working conditions or may run into trouble either inadvertently or through their own fault. In all these situations, the staff member should have confidence in the constructive support of his superiors. In administrative matters, such as the overdue payment of an allowance, the supervising officer should actively support the field man's case with the administrators. This type of support engenders a reciprocal loyalty on the part of field staff and is undoubtedly a major factor in the motivation process. Conversely, motivation soon breaks down if salaries and allowances are not paid promptly.

(e) The Challenge of a Specific Objective

Each project should have a simple, clearly defined objective, such as to install a particular type of water supply or a certain number of latrines for a particular community in a defined area. Motivation is easier to achieve with such a specific goal than it is for, say, maintenance crews or accounts clerks. This point is also related to the fact that in many cases the execution of a project is a dynamic process, in which field staff are applying different techniques and procedures at different times and with different communities.

(f) The Degree of Responsibility Entrusted

This refers to the stimulating effect of responsibility. Provided responsibility is given gradually and supported within a framework of standardized procedures and regular supervision, field staff can be given a relatively high degree of responsibility (e.g., one Field Assistant can be responsible for a community of 5,000 people).

(g) Pressure from the Community

This is very significant in a self-help project. The Field Assistant lives and works in the community and therefore comes under strong social pressure to carry out what the community expects of him.

9.06 Clearly, there are other conditions affecting motivation in different circumstances, and different factors will need to be emphasized according to the nature of the program.

X. QUALITY CONTROL IN SELF-HELP CONSTRUCTION

10.01 There are a number of factors which will determine the quality of construction.

Task within Technical Capacity

10.02 It is possible that many self-help projects have resulted in poor technical quality because too much was expected of the community in the first place. As a general rule, self-help labor is only applicable to the very simplest technical tasks, and even these will require supervision.

10.03 In addition, the community's ability to organize itself to do the work should not be overestimated. The community organization should be assisted and underpinned by discreet support from project staff. Poor organization will inevitably lead to poor quality work.

10.04 The technical tasks of project staff or contract workers must also be well within their technical capability. Only local knowledge can decide which tasks are suitable. For example, a Field Assistant can, with a little training, become proficient at pipe-laying, but may have great difficulty in producing adequate quality concrete work. If this is so, Field Assistants should clearly not be asked to do any concrete work.

Technology-Specific Approach

10.05 It is easier to ensure quality of construction if the various tasks are carried out by specialist teams. For example, in a low-cost rural water program there may be three basic technologies, namely boreholes, hand-dug wells and piped water schemes. It is better to run three separate sub-programs, each specific to one technology, rather than a generalist rural water program in which program staff are expected to cope with all three technologies.

10.06 At a lower level, during the execution of, for example, a shallow wells project, one construction team should specialize in lining the walls, while another may specialize in casting and installing the wellhead cover. This breaking down of a project into specific tasks each with its own team of specialists will greatly help quality control at this level of work.

Standard Designs

10.07 It is essential that the program develops standardized designs for all technical construction works, whether they be pit latrines, public standpipe aprons, storage tanks, shallow wells, etc. Where designs clearly have to be tailored to each project, for example, a piped water system or slow sand filter, standardized design procedures should be laid down.

10.08 Clearly this means that the designs must be basically sound and will not need to be altered radically with experience. Minor improvements and modifications are to be expected as the program develops, but the basic design must be carefully thought out and tested during the pilot phase.

10.09 The effect on construction quality can be illustrated by the fact that a builder building his fourth tank of the same design will build a better tank more efficiently than if each previous tank was different. Even different size storage tanks can have many common dimensions, such as roof, wall or floor thickness, and wall height. This will inevitably mean over-designing in smaller tanks, but this cost is greatly outweighed by the improvement in construction quality.

10.10 There may be areas where the standard design is not suitable for some reason. In this case a special design should be carried out. However, the standard design should be one that is suitable for the vast majority of projects within the program.

Standard Procedures

10.11 Construction quality can be greatly improved by the application of standard procedures for as many of the routine or repetitive activities of the program as possible. This is particularly important for self-help projects. For example, the backfilling of an asbestos cement pipeline is a very important operation. Poor backfilling can result in cracks and bursts later as the pipeline settles. If in a rural water project a group of villagers is asked to backfill the pipeline, they will usually heap all the excavated earth back into the trench, enthusiastically but haphazardly. The soil will not be compacted and some sections of trench will not be completely backfilled, posing an erosion hazard. If, however, the self-help labor is split up into teams, the first to cover the pipe only and compact the earth, the second team following at a reasonable distance to fill half the trench and compact it, and the final team following behind to complete the backfilling, then the job is likely to be done properly. (Such a standard procedure should be instructed to the Field Assistants who should organize the labor accordingly.)

10.12 In the case of a shallow wells and handpump program, there should be a standard procedure to govern the various stages of construction. The Field Assistant should be instructed in such a standard procedure and for example, the initial excavation may have to reach a standard depth and diameter before a building team is sent to commence lining. Following the completion of the lining and the wellhead, the villagers may have to prepare a drain and soakaway pit to the proper standard before the well-pump is issued and installed.

10.13 For more specific technical operations, such as the joining of pipes for which high quality work is essential, laying teams should be issued with a standardized pack of equipment needed. The detailed sequence of pipe-joining actions should be laid down so that it becomes completely automatic.

Supervision

10.14 It is unlikely that self-help labor will achieve adequate technical standards unless it receives a high degree of supervision on the job. This supervision should come from fully paid project staff, i.e., the Field Assistants, who should be present at every major activity where large numbers of self-help labor is involved. It is not sufficient to entrust technical supervision to the community leaders. On the other hand, it is important that the authority of the community leaders is brought into play when the project staff are insisting on the desired standard.

10.15 Similarly, quality control is affected by the degree of supervision applied to project staff. With a ratio of about one supervisor to ten Field Assistants, each Field Assistant should be visited at least once a week.

10.16 Supervision is particularly important for trainees and in the early stages of a project. This will reveal at an early stage whether staff have inadequate tools, or whether the procedure they are following is wrong. For example, when a latrine construction team starts work on a new project, they should receive daily supervision for at least the first week. This may mean that the commencement of each team's work should be staggered to allow the Supervisor to supervise all the teams under him in succession.

XI. MAINTENANCE

11.01 Maintenance organization and requirements are affected by the technology selected, the quality of design and construction, the extent of community involvement and the technical and material support provided under the program.

Technology

11.02 Complex technology involving pumps and treatment plants usually requires a more sophisticated level of technical maintenance than is realistic in many developing countries. In general, simpler technologies have a lower technical maintenance requirement. However, no system is maintenance-free and simpler technologies may actually require a more sophisticated institutional base than more complex ones.

Quality of Design and Construction

11.03 The maintenance required by a system is closely related to the quality of the design and construction. In the course of a program the maintenance load of completed projects should progressively be reduced by closer attention to detail during design and by continual improvement of construction standards. Maintenance is also considerably reduced by special protective measures, such as the protection of pipelines from storm water damage. The combination of the roles of design and construction engineer is usually feasible for simple technologies and greatly facilitates the upgrading of designs in the light of construction and operation experience.

Involvement of the Community

11.04 The degree of community involvement during the construction phase can be of major significance for subsequent maintenance. The more the involvement, the greater the degree of responsibility felt by the community. However, this responsibility must be supported in practical terms by a realistic organization.

11.05 There are three principal advantages of community involvement that relate to maintenance. First, the community is already familiar with the "partnership" concept of providing self-help labor (usually) in return for technical support; it is thus relatively easy to maintain the relationship for maintenance purposes, (but unrealistic to expect the community to take over all maintenance duties). Secondly, the community is generally familiar with some of the technical operations learned during the construction phase, many of which occur again in both preventive and curative maintenance. In many cases, the community may be able to carry out minor repairs without supervision, provided materials are supplied. Thirdly, the community's sense of responsibility increases the effective surveillance of the system, and ensures that defects are reported quickly.

Technical and Material Support

11.06 A general sense of responsibility shown by the community is not enough to guarantee maintenance. Usually, the only resources the community can offer are its labor, and sometimes small sums of money. It is usually beyond both the human and financial resources of the community to carry out anything other than very minor repairs. In addition, the community is unlikely to carry out routine preventive maintenance tasks that are necessary for the continued reliability and long life of even a simple system. It is therefore the responsibility of the program to provide technical manpower and material support within an effective field maintenance organization as part of the maintenance phase.

Maintenance Organization

11.07 A program should set a full scale maintenance organization as part of the final Maintenance Phase. 1/ It is impractical to expect other agencies to take over maintenance duties as their manpower and financial resources will usually already be stretched to the limit with their own work.

11.08 The key man, as with the construction phase, is the Field Assistant, who may now be called a Maintenance Assistant. Ideally, he should be a Field Assistant who worked in the same area during the construction of the project so that he knows the technical layout and the people concerned. A Maintenance Assistant may cover one large project area or a number of small ones. He should work to a specific schedule of preventive maintenance and inspection, which should also allow him time to carry out repair work. He should hold a stock of spares and repair materials. The Maintenance Assistant may control any semi-skilled operators involved in the system such as pump attendants or de-sludging teams. Maintenance Assistants should be supervised by a Maintenance Supervisor operating from a regional or area headquarters. The overall responsibility for the maintenance organization should lie with an Assistant or Project Engineer level officer (Maintenance Engineer), depending on the size of the task.

11.09 The maintenance organization which should include a specialist repair team for those repair tasks which are beyond the ability of the Maintenance Assistant or the community (for example, the repair of intake weirs or storage tanks), should have its own transport, stores system, accounting procedures and management systems. The Maintenance Engineer should be responsible for keeping operation and maintenance records of all projects and systems.

1/ Clearly some maintenance would be required before the Maintenance Phase; this would be undertaken by the project team in addition to its construction activities.

XII. PROGRAM ORGANIZATION

12.01 The program organization will develop according to the phase of the program. In the Initial Phase the organization should be just sufficient to conduct one or two initial projects and may involve less than ten people. After ten years, the program should be in the middle of its Expansion Phase and may involve 100 people or more. It is impossible, therefore, to postulate an ideal organization applicable to any program, whether rural or urban, water supply or sanitation.

12.02 Figure 1 shows an initial organization that may be appropriate to the Initial Phase of a rural piped water program. The Project Engineer may also be the Program Manager. Administrative support may be provided by an "umbrella" organization, such as ministry headquarters. Figures 2 shows the institutional framework of the same program after about ten years of development.

12.03 The Program Manager is in overall charge of program development, particularly for policy decisions, manpower development and project selection.

12.04 The Senior Projects Engineer is responsible for the execution of current projects. He is the direct link between Project Engineers and Program Headquarters. He is also Deputy Program Manager.

12.05 The Monitoring, Evaluation and Technical Development Unit 1/ should be headed by an experienced former Project Engineer. He should have a small team of experienced staff (i.e., ex-field staff) to make construction records and to record information on current and completed projects, particularly concerning community or consumer reactions to technical features and concerning general system performance. He must work closely with the Maintenance Officer and Project Engineers. He is responsible for improving design and procedures in response to the lessons learned, and for developing new technologists as appropriate.

12.06 The Drawing Office may be run by an Assistant Engineer (after field training) whose function is to provide design facilities if necessary for field engineers. In general, field engineers should design their own projects as much as possible.

12.07 The Training Officer should be an experienced Assistant Engineer or a senior Supervisor suitably promoted. He should be in charge of running upgrading courses for Field Assistants, on-the-job training, the production of field manuals, etc.

1/ Some form of monitoring and evaluation component shall be included from the beginning of the program. In the early phases these functions could be carried out internally by regular program staff members.

12.08 The Administration Section should be headed by an Administrative Officer, with appropriate staff to handle accounts, stores and routine personnel matters.

12.09 The Maintenance Unit should be led by a Maintenance Officer who should be an experienced Project Engineer or Assistant Engineer. Maintenance field staff should be rotated with project staff to prevent the Maintenance Unit becoming a "dead-end", low-status job.

12.10 In Field Projects, each project has its own discrete organization as described overleaf. Project staff proceed from one completed project to the next in succession.

XIII. PROJECT ORGANIZATION

13.01 In self-help projects there are essentially two organizations, one for the project staff and one for the community. These are separate, although they must be closely linked.

Project Staff Organization

13.02 Figure 3 shows the typical organization of a major rural piped water project to serve about 50,000 people with public standpipes. The Project Engineer may be assisted by an Assistant Engineer in a training post. Each Supervisor supervises between 5 and 10 Field Assistants, and cover separate geographical areas of the project. Some of the Field Assistants will be trainees (i.e., within their first two years of appointment). The Field Assistants may be grouped in teams of two or three when necessary, for example for the excavation or laying of main pipelines, or may work individually on branch lines. The artisans, drivers and storeman are controlled directly by the Project Engineer (or Assistant Engineer), although the day-to-day programming of drivers may be controlled by the Supervisors.

13.03 For personnel transport, Field Assistants use their own bicycles (for which they may claim an allowance), Supervisors and Assistant Engineers may be issued with motorcycles, and the Project Engineer may typically have a one-ton truck, Land Rover or equivalent. Project transport for this size of project would be two Land Rovers (or equivalent) and access to two lorries, (typically a 7-ton tipper for construction materials and a 5 or 7-ton flat-bed for pipes).

13.04 Figure 4 shows the typical organization of three small projects in the same area under the control of an Assistant Engineer. Project A may serve about 5,000 people, Project B 15000 and Project C 3000.

Community Organization

13.05 Figure 5 shows the community organization of the typical major rural piped water project as described in paragraph 13.02. It is quite distinct from that of the project staff, although naturally there is close co-operation between the two. The community organization may vary slightly through the course of the project as the principal task changes. The organization is set up with the authority of the Chief and the District Party Chairman of their equivalents. They should call a meeting to elect the Main Committee, which is responsible for the overall management of the self-help labor programme. This committee will decide how the work should be divided up, taking into account the advice of project staff. The task, which may initially be to dig a long main pipeline, may be divided up into sections, with a number of villages allocated to each section. The Main Committee then calls upon each group of villages to form a Section Committee. This committee draws up the daily work programme and ensures that it is maintained. A committee member should be present at work each day to help supervise and provide the necessary authority to support project staff. Beneath the Section Committees are the villages themselves, which may be led by a headman, a natural leader or a village committee. The village leaders assist project staff with the supervision of self-help labor.

TYPICAL ABBREVIATED JOB DESCRIPTIONS

(relating to a Rural Water Program after 10 years of development)

1.01 Program Manager

Responsible for:

1. The overall development of the program.
2. The long term planning and orderly development of water resources to supply rural communities, in cooperation with other government agencies involved in the sector.
3. Recommendations for project selection.
4. Liaison at the appropriate level with other programs, agencies and ministries.
5. Overall manpower, recruitment and training policy to ensure adequate staff are available for the expansion of the program.
6. All expenditure and accounts.

1.02 Senior Project Engineer

Responsible for:

1. The day-to-day management of the program, particularly in support of field projects.
2. Supervision of the work of Project Engineer and Assistant Engineer in charge of projects, particularly checking designs and special construction works.
3. Procurement of all imported supplies and delivery to projects.
4. Coordination of program transport.
5. Posting of staff to new projects.
6. Monitoring progress of all projects, making regular visits and maintaining a close working relationship with field staff.

7. Conducting feasibility studies on project requests and submitting results to Program Manager.

8. Ensuring that newly appointed Project Engineers and Assistant Engineers receive appropriate training in design and field work.

9. The work of the Maintenance Engineer.

10. The work of the Monitoring, Evaluation and Technical Development Engineer.

11. The work of the Training Officer.

1.03 Project Manager (and Assistant Engineer)

Responsible for:

1. Overall management of the project.

2. Detailed design, material and staff requirements for the project.

3. Siting and surveying as required.

4. Project schedule.

5. Procurement and distribution of local supplies within the project.

6. Overall supervision of field staff, ensuring maintenance of technical standards, on-the-job training and staff morale.

7. Holding regular project staff meetings to monitor progress and problems.

8. The mobilization, organization and supervision of self-help labor, through the Supervisors and Field Assistants.

9. Supervision of artisans and maintenance of construction standards.

10. Overall control of project vehicles and their maintenance.

11. Final project inspection.

12. Establishing maintenance organization prior to handling over to Maintenance Officer.

13. Submitting quarterly progress reports to the Senior Projects Engineer.

14. Liaising with appropriate level staff of other agencies working in the project area.

1.04 Supervisor

Responsible for:

1. Assisting local leaders in the formation of the Community Organization.

2. Assisting committees and community leaders with setting up and maintaining self-help work programs.

3. Supervision of Field Assistants, monitoring their work programs and progress.

4. Special support and assistance for trainee Field Assistants.

5. Day-to-day programming of project vehicles.

6. Supervision of project internal stores system.

7. Effective distribution and use of project tools.

1.05 Field Assistant

Responsible for:

1. Execution of all tasks in which self-help labor is involved.

2. Day-to-day on-site supervision of self-help labor, particularly to maintain technical standards.

3. Effective distribution of labor on site.

4. Liaison with local committees and leaders both on and off site.

5. Specific technical operations, e.g., pipelaying, standpipe apron construction.

6. Interpreting simple plans, such as pipeline routes on aerial photographs.

7. Procurement of supplies within the project stores system as required.

8. Submission of work programs and reports to the Supervisor.

COMPARISON BETWEEN SELF-HELP WATER SUPPLY AND SANITATION PROGRAMS

	COMMUNITY WATER SUPPLY	ON-SITE SANITATION
1.	Usually greater felt need - therefore easier motivation of community; greater political impact.	Less identifiable felt need; less political impact.
2.	Suitable for mass community activity (except boreholes). The consumer unit is the community.	The consumer unit is the household.
3.	Community factions may jeopardize whole project.	Effect of community factions more limited.
4.	Likely to involve less socio-cultural problems.	More complex issues socially and culturally.
5.	Usually more complex technically.	Technically simpler, though detail may be more important.
6.	Sometimes designs not easily replicated (e.g., reticulation systems, treatment systems, etc.)	Designs easily replicated.
7.	Easier to upgrade system (if allowance made in design).	Latrines less easy to upgrade.
8.	Can offer great economies of scale.	Limited economies of scale.
9.	Project may take years to construct; community motivation must be sustained longer.	Latrine may be built in a month or less. Householder motivation easier to sustain.
10.	Project duration may be shorter for a given population.	Project may take longer before every household served - project effort must be sustained longer.
11.	More vulnerable to system breakdown - breakdown could affect whole community.	Less vulnerable - effect limited to one household.
12.	Communal facilities usually acceptable.	Communal facilities may not be acceptable.

	COMMUNITY WATER SUPPLY	ON-SITE SANITATION
13.	Has potential benefits other than public health.	Benefits chiefly limited to public health.
14.	Facility potentially available to whole community.	Children and older people might not use latrines.
15.	Program can succeed with relatively fewer complementary inputs.	Program needs more complementary inputs (education, extension, propaganda, etc.).

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