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PLANNING, IMPLEMENTING AND EVALUATING COMMUNITY WATER PROJECTS

IAN-45922

Working Group 1

Introduction

Planning, implementing and evaluating community water porjects, broadly defined, encompasses the necessary actions to bring projects from conception to completion. Done properly, the process should yield a project capable of meeting its objectives, both long-term and short-term. These three major elements, i.e, planning, implementing and evaluation, are not discrete activities, but mutually reinforcing in the long run. Their continuing review leads to improved policies and strategies and ultimately better water services to project beneficiaries.

Because much information and guidance is available for this sector on planning and implementation, but very little on evaluation, this report focuses largely on policy and evaluation.[1]

Essential elements in this pre-project process include (1) identification and consensus in re:

- project objectives
- available resources
- intended beneficiaries
- government and community support for the project(s)
- economic and technologic options
- range of acceptable levels of service

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[1] Evaluation, i.e., ex-post evaluation, is one part of project management which also includes ex-ante evaluation, i.e., appraisal, on-going evaluation, i.e., monitoring, and financial review during and after the project, i.e., auditing. In the context of AID development of sector policy and strategy, it is ex-post evaluation at issue here.

- human and institutional resources
- physical resources, especially water
- complementary resources and possible constraints
- scale, timing, and staging possibilities

Key Issues in Planning, Implementing and Evaluating Community Water Supply Projects

1. Political: Is the Government committed to the success of the project? The host country commitment to provide resources and qualified personnel is considered necessary over a long period of time to sustain the program.
2. Social: Is the community committed to the success of the project? Communities should be aware of the costs and benefits of the system provided and be involved in the project from the very beginning. Tariff should be applied.
3. Financial: Is there sufficient cash or other financial resources available to fund the project? Donor assistance?
4. Technical: The technology used should be manageable by the local institution and above all by the communities. Equipment should be locally manufactured wherever applicable.
5. Institutional: There should be a local institution that is responsible for construction, operation and maintenance.
6. Objectives: Should abstract or achievable objectives be set up? Abstract objectives with indicators of a decrease in the mortality rate and the such are proved to be non-practical in verifying the success of a water supply project.
7. Associated Programs: Water supply projects would be more likely to succeed if they were a component in a program that included health education, sanitation and education in the proper methods of collection and storage of water.

8. Benefits: What benefits will the project generate? More convenience, time savings are considered as the more apparent benefits while the benefits to health although believed to exist are unproven.

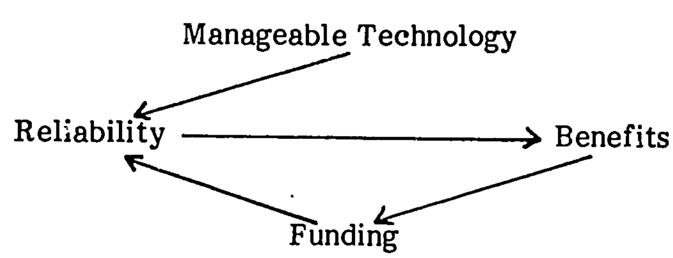
Reliability and Benefits Models

A reinforcing mechanism seems to exist between reliability and benefits. The mechanism is the willingness of the communities with water systems to provide the necessary funds for their operation.

The capital funds are generally beyond the financial means of the rural resident. The rural residents may not be able to assess the benefits they will reap till the project is implemented, and it is evident that the benefits outweigh the running cost, thus capital funds will have to be secured from other sources.

The reliability and benefit relationship with funding is illustrated below.

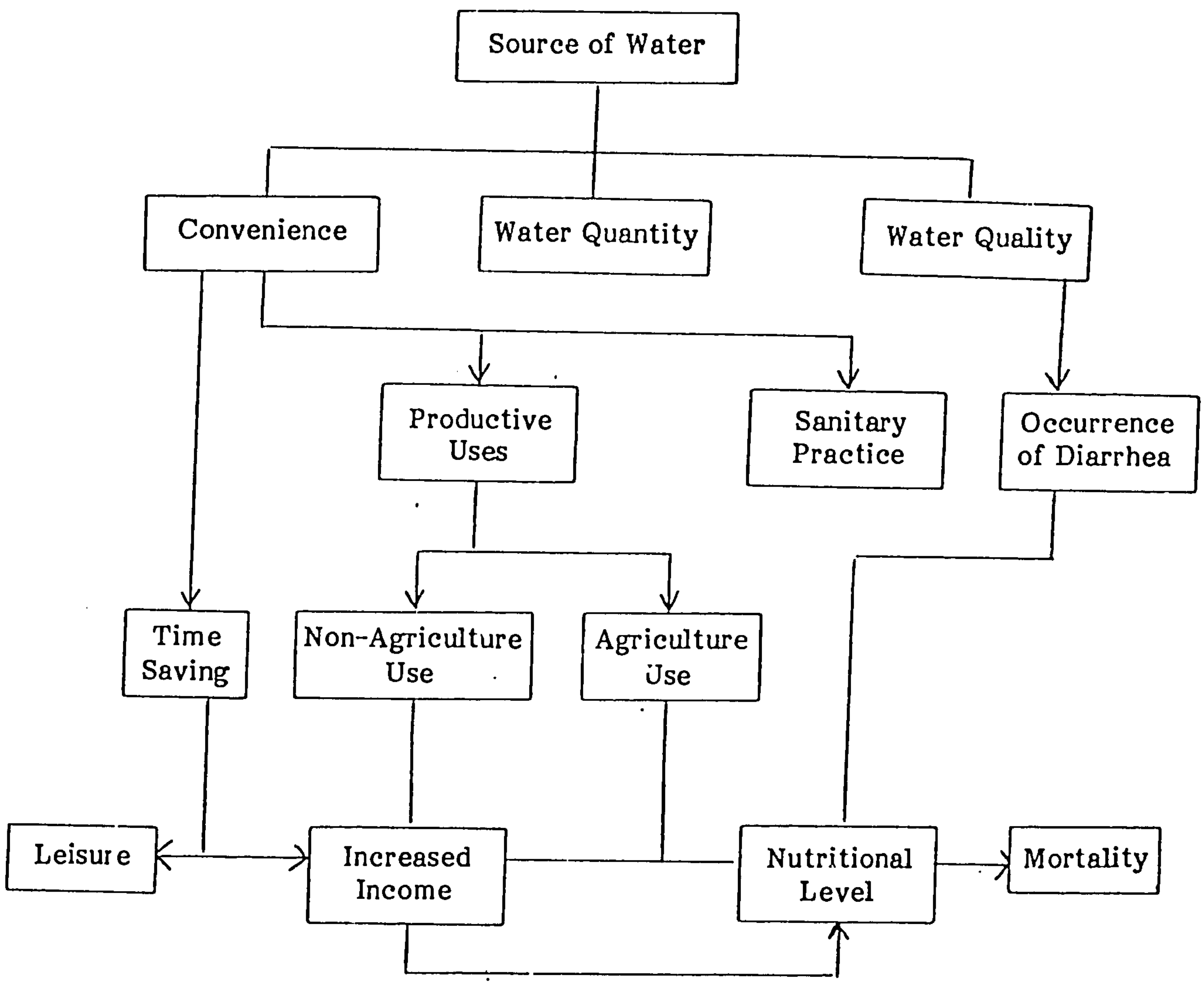
Figure 1. Reliability Model



Funding is an important parameter and is a function of cost. The cost element is directly related to the technology selected for a particular situation to produce the most reliable system. Based on field data, it is interesting to note that the reliability of a rural water system is not a function of the level of technology used; this finding contradicts the view that simple systems are reliable and complex systems are less reliable. A balance between the inputs of the reliability model is desirable to produce the most effective system.

The benefits reaped from a rural water supply system can be illustrated in the figure.

Figure 2. Water Benefits Model



We generally agreed that major benefits are to be gained from improved rural water supply systems, but it is extremely difficult to measure or quantify such benefits. Furthermore, benefits tend to appear not all at once, but build up and become evident over time.

Benefits from a community water supply system can be impaired through inadequate consideration to possible negative effects resulting from the introduction of water supplies. Under certain conditions these potential negative effects include serious wastewater accumulation, land salinization, degradation of grazing pastures leading to lower productivity, and deterioration of the environment and public health. Such effects can stem from design aspects of the system or from subsequent water management practices that would seek to optimize the benefits due to convenience and quantity. The quality of water will not necessarily enhance the health conditions unless the whole water supply, delivery, storage system and end use practices are hygienic from the public health point of view.

Utilization of Limited Donor Resources

AID cannot possibly respond meaningfully to the full scope of rural community water supply needs with village or local level projects. Therefore, we should seek to direct resources toward the development of two types of host country (national) institutions which are essential but missing in most developing countries. These are:

1. A financial institution which will provide a source of loan capital to cover all or a part of the construction cost; and
2. A technical organization to provide assistance in planning, design, construction, operation and maintenance.

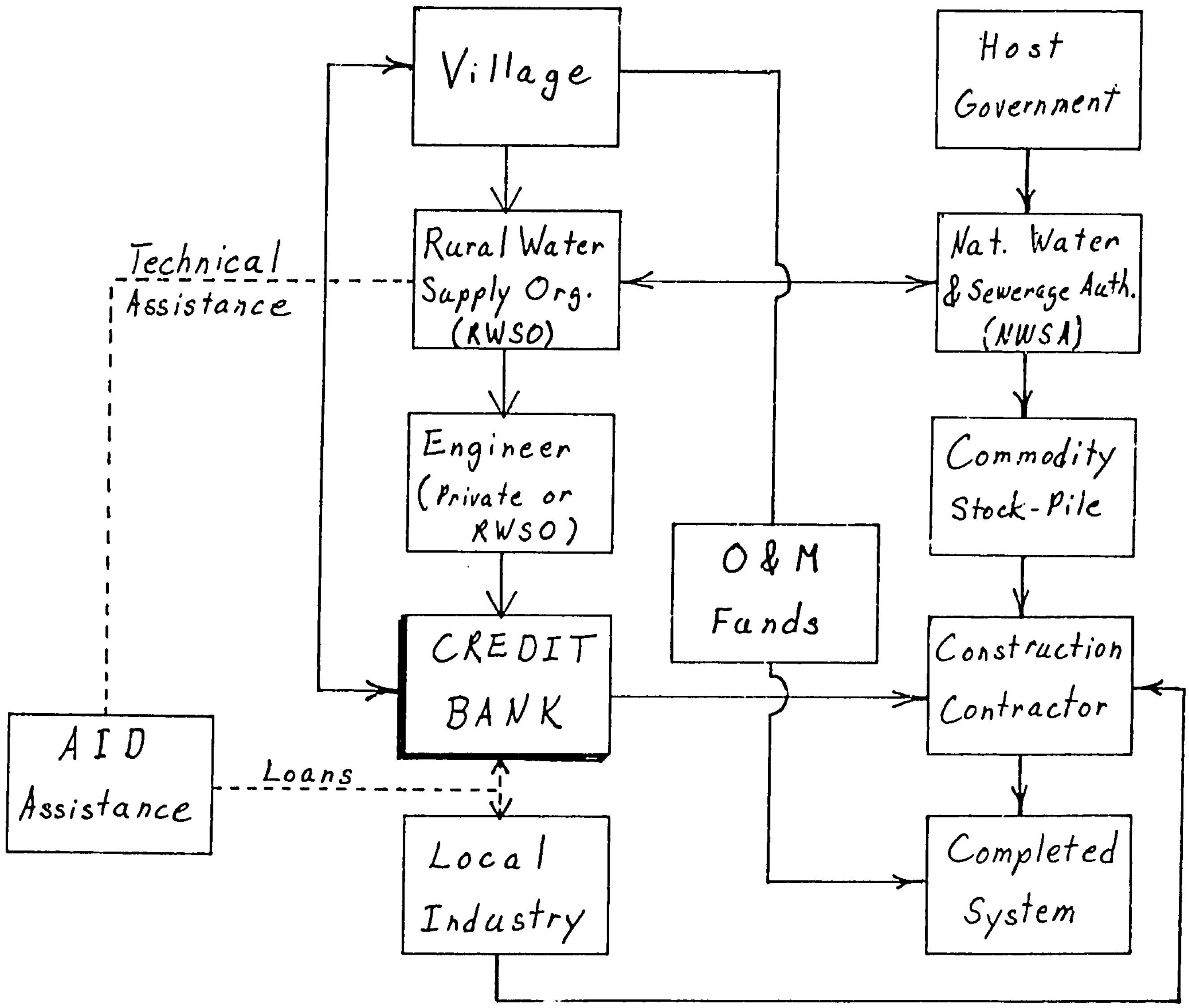
The financial agency should be an existing national development bank or the like which would administer a special water supply and sanitation fund. The fund would be administered on a sound financial basis so that the capital would be maintained through loan amortizations.

The technical organization would provide the required expertise in all phases of water supply system planning as well as its design. It would supervise the construction to assure adherence to the required standards and most important, operate and maintain the system or provide assistance which would assure a continuously operating system.

AID input would include loans to the national water supply fund, technical assistance to the technical organization and training opportunities for selected personnel.

Organizational relationships are shown in Figure 3 below.

Figure 3, Institutional Model



Policy Implications

The working group reviewed Section 6, Policy Implications, of the Conference Working Paper. In the light of the collection professional experience of the working group, the following comments are made:

Recommendation No. 1

"AID should fund rural water projects primarily from the rural development account." The group accepts and supports the underlying intent of this recommendation, which is to broaden the funding base for water projects in terms of AID's legislative framework. The recommendation as written, however, might be construed to mean that all projects, including urban or housing guarantee projects, should be funded from the agriculture/rural development account. Accordingly, we recommend the insertion of the words "rural community" between "fund" and "water," to make it clear that we mean rural projects. At the same time, the present language would not exclude funding of rural water projects from health account, HIG, ESF, or other sources.

Recommendations No. 2 and 4

The working group recommends that these be put in terms of a single recommendation, which would be as follows: "Water projects should be designed with the goal of their being self-supporting, with some measure of capital recovery if feasible, preferably through direct payment by the beneficiaries or though some form of cross subsidy. When feasible, funds collected for operation and maintenance should remain with local water systems."

Recommendation No. 3

The working group does not believe it is realistic to assume that the regional bureaus will relinquish responsibility for review/approval of projects. Further, at this time, there does not exist a specialized sector review mechanism, and its establishment for the rural water supply sector would lead to demands for similar mechanisms in other sectors. The working group suggests that this recommendation be re-worded as follows: "The Agency should establish an advisory inter-bureau water professional group that would control sectoral policy/research/evaluation, and seek to develop guidelines for programming rural community water projects."

Recommendation No. 5

The working group accepts and supports this recommendation without modification.

Recommendation No. 6

The working group accepts and supports this recommendation without modification. We sould add the comment that separate hygiene and health education programs should be designed to complement water projects where the latter show promise of making a major difference in the availability of water.

Recommendation No. 7

The working group does not agree with this recommendation. Whether or not latrine/excreta disposal projects can be designed and implemented separately from water projects depends on the density of the population being served, physical characteristics of the project zone and per capita water use.

Recommendations No. 8 and 9

The working group believes that these recommendations are unimpeachable, but are so general as to have little practical value. The question of hardware development (Recommendation 9) would appear to be a subset of the appropriate technology area.

The working group wishes to attach as Annex A the paper "Planning and Evaluating Community Water Projects" by WASH Project.

WASH Project
January 1982

PLANNING AND EVALUATING COMMUNITY WATER PROJECTS

Planning is a process of determining the actions necessary to achieve intended objectives. Evaluation is a subset of the overall planning process which has the purpose of assessing the results of past actions in order to guide future actions. Both the broad-based planning process and the more narrowly-based evaluation activities are essential elements in community water supply development.

The entire planning process can be viewed as a continuum involving the following eight sequential steps:

1. Identify the problem.
2. Formulate objectives.
3. Collect data.
4. Generate alternative solutions.
5. Select and design final solutions.
6. Implement the project.
7. Operate and maintain the project.
8. Evaluate the project.

Ideally, the evaluation step, in turn, leads to the identification of new problems and the subsequent continuation of the planning cycle.

Community water supply systems have been the subject of concern and activity among international development organizations over the past quarter century. Weaknesses in the planning and evaluation of these systems have been major contributing factors in the poor performance and even failure of many programs and projects. What is often lacking in planning and evaluating community water projects is an appreciation of the broad range of relevant issues and a familiarity with systematic procedures for addressing the most important of these issues. In other words, planners and evaluators have generally underestimated the complexity of the development problem and have had poor analytical tools to work with.

The range of issues important to both planning and evaluation includes the following six feasibility areas:

1. Technical: Does the project physically deliver the desired quality and quantity of water?

2. Economic: Does the project produce sufficient benefits to warrant the cost of expended resources?

3. Financial: Is there sufficient cash or other financial resources available to pay for the project?

4. Political: Is the host government committed to the success of the project?

5. Social: Is the community committed to the success of the project?

6. Institutional: Are there organizations available to support the project at all stages of its development?

Each of the above feasibility areas must be thoroughly considered in system planning. If any area is found to be infeasible, project success will not be possible unless the limiting constraints are overcome or the project itself is changed.

One of the most difficult phases of the planning process is the initial conceptualization that precedes formal planning and design. The planner needs to be able to quickly review those aspects which will allow him to judge the merits of a potential project before major planning resources are committed to it. The following five-step procedure is recommended for field offices responsible for program formulation:

1. Identify the problem in terms of the general development objectives of USAID, the local community, and the national government.

2. Determine the socio-economic status of the community in terms of prevailing levels of education, existing health conditions, and average household income.

3. Select a water system having a level of technology that is appropriate for the existing problem, the relevant development objectives, and the estimated socio-economic status.

4. Determine the infrastructural, material, and personnel support conditions necessary for the selected water system. These support conditions will include (1) those already existing and available, (2) those to be generated by complementary (or additional) benefits, and (3) those subsequently induced by the presence of existing conditions and complementary investments.

5. Estimate the benefit potential of the project in terms of (1) immediate behavorial changes in the community, (2) long-term health, economic, and social impacts and (3) changes in support conditions.

By using the above procedure, the planner should be able to progressively eliminate infeasible or impractical project proposals. Those proposals which successfully pass through all five steps, therefore, have high potential and merit detailed planning and subsequent development.

Evaluation is basically the measurement of changes caused by the implementation of a project. In community water supply systems, there are three sequential levels of change that can occur:

1. System operation, involving physical improvements in the system itself. The operational changes can be assessed in terms of better water quality and quantity, as well as greater accessibility to and reliability of facilities.

2. System performance, involving the degree of usage of the facility. These represent behavioral and institutional

changes in the community. The former may consist of changes in water use and consumption rates, while the latter may include changes in local committees, support organizations, and local maintenance procedures. System performance benefits are achieved through user education plus actual usage of the facility plus a community response to the need for system support.

3. System impacts, involving the long-term desired benefits of improved health, economic, social well-being, and environmental quality changes. These impacts are dependent upon the behavioral and institutional changes occurring at the performance level. In most cases, there must be a variety of complementary inputs to allow the water system to achieve the ultimate impact stage. Health impacts may include reductions in fecal-oral diseases (cholera, typhoid, ascaris, ankylostomiasis, schistosomiasis, and various gastrointestinal disturbances), mosquitoe-borne diseases (malaria, filariasis), and skin infections (tinea, scabies, onchercerciasis). Economic impacts include decreased water costs, reductions in medical expenditures, and increased agricultural productivity. Social well-being impacts include greater convenience, improved social status, increased community involvement, and strengthened community institutions. And finally, environmental quality impacts may consist of improved surface drainage, higher quality groundwater, and decreased rodent and insect populations.

Although a primary function of community water systems is to produce benefits, it is not always a simple task to show that benefits have actually occurred. This is especially true in the case of system impacts, which are especially difficult to measure in the rural environments of most developing countries. Enormous efforts have been made over the past twenty years to measure and quantify the health, economic, and social impacts of community water supplies. The results have generally been disappointing as very few studies have been able to conclusively show direct causal relationships between water projects and ultimate system impacts. To some individuals, this has been the basis for a rejection of further investment in community water systems. To others, however, the inability of investigators to find strong benefit relationships is less a failure of water projects to produce benefits than it is a reflection of the immense difficulty of measuring causal linkages in complex human communities.

The experience of past impact studies and the current awareness of the complexity of impact interactions has resulted in several conclusions:

1. No impacts universally occur in all projects.

2. Impact interactions are sufficiently well understood to allow the formulation of preliminary planning models.

3. The provision of water facilities alone is not sufficient to produce significant benefits.

Given the difficulties in assessing ultimate project impacts, it would be better for planners to set their sights on the relatively easy-to-measure behavioral and institutional changes that occur at the system performance level. Such changes are readily observable and occur in a relatively short period of time. Since these behavioral and institutional changes are essential links in the achievement of ultimate system impacts, their adoption as primary objectives for both planning and evaluation purposes would allow, for the first time, the direct measurement of project benefits, and thereby help to promote increased water investment.

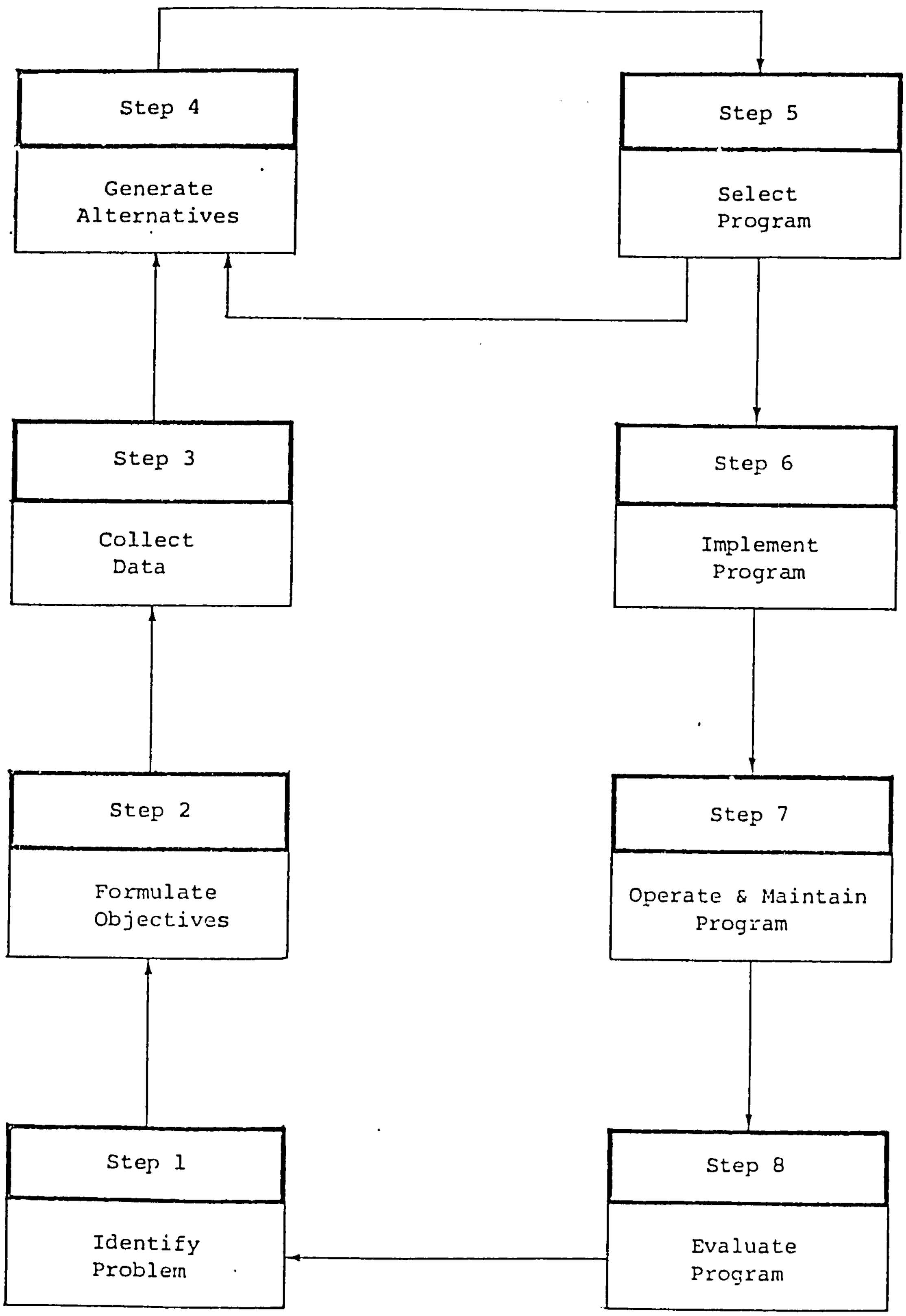
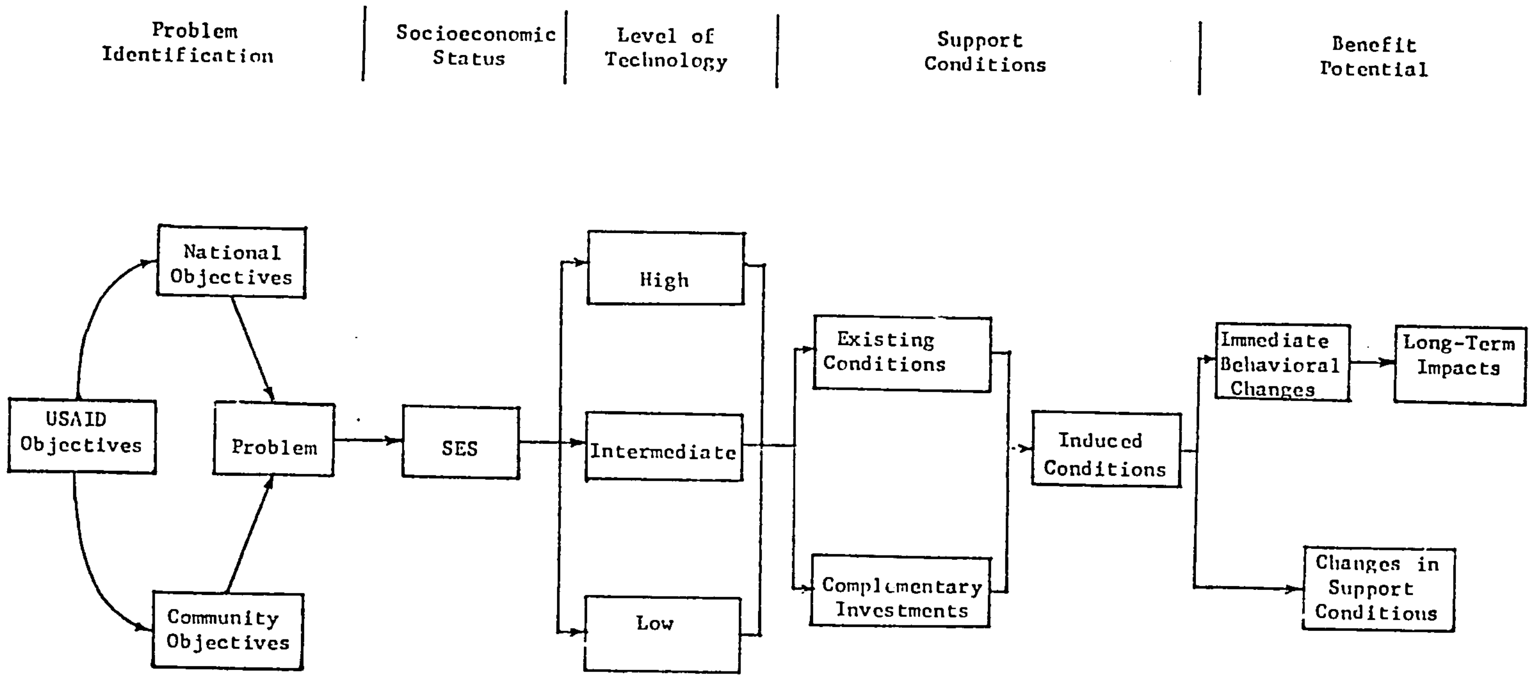
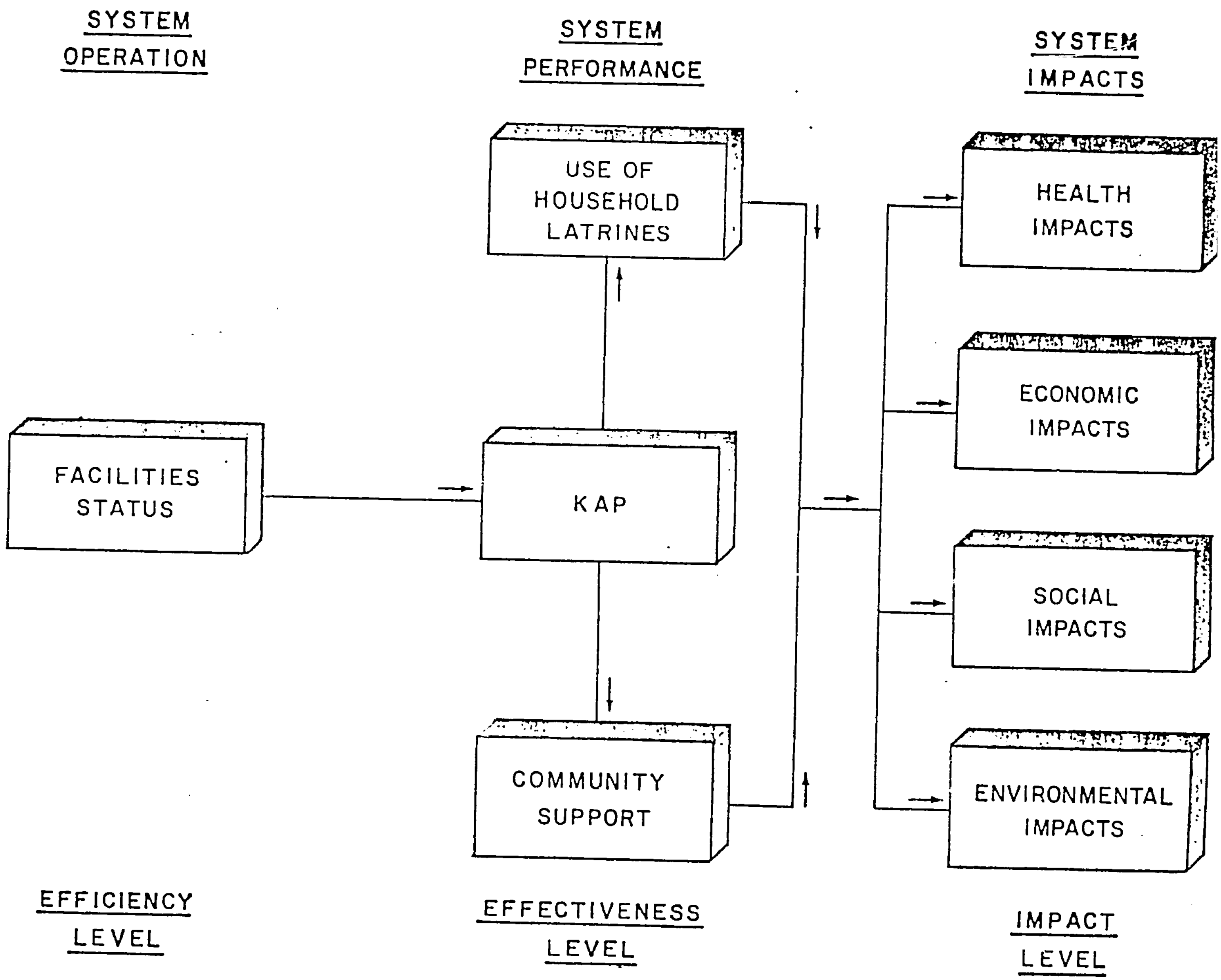


Figure 1

General Planning and Development Model



Model of Social and Economic Preconditions in Program Development



Assessment Model for Water and Sanitation Impacts.

FUNDING AND FINANCING WATER SYSTEMS

Working Group 2

Introduction

Water and sanitation systems are costly undertakings involving significant capital, as well as continuing maintenance and operation expenditures. To date, national governments have been heavily involved in building and sustaining systems, although the record on maintenance and operation is dismal. The difficulty in system upkeep stems largely from: 1) a lack of local involvement in and responsibility for water (and sanitation systems); and 2) the need to rely on national government resources and interest to maintain the existing system. However, given the increase in LDC populations, the need to expand and continue water and sanitation systems, and stagnant government budgets, some form of financing other than government revenues is essential if water and sanitation systems are to be viable over the long-term.

Generating revenue from users who want water systems can replace or supplement government resources and involves beneficiaries in decisions on locally appropriate technology, site selection, fee structures, future expansion, and allows local control over maintenance and operation. In effect, communities (or individuals) identify what kind of water system they want and are willing to support, simultaneously making continuation of the system viable.

Sanitation systems are more difficult to finance because demand for such service is low; however, technologically sophisticated systems are only necessary in densely populated areas as public health measures. Hence, expenditures for water may subsidize sanitation in urban areas, which will continue to claim national resources at least for the short-term.

\b

Cost Recovery Guidelines

There is no inflexible rule as to the level of cost recovery desired. As a general rule, the cost recovery policy adopted should be consonant with the host country's policy unless it is clear that application of that policy will be a burden on the intended beneficiary. Therefore, the financial capacity of the recipient must be established with reasonable assuredness to determine how much of the life of project costs can be borne by the recipient.

Certain guidelines should be considered in establishing the cost recovery program. These are:

1. For household water supply projects, full cost (capital and recurrent) recovery should be the goal. Rates should be structured to include cross subsidization so as to allow minimum consumption requirements at affordable costs to the lowest income level beneficiary.

2. For non-household water supply projects the target for recovery of costs, over and above O & M costs, should be maximized but not subject to any predetermined level.

3. Consideration should be given to providing maximum subsidy to sanitation projects because demand for such systems is insufficient to cover total costs. The minimum requirement is that O & M costs be met.

4. The mechanism and timing of collection should be project-specific, recognizing that house connections represent a significant project cost and that full cost recovery is desirable.

AID should carefully examine the financial arrangements between a central government and the project's operating entity, particularly in those cases where there are reloans or payment by the operating entity to the cen. al governemnt for donor and/or central government grants to a project. AID should not, in general, agree to subloans with a substantially shorter term and a significantly higher interest rate than the

AID loan. The cost of funds to the Government is a useful guide on Government-granted funds. To the extent possible, the term of the agreements should equate to the life of the asset (.0) financed.

Minority Opinion Regarding Charges

To the extent that rate structure can generate revenue above and beyond capital and operating expenses, AID should encourage the reinvestment of those funds into new water projects or systems extension.

Conservation

In seeking to design water systems that people value and are willing to pay for, (i.e., systems that increase quantity and/or convenience) communities and project designers must recognize that the systems will also increase consumption. In most areas in which AID is working, conservation should be strongly encouraged to preserve scarce resources, to keep a lid on the capital costs of a system, and to minimize negative impacts on health and aesthetics which result from wasted water. In some cases the need to conserve may limit the amounts of water the system can deliver. Conservation may be encouraged by limiting access to or the convenience of a system or it may be controlled by restricting water flow. Price structures and rates charged (such as increasing block rates) are also legitimate tools for encouraging conservation.

Subsidies in Community Water Supply Projects

Projects for the lower income sectors of the population will normally require direct subsidies from central or local governments or indirect subsidies from the most affluent sectors of the community.

For simplicity reasons, only the following two types of beneficiaries will be considered in this analysis:

- City Slum Dwellers
- Poor Rural Villagers

City Slums

The population of the slum areas generally has a much higher cash income than the peasant population. However, it will also require more sophisticated and costly water systems (including sewage disposal) which will generally require some sort of subsidy.

One common way of financing slum water systems is through sub-loans to the beneficiaries for the total cost of street distribution lines, house connections, and where applicable, meters. Central and local governments or city water authorities usually provide the capital financing from grants, development loans or their own resources. The government subsidy would generally include the coverage of the repayment and foreign exchange risks and administrative costs. In addition, the cost of the major infrastructure facilities will not normally be included in the sub-loans. These may consist of intake and treatment facilities, and truck lines. The cost of these should be recovered through the city-wide water rates. Thus, the higher income sectors of the city — which consume more water and normally are charged with higher rates — will subsidize the provision of water to the slum areas.

Rural Villages

Since most of the rural villagers have a subsistence economy. The government subsidy will have to be higher. The community contribution will normally include free unskilled labor and native materials. In certain instances, it may also include some cash contribution. Imported materials, supervision and skilled labor will generally be heavily subsidized. Although it is desirable that upon completion of system construction the communities should assume full responsibility for operation and maintenance, some inescapable subsidies may still be required for planning periodic inspections, assistance in major repairs and provision of spare parts.

A number of evaluations of water supply and sanitation projects have shown that a major contributing factor to the success or failure of a given project is the manner in which a cooperating government establishes a structure or institution to carry out the program. In programs which have not had much success, no single organization/institution has been vested with responsibility for the program. Either the responsibility becomes blurred within a ministry or it is spread through a multiplicity of ministries, agencies and authorities so that "everyone is in charge and nobody is responsible. Experience has shown that early in the planning stages of water supply and sanitation projects the Donor Agency must locate a cooperating country institution which will assume the local responsibility for the project. The format will vary from country to country. In some instances a central government agency, in others a regional government agency, in yet others a semi-autonomous or fully autonomous entity.

The chosen institution assumes the responsibility for carrying out the detailed coordination and planning of the project. In collaboration with the Donor Agency the local institution:

1. establishes criteria for:

    - site selection and determination of types of systems and levels of service to be supplied. This to be done by consulting with the user public and determining which types of systems and levels of service they are able and willing to pay for;
    - establishment of rate structures; and

- establishment of a mechanism to collect user fees.

2. establishes, in cooperation with user organization at the village/neighborhood level, mechanisms for carrying out operations and maintenance of the systems installed.
3. It is of great importance that an adequate operation and maintenance is provided for any water supply system. Such funding must originally come from the donor and must cover the cost of spare parts, such spare parts must be available in the area at all times and should eventually be produced in the country itself. It is also important that the donor make funds available for continuous maintenance of the project until such time that satisfactory assurance has been obtained for a continuing satisfactory operation and maintenance of the project.

   Many good projects have failed due to lack of financial support of O & M. The importance of such support should not be overlooked in the original planning of any water project in a developing country.
4. undertakes the training of those individuals who will be responsible for carrying out O & M and furnishes technical assistance as needed.
5. assures the availability of needed spare parts and a system of resupply to the local operating agencies.

If adequate local institutions are not found in the cooperating country it is essential to establish them as a pre-requisite to implementing projects.

Community Participation

Experience has shown that project success is closely related to the degree of community participation in its planning, design, construction, operations and maintenance phases.

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Involvement of the community during the planning and design phases will allow the project proponent to better understand what the community desires and is willing to pay for. Lacking this input, the designer may make the mistakes either overbuilding (e.g., placing in-house water systems to a poor community) or underbuilding (e.g., placing hand pumps in a semi-urban community that already has equally convenient, reliable sources). Community participation may also be valuable in helping the designer to aovid mistakes which have already been made or which might be avoided with better knowledge of the local conditions. For instance, in a rural situation the location of a shallow aquifer may be identified by local lore; in a semi-urban situation problems occuring with certain types of pumps may be identified and avoided. Nevertheless, most of the technical inputs to a project will most likely come from outside sources.

Community participation along the construction phase of a project may come as cash, labor, and/or other resource inputs. An unsophisticated rural system may require outside capital investment but should involve at least labor of the local community. On the other hand, a relatively sophisticated urban system may not be able to draw on the local unskilled labor pool, but should instead require at least partial financing of the local population.

One of the most important areas for local contributions is that of operation and maintenance. While regional and national governments may be the major realistic source of loans/funds for the capital costs of water supply facilities, there is broad consensus that operation and maintenance should be supported to the maximum extent possible by the local community. It may furthermore be desirable for all parties to share the costs of institutional and infrastructure development and that of training personnel. In practical terms, however, these costs probably will have to be born by the regional and/or national government.

Sanitation

While recognizing the need to integrate certain sanitation and health education elements into water projects, from an economic/financial perspective, those interventions need to be subsidized and therefore should be limited to what is essential to protect health and the environment.

Improvements to sanitation are increasingly essential as population densities increase. Indeed rural areas may not need to invest in sanitation systems. They are extremely expensive to construct and to maintain, and are not perceived as benefits by the individual users. Rather health improvements are imposed on water project designs to protect the community as a whole.

Recommendations Regarding Water Supply and Sanitation Project Financing

AID should assure that the following criteria are fulfilled before making a final commitment to fund a water supply or water supply and sanitation project:

1. The level of the system (well, hand pump, community fountain, household connections) should be affordable by the beneficiaries and appropriate to their expectations as well as their ability to operate and maintain. This implies the need to closely involve the community in project planning and implementation.
2. Users should always be required to contribute in cash or kind to the costs of maintenance. In the case of simpler systems (e.g., wells, hand pumps) they should also contribute cash, materials or labor to construction costs.
3. The rate structure and specific funding and financing responsibilities (institutional and individual) should be established before the project commences. There must be a clear understanding of and agreement to financial responsibilities by AID, the host government, local governments and agencies, and beneficiaries before construction begins.

4. All Water Supply and Sanitation Project Papers should require strong economic and financial justification, particularly with respect to the issues of recurrent cost financing and system maintenance. Project Papers which do not provide adequate evidence of financial sustainability and local absorption of recurrent/operating costs should be rejected.

5. Water Supply and Sanitation projects should contain provision for a strong technical institution or authority which oversees construction and establishment of local water systems and which serves as a source of assistance to communities and users associations once they become responsible for on-going operations and maintenance. Wherever possible, existing institutions should be used; where necessary, new ones should be created.

Recommendations Regarding AID Water Supply and Sanitation Funding

1. Although this paper has emphasized financing of projects rather than AID funding in the sector, it was the consensus of the working group that AID should recognize the multiple benefits of water supply and sanitation projects and thus permit them to be funded from the Food and Nutrition (FAA, Section 103) Account as well as the Health (Section 104) Development Assistance Account. The working group concluded that this recommendation reflects the general sense of the conference that the health budget of the Agency is inadequate to support even a small proportion of the U.S. commitmenet to the U.N. Water Decade, and that other sources of funds will be required if AID is to make more than a token contribution to this international endeavor.

2. While co-financing of water projects is often desirable (e.g., where AID finances software and R & D efforts while the international lending institutions fund larger-scale infrastructure), where it is not feasible AID should

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seek to promote the fullest possible coordination among donors in order to prevent major conflicts of policy and/or approach from arising.

3. AID should seek wherever possible and appropriate to encourage the development of private loan financing with U.S. Government guarantees as an alternative to conventional loan and grant financing (ESF) of water supply and sanitation projects.

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UTILIZATION OF APPROPRIATE TECHNOLOGY

Working Group 3

Introduction

The supplying of water and sanitation services to those who lack them is the objective of the Drinking Water and Sanitation Decade. A useful concept is that we deal with a continuum of services ranging from no water and no life to an adequate supply of water of a satisfactory quality.

Appropriate technology is the most cost-effective, feasible and acceptable means to provide community water supply and sanitation services that the users and appropriate authority can afford and are both willing and capable of operating and maintaining. It is a technology that works and will keep working. It contemplates the simpler, more easily maintained equipment and systems and requires that the services are convenient and accessible, and reliable.

(Truly appropriate technology must be carefully designed, properly constructed and capable of reasonable maintenance.)

Issues

Is it realistic to expect central governments to completely finance the maintenance and repair of local water systems? Selection of a water system technology which is based on the maintenance capability of the community is more likely to be viable.

Is it possible to provide a pre-selected appropriate technology which will always be successful? The failure of water systems is more often caused by human action (or inaction) rather than selection of a particular technology.

Rainwater as a supplemental low cost source of drinking water may help to reduce the need to improve the quality of the existing water systems.

Discussion of Types of Systems

1. Rainwater

- Private cisterns

  PRO No pumping system required

  Gravity fed most desirable

  Water located at user's house

  Always easily accessible

  Low-cost

  CON Sufficient rainfall not always available

  Supplemental system

  Inlets need proper protection

  (Rainwater separators to reject first rain)

  (Clean roof and paint with lime)

  Concrete or rock needed

  Leaf roofs not useful for rainwater collection

  Cost may be prohibitive for private systems

- Private small system with natural catchment area (i.e., rock outcrop where drainage low)

  PRO Low cost for overall maintenance

  CON More polution

  Often clearing

  Lower quality water

  More land area

- Communal public underground system with paved catchment area

  PRO Adequate storage more likely

  CON Public maintenance may be more difficult

  High cost per cubic meter

  Requires management structure

  Routine disinfection

- Natural public catchment area

  PRO Less expensive than communal public underground system with paved catchment area (cheaper with neoprene)

  CON Quality much more doubtful

  More maintenance

  Least desirable option (except where natural remote rock catchment area exists — Kenya)

- Springs (temporary) ground water

2. Surface water (can be classified in other araeas)

With infiltration galleries

Rivers

- Dams (small ones in rural areas)

  PRO No pumping, gravity-fed

  Minimum maintenance

  Multiple uses with extraction

  CON High cost construction/maintenance

  High skilled technicians

  High materials

  3-5 meters minimum

  More vulnerable to pollution

  Vector breeding ground (if not properly managed)

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Water hyacinths

(Sub-surface dams is a technology which may be appropriate especially in arid areas)

Can be done with hand labor

Tanzania, Algeria, Tunisia

- Extensive geological knowledge required

3. Ground water

- Springs (upland and lowland)

PRO Gravity-fed (may not be if at sea level)

Usually good quality

Low cost construction and maintenance

CON Could be highly mineralized

Create problems for sanitation

Need to avoid filtration to prevent contaminate source by taking distribution point far enough away

Dangerous (cannot) increase quantity (don't mess with mother nature)

Proper design and development required

- Shallow hand dug wells (open), large diameter over 15 inches

Traditional: with rocks

Prefabricated: with concrete rings

PRO Generally cost and maintenance-free

Cheap if less than 7 meters deep (because of voluntary labor)

Can use alternative materials

Increase yield by infiltration galleries into it

CON Contamination potential greater than deeper wells

(Danger cave-in unless cement rings used)

Expensive over 10 meters deep

Water quality more subject to contamination than deeper wells (Jack does not agree)

Definition shallow wells: below 10 meters becomes expensive; other technologies should be considered

- Deep Hand Dug Wells

(more than 7 meters)

Generally so expensive that other methods should be considered

Problem 3,000 TDS (total disolved solids)

- Drilled well or boreholes

Hand drilled or machine drilled and cased with PVC or steel casing

Manual drilling good to 25 meters

Percussion drilling 40 meters

<u>PRO</u> Simple tech

Manpower readily available

<u>CON</u> Requires more equipment

(Requires pumping system)

Takes longer to repair

Requires continual maintenance

- Machine-drilled bore holes

<u>PRO</u> No limit to depth

Lower cost per meter for very deep wells

Water is clean and safe

<u>CON</u> Requires pumping equipment

Could be more expensive

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Pacific Islands

Background

Topography

Ranges from islands with a mountainous backbone at elevations of up to 8,000 feet liberally supplied with fast flowing streams and rivers and small waterfalls (Melanesian Islands), to very small low sandy atolls with either a very fragile freshwater lens or no fresh water at all. (Polynesian and Micronesian Islands)

Distances

Distances between islands can be up to 200 miles or more providing transport problem for materials and equipment.

Rainfall

Generally good 80-300 inches per year (average say 120 inches).

Populations

Relatively small. Rural water scheme usually supply only communities of 200-500 people. Systems designed to supply 20-30 l/c/d of potable water for domestic uses. Usually most villages also possess private rainwater collection systems.

Sanitation

Very important in Pacific Island villages, and nearly all community reticulated schemes are seen as a means of providing additional water to operate pour-flush family latrines. In many cases the villages have two classes of water — (a) rainwater for drinking and washing clothes (economical on soap) and (b) piped water for bathing, cleaning

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and flushing latrines, and as a back-up during the dry period. (Green coconuts are still popular for drinking but this is not to be encouraged as it significantly reduces the copra production.)

Problems

1. Distances: Shipping very infrequent between islands as many have no internal air service.

2. Local skills: Often little or no local skills available — plumbers, metal workers, carpenters, etc.

3. Training: Very important.

4. Sanitation education: Very important.

5. Supplies: Nearly all materials and equipment have to be imported. No reliable supply base at the main town.

6. Language: Many people do not speak English or French, only local languages.

7. Corrosion: Of metal equipment is a serious problem due to salt spray. Concrete, plastic or fiberglass should be used wherever possible. All explosed metal surfaces must be given extra protection.

8. Cyclones: Foundations for tankstands and windmills must be firmly constructed, and elevated water tanks and roofs firmly tied down.

9. Economy: Many villages are on a subsistence economy with very little cash.

After determining the appropriate water source, it is imperative that the local village "officidum's" support he obtained. This structure is the church pastor, headman and also the women's committee (in Polynesian society). With this backing, support in the form of manpower, housing facilities and food is provided to the project. In addition, this group also implements local financial through village participation in meeting maintenance costs.

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In determining what appropriate technology is to be used, it is also necessary to evaluate available skills, e.g., carpenters, builders and persons knowledgeable in engine maintenance. At the same time local building material resources can be determined.

Because of rivers and springs in the high Melanesian Islands, gravity feed scheme systems are the first choice. In other areas (low islands and atolls), rainwater collection systems with a back-up system of shallow wells or ground water system is selected. Windmills are employed as the power source for the pumps.

Conclusions

1. Where topography and distance permits, elevated sources with gravity feed systems should be used.

2. In atolls and low islands rainwater collection and ground water utilization are the only available sources.

3. Where pumping is required — natural power should be used — windpower (windmills), manpower (hand pumps), solar power (for future).

Tunisia

Lessons leanred from experience related to appropriate technology.

Construction or structure

1. Capturing spring into spigot boxes worked and was accepted by the users only when the spring had enough output for the local population. Conclusion: Spring boxes should apply only to permanent spring with enough output.

2. Wells: Shallow or deep wells in a poor aquipher should not be covered and equipped if there is not enough water for the population. Wells with an important output should be covered and equipped with a pumping device.

3. Low cost drilled wells should replace wells in areas where the aquifer is poor.

Equipment for Water Extraction

1. Gravity flow systems for springs with enough output.

2. Hand pumps for hand dug wells work when there is enough water and permanent maintenance structure with a stock of spare parts.

3. Diesel system did work in Tunisia on deep wells with enough quantity of water. The wells with diesel pumps are fitted with storage systems and spigots.

Conclusions from Experience

1. Encourage the increase of the quantity of water.

2. Consult the community in the design of the project.

3. Encourage community participation in the implementation of the project.

4. Hand pumps should be available in the country or easily imported, if imported a stock of spare parts should be kept.

5. Encourage low cost drilling in areas where the shallow aquifer is poor.

6. Encourage the population to do the preventive maintenance when a simple technology is used.

7. Curative maintenance should be done by an autonomous institution that is funded partly by the government, and the population.

8. Maintenance should be done by local trained people, not foreign experts.

9. Encourage the use of appropriate technology for water treatment such as the use of jars filled with lime graded gravel and javel (chlorine solution).

Background

The developing countries, based on advice from experts, have adopted a policy that all rural water supplies should be potable, and meet the WHO water quality standard to the maximum extent possible. Since the source of water in most cases is rivers or streams which are polluted, high technology for treatment of the water is needed. The imported high technology results in high foreign exchange components both for the initial capital cost (66 percent of the total project cost) and spare parts required to maintain the equipment. The government does not have sufficient skilled manpower to operate the schemes. Because of this shortage, treatment plants are designed to treat a 24-hour water supply requirement in 8 hours. On the average, the government's revenue from water sold to consumers — only 25 percent of total operating cost. Treated water is provided for human and livestock consumption and irrigation of garden plots.

Findings

More than 25 percent of the schemes are unreliable. Reasons for breakdowns have been (1) lack of imported spare parts; (2) lack of imported fuel to operate parts; and (3) lack of skilled manpower to operate the schemes. When a system becomes unreliable, people revert to polluted water, and it takes time to bring them back into the scheme.

Conclusions

1. If the water quality standard is dropped so that the development of the scheme is undertaken in stages, more people can be served with the funds available. As an example, either rain water or chlorinated water should be provided in the beginning, and as the system becomes more popular, treated water should be added as necessary.

2. Water should be provided for income producing activities so people can afford to pay sufficient fee for water to at least recover the operating costs.

3. Technology using local resources to the maximum extent possible should be encouraged.

4. More local nationals should be provided training.

Background

Shallow Wells

As least cost and appropriate solution for water supply in the poorest rural areas of Africa.

Appropriate

The best solution under the given circumstances.

Circumstances

1. Poor infrastructure, bad roads, no telephone, no spares, no garages, no skilled labour, expensive or no fuel, etc., etc.

2. Cholera, typhus, etc., etc., and the necessity to hurry up for good water supply in an area where the water is just taken from the river, pools, etc.

3. The necessity to teach the government a method of construction that works and can be continued. The availability of money is almost nothing/or nil.

4. The necessity to leave the country with a product that hardly requires any maintenance costs.

Appropriate technology used in the:

1. Survey (and planning)
    - Design of special (sturdy) hand-operated equipment
    - Design of special pump
    - Design of special wheelbarrows for the transport in the villages

Formerly: 1 landrover and 1 group (drilling rig) to 1 site/week

Now: 1 truck and 5 groups and hand tools are picked up at the end of the week, 5 sites ready. (1 approved site is the result out of 5-10 holes per week.)

2. Construction

- Design of special hand drilling tools
- Adoption (design, special trailor and LR-no truck now required)
- Design special drilling pipes (casing), etc., etc.

Formerly: 1 truck and equipment for hand digging, dewatering pumps, etc. etc.

Concrete lining, dewatering equipment, etc. etc.

Now: 1 LR + trailor produces 1 well per week, cheaper, better, no pollution, better closed construction.

3. Pump

- Improving pumps, evaluation every month, what is wrong, what could be improved
- Next series of 50-100 after some time, evaluations
- Continuously improving, testing, never be satisfied

Appropriate: Kangaroo pump, no hinge points, no pivot points; hand pump, overdimensioning

Somalia Project Description

Background

The USAID has financed a groundwater development project in West Central Somalia which is cited as an example of a high technology designed project.

A. The pertinent physical conditions in the project area are briefly described below.

1. Aquifer conditions are little known and require geophysical exploration.

2. Dependable aquifers are found only at high depths (over 100 meters) in many areas.

3. Water quality is generally poor.

B. The social conditions in the project area include the following.

1. Both sedentary and nomadic peoples are water recipients.

2. Villages are dispersed and are generally from 500 to 5,000 population.

3. Stock water requirements are an integral part of project design.

C. The technical approach utilized in project implementation (which has only recently begun) is highlighted below.

1. Heavy duty rotary drilling rigs (with down the hole hammer capability).

2. Drilling diameter up to 15", gravel pack, 8" PVC casing and screen.

3. Pumps will include diesel direct drive and generator powered submersible.

4. Windmills (counter balance type) have potential but are as yet untried.

D. The social criteria considered necessary in project implementation for siting wells are given below.

1. Community participation in selection, design, and location of well and pump.

2. Community will share cost of operation and maintenance of well.

3. Quantity of water available year round and distance to procure will determine priority.

4. Existence of school and/or dispensary (to establish health benefits) also provide level of priority.

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Findings

It is too early in the project impelmentation to determine significant findings. However, it is apparent that a high technology project will be most vulnerable to delays because of mechanical breakdown. Essentially all of the project equipment must be procurred internationally and requires high reliance upon fuels for well construction and operation.

Conclusions

Somalia is a country which has areas of water need that can only be acquired through a high technological means. The term "appropriate technology" is applied in this case as being necessary to achieve project goals in spite of the obvious risks of introducing a high technology to a country that is limited in technological experience.

Treatment

Where required treatment of both water supply and sewage should be of the simplest and most reliable possible.

Chlorination is not practicable for individual small supplies generally. Solution type equipment using hypochlorite is the simplest, safest and easiest to operate. Any equipment requires qualified personnel and common sense.

Slow sand filtration is generally more satisfactory than rapid sand plants with pretreatment. Direct filtration offers useful method where water quality is appropriate. Generally, these simple, unmechanized plants (except pumps) can be built with local materials and by local labor.

Every effort should be made to avoid the need for treatment by proper source location, development and protection.

Recommendations

Participation of beneficiaries in cash or in kind is an important ingredient contributing to project success.

AID's efforts to stress improved water quality are well intentioned. However, they impose major constraints to providing significant improvements in quantity, accessibility and reliability of water to a greater number of beneficiaries. Wherever possible, we recommend increasing the quantity of water as the first priority. The second priority should be to increase accessibility and improved water quality.

Prior to involvement AID should place greater stress on this long-term maintenance and operational component of water systems, placing particular emphasis on indigenous capacities.

In order to maximize indigenous capacity for system operation and maintenance AID should limit its source of origin requirement to the minimum.

ASSESSING AND AFFECTING INSTITUTIONAL CAPABILITY

Working Group 4

4.1 INTRODUCTION

The planning, design and implementation of successful community water supply projects in developing countries is frequently constrained by inadequate institutional capability within the host country. This section will examine methods and critical issues in assessment of institutional capability and identifying courses of action which can be taken to improve institutional capability.

The paper's approach to address this complex issue is to look at institutional concerns which apply to almost all planning and project activities in the area of community water supply, with minor adaptations. For analysis institutional functions have been divided into the following catagories:

I. Policy, Planning and Evaluation

II. Operational

III. Financial

IV. Commercial

V. Administrative Support

The assessment process for institutional capability should examine these categories using a low cost and simple methodology. This should aim at making use of procedures suitable for the evaluation of managerial, as well as technical viability of the institution concerned. While focus would be on policy making for national institutions, it may be shifted to operational or other support functions for local or community level.

4.2 KEY FINDINGS

In reviewing institutional capability the following items were identified as key findings:

- The commitment of the host government to community water supply is critical to ensure program or project success, often this commitment is reflected in a national policy or a plan of action related to the UN Water Decade and the existence of an active coordinating organization.
- Successful project implementation requires that clear lines of legal authority exist which clearly defined administrative, financial and technical responsibility. In cases where more than one organization is involved there must be a working agreement to ensure coordination.
- Host country organizations responsible for project implementation should be subjected to an in-depth institutional analysis during project design, this should include organizations with responsibilities for secondary aspects of the project.
- It is necessary for the implementing agency to have an established capacity in five functional areas: planning, operations, commercial, financial and administrative support.
- Successful project implementation requires that provisions exist for the long-term provision of operation and maintenance funds to finance both local and foreign currency costs.

4.3 RECOMMENDATIONS

It is recommended that the key findings identified above can be best addressed in the project planning, design and implementation process through the conduct of a detailed assessment of institutional capability combined with, as appropriate, activities to strengthen institutional capabilities.

With regard to each of the proposed components of institutional capability to be examined, consideration should be given to the outputs of the systems or services being explored so evidence of effective institutional capability is demonstrated. Prior to carrying out assessment activity, outputs considered critical should be identified, identification should be based upon analysis of the level of complexity of the institution and that of the specific project being proposed. Once identified, the acceptable level of these outputs should be defined operationally. After assessing the individual components of institutional capability, it is proposed that a determination of institutional capability be developed which is based on an integrated analysis of outputs which weigh the various elements analyzed to determine an appropriate course of action. These could include: institution building activities as a project element, development of an independent project to improve institutional capacities or a recommendation to defer project funding.

4.4 ASSESSING INSTITUTIONAL CAPABILITY

In general, institution(s) must be able to function in five functional areas:

1. Policy, Planning and Evaluation
2. Operational
3. Commercial
4. Financial
5. Administrative Support

The following section is intended to provide an outline of topics which should be given consideration as appropriate to the specific institution and water supply activity, in the course of an assessment of institutional capability.

4.4.1 Planning Functions

1. Formulation of policies and plans on the national, regional and local levels.
2. Implementation of plans and programs in accordance with obligations and constraints on institution.
3. Establishment of economic financial plans consistent with available funds.
4. Verification that institutions management conforms to established plans and programs.
5. Evaluation of variations in planned and implemented programs and establishment of reasons for causes and suggestion of future solutions.
6. Evaluation of appropriate technology and environmental assets in project planning.
7. Evaluation of projects with regard to energy and water sources in terms of cost, short-term availability and long-term availability in project planning.

4.4.2 Operational Functions

1. Project Management Subsystem
   a. Preparation of studies and project documents including technical, financial and economic considerations.
   b. Completion of work in accordance with standards of quality, performance, deadlines and cost.
   c. Development of operation and maintenance information on performance in order to control and evaluate.
2. Operation Subsystem and Maintenance Subsystem
   a. Establishment of services to meet conditions of quality, quantity, continuity of service, covering and costs.

b. Establishment of services to maintain condition for adequate operation and performance, providing services in a stable, continuous and efficient way, maximizing economic life and minimizing cost.

4.4.3 Commercial Functions

1. Monitoring the usage of water sewerage services to determine fair distribution of services.
2. Invoice consumers for services rendered and maintain records.

4.4.4 Financial Functions

1. Generate financial resources for operation and expansion.
2. Optimize application of financial resources.
3. Control financial implementation of institutions plan.
4. Provide information on economic/financial status of institution.

4.4.5 Administrative Support Functions

1. Human Resource Management and Development Subsystem
    a. Establishment of policies, standards and procedures for:
        - evaluation of positions
        - classifications of positions
        - selection
        - recruitment
        - performance appraisal
        - training

- social welfare
- occupational safety
- employee relationships

2. Supplies Management Subsystem

   a. Maintain adequate materials, supplies and spare parts.

   b. Establishment of purchasing procedures that take advantage of market in relation of piece, quality and conditions of payment and delivery.

   c. Establishment of modern administrative procedures.

   d. Establishment of system of information and materials control.

3. Transportation Management Subsystem

   a. Provision of planning, organization, programming and control of:

      - operation of transportation system
      - maintenance of transportation systems

4. Public Relations Subsystem

   a. Promote, motivate and educate community to participate in planning, construction, operating, maintaining and managing services.

   b. Motivate institution personnel in achieving greater participation in accomplishing institutional goals.

4.5 METHODOLOGY FOR ASSESSMENT OF INSTITUTIONAL CAPACITY

It is recommended that the following general methodology, which places emphasis on the development of an institutional history, be adopted for the assessment of institutional capacity. It involves the development of an assessment based upon:

- Conduct of a series of interviews with personnel within the institution, including:

  - senior management

- technical experts
- training specialists
- financial staff
- administrative staff
- para-technical staff/skilled tradesmen

- Conduct a series of interviews with individuals outside the institution, including:
  - representatives of other governmental organizations
  - representatives of other donors
  - local authorities
  - users of the utility
- Conduct a review of the organizational structure of the institution, examining operating division structure, staffing pattern, position descriptions, etc.
- Conduct a review of records, studies and plans.
- Conduct site visits to operations projects planned, designed and/or implemented by the institution or under the administrative/managerial jurisdiction of the institution.
- Conduct field visits to evaluate the level and quality of support provided by support facilities, including: laboratories, maintenance shops, motor pools, warehouses.

4.6 METHODS OF STRENGTHENING INSTITUTIONAL CAPABILITY

Upon completion of the assessment discussed above, certain factors will be selected for strengthening in the concerned institutions. They may originate from one or more of the five functional areas. Actions that might be instituted in the institution(s) to strengthen it include:

- Training
- Development of management information systems
- Interagency communications and coordination
- Technical assistance

4.6.1 Training

In far too many cases, developing countries rely on the existing educational/training institutions of the country or of donor nations to provide their human resources. This has not proven satisfactory. Thus, a primary need is the establishment of training of trainer programs to supply institutions with trainers for their programs. This means that engineers, managerial, financial, accounting, technicians, skilled labor, etc., must be trained as trainers. This includes not only their role as trainers in specialized training situations, but also the preparation of foremen, supervisors and professionals for their trainer role in their day-to-day activities.

A second training activity is the area of management training. In most institutions personnel advance by seniority in their particular skill area. Most times they receive no training for their increased management responsibilities. Each institution must have facility for their employees to receive training on decision-making, delegating authority, time management, motivating subordinates, crisis management and similar types of management activities.

The third major need in training is the lack of skilled technicians who must operate and maintain equipment, facilities and systems. This includes the caretaker of a springbox or hand pump up to the electrical, mechanical and chemical technicians operating and maintaining more sophisticated systems.

4.6.2 Development of Management Information Systems

A major shortcomong found in many programs was the lack of information on the status of the systems. Each of the following areas should have a reporting methodology developed and mechanisms implemented for review by appropriate levels in the system and changes made in operation, maintenance or management of the systems. These information systems should include but not be limited to:

- Progress reports
- Procurement scheduling
- Inventory and equipment control
- Financial statements

These management information systems should not only be limited to these formal reporting mechanisms, but also should include such informal mechanisms as between peer and superiors and subordinates in daily reviews of work, weekly reporting sessions, retreats, quality circles, or other appropriate mechanisms.

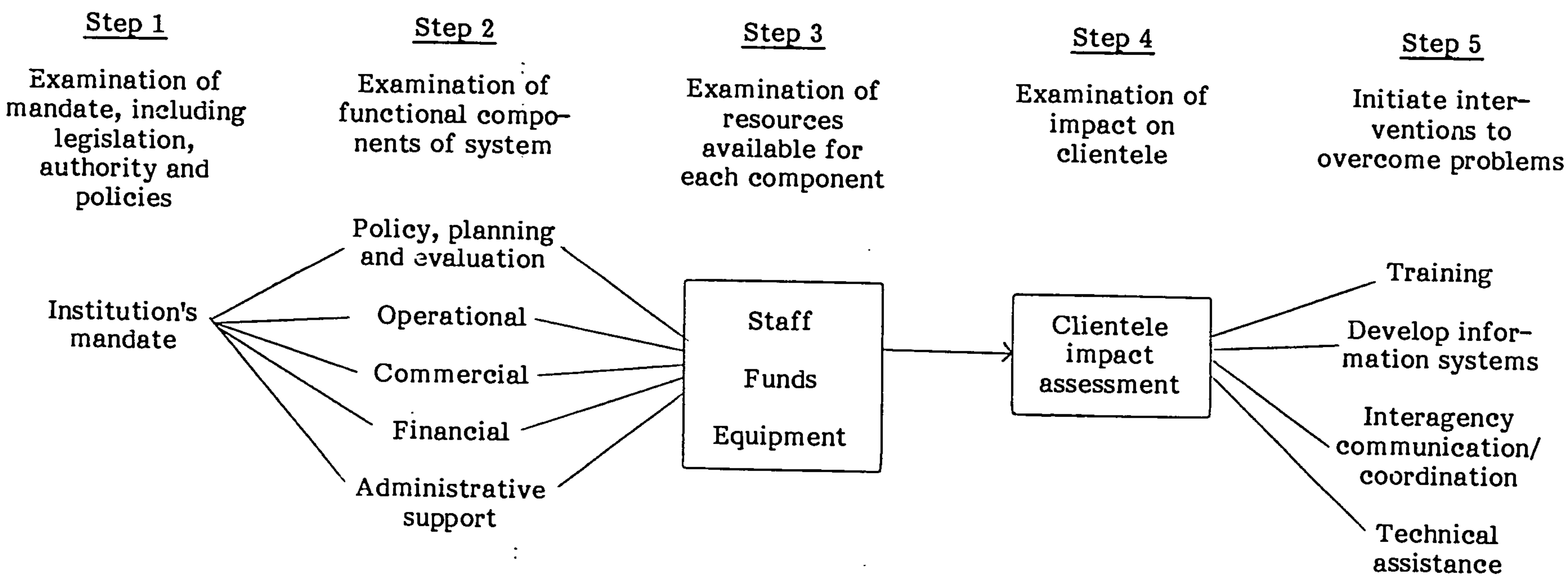
4.6.3 Interagency Communication and Coordination

The lack of communication and coordination between various institutions involved in water and sanitation sector efforts has been well established in many projects. Efforts should be made to involve the National Action Committees (NAC) in each country early in any new efforts and develop communication and coordination mechanisms for each significant step in an effort. Where local circumstances do not permit the NAC to assume this role, other methods must be developed.

4.6.4 Technical Assistance

A fourth major area for strengthening programs is the provision of technical assistance. Three major areas have already been pointed out, namely training of trainers, management skills and skilled technicians. These three occurred with great frequency. However, in most countries there will be other technical areas needing specific technical assistance. Importation of specific technical assistance should be sought to bring the institution's personnel up to a prescribed level of performance.

Schematic on Systems Approach to
Institutional Capability Assessment



Notes on schematic: In assessing institutional capability, it is recommended that systems analysis approach be used. Five analytical steps are proposed as follows:

Step 1: Examination of institution's mandate, including legislation, authority and policies.

Step 2: Examination of components of the system, which are as follows: policy, planning and evaluation; operational, commercial, financial and adminstrative support.

Step 3: Examination of resources available for each institutional component (staff, equipment, funds, etc.). Methodology for examining each component is described in the body of the paper.

Step 4: Examination of impact on clientele.

Step 5: Review information gathered during Steps 3 and 4 and initiate various interventions (e.g., training, development information systems, technical assistance, etc.) to overcome problems.

DEVELOPING SYSTEMS THAT COMMUNITIES VALUE

Working Group 5

INTRODUCTION

We begin our work in this section with several assumptions regarding the conditions under which support for the development of a water supply for any given community is being considered. First, the host government has made a commitment to the development of community water supplies as evidenced by:

1. System established for the procurement and distribution of equipment and supplies, including replacement parts.
2. Funds appropriated to cover local costs.
3. Position for required personnel.

Second, a preliminary study has determined the availability of an acceptible water source and determined the approximate cost of a system that members of the community could consider. Third, there are members of the host government planning group who believe the maintenance (or capital) costs would be beyond the capacity of the community either to bear in their entirety or to share.

BENEFITS VALUED IN WATER SUPPLY SYSTEMS

Values are best determined in relation to various uses of water. A matrix comparing uses with values is the basis for the following discussion.

Value \ Use	Drinking & Cooking	Washing utensils and clothes	Bathing - body, hands, anus	House and yard cleaning	Home Gardens	Animal Use
Physical Characteristics						
Distance						
Reliability						
Perceived health benefits						
Convenience						
Equity						

Types of Values Applied to Systems

People place high value on the physical qualities (color, taste, odor, temperature) of water they use. They are often willing to bypass a more convenient source of water to obtain water having certain physical qualities they value. On the other hand, where water is a matter of basic survival, people are willing to use water of almost any quality to meet their needs.

If we assume that everyone already has a (reliable) source of water, people are then more concerned with the tangible qualities of water, such as taste and color and temperature than with its accessibility (distance, convenience) or indirect benefits (health). Those preferences show up particularly in values attached to water use for drinking and cooking.

Drinking and Cooking

Water for drinking and cooking is a matter of basic survival. All people have a source for meeting their absolute needs. In meeting their basic needs, people have varying degrees of choices. At the lower end of the scale, some people have only one available source of water for survival and cannot exercise a preference. At the other end of the scale, some people have the luxury of choosing their sources. But people always have their set of preferences/values regarding water they use for drinking and cooking.

The preferences expressed by consumers indicate that they place great value on certain characteristics of a water supply:

- Preference for soft (sweet) over hard (acid or metallic tasting) water for drinking
- Preference for sweet water for tea which leaves it with it "natural" color, whereas water with a high iron sulfate content turns tea black.
- Preference for cool water for drinking
- Preference for clear over murky water for drinking
- Preference for odorless water
- Preference for unboiled water for drinking since boiled water is considered "hot," even though cool, and as such medicine, unless redefined as "cold" (Sri Lanka) and so drinkable
- Preference for surface water over ground water, with high iron content, which is considered dangerous (Sri Lanka, Thailand) or unpleasant (Bangladesh)

- Preference for traditional sources over chlorinated water which tastes and smells bad

Washing — Utensils and Clothes

Laundering of clothes and washing of kitchen utensils consume a large percentage of domestic water. Most women wash their dishes, pots and pans at home, even if facilities are primitive and water scarce. Water is often reused and cleanness of utensils is questionnable. In many communities where water has to be carried, clothes are taken to streams, wells or canals to save time and energy. Values are also attributed to the softness of the water (savings in soap, quantity of the water and energy expended for better rinsing). The social contacts in public laundering places are valued by women in many cultures where their activities are confined to the home (Purdah) tasks. Exceptions to this are found where women prefer to carry up to 40 lpcd of water in order to launder at home. In other cultures public laundry facilities are valued particularly when water is made available in the patio/home — but not all (Guatemala, PB, 1978). Even when public laundry facilities are constructed, some women prefer the stream or canal, where water is flowing and children can play, swim and bathe (Nicaragua, Kenya). In fact, laundry and bathing are often combined at a public well (Sri Lanka, Thailand). Some such wells are designated for men only, others for women as are certain places along the river, stream or canal.

Washing of utensils in a stream is sometimes continued even after domestic water is available in the home (Korea, Dworkin and Chetwynd, 1981). With piping of water into the home/patio, washing of clothes and kitchen utensils in combination in a single basin, washing dishes and diapers together under a single tap when water is more available can lead to negative results (Elmendorf, WWW, 1980).

Behavioral patterns related to values of water for washing of utensils and clothes need to be understood in order to plan and design an acceptable system which will be used and valued.

Bathing

Water for bathing is valued chiefly if it is available in sufficient quantity, although many populations have adapted to extremely small quantities of water for this use. In Mauritania for example where no water may be available for months, bathing may be done in a small quantity of milk or sweat baths in highland L.A. are another example of use of small quantities of water (Peru, Guatemala, Mexico).

Because quantity is the chief value, the use of streams, rivers, canals and irrigation ditches is practiced for bathing in many parts of the world. This practice has relevance to health in many Muslim cultures such as Bangladesh, where polluted water may be used in bathing involving not only the outside of the body but orifices as well. There is evidence that people who use tubewells for drinking but still bathe in rivers and canals have just as high a cholera rate as those who use the rivers and canals for all purposes.

Anal cleansing in Muslim societies may be practiced in rivers and streams where water is relatively abundant, but where water is scarce having it available at the house even in small quantities may be more highly valued. Thus, distance, reliability,, and convenience enter in as higher values too.

Where infants and elderly persons are concerned, and in some societies all adult men, bathing at the house is highly valued and a quantity of water sufficient for their bathing needs is required. Again, distance, reliability and convenience are implicated. In Burundi for example, a young girl was asked how many 20 l. jars she carries to the house each day. She replied that it depended on whether or not her father took a bath that day, thus 2 or 3 times.

Lastly hand washing as a particular form of bathing has implications also for at least a small quantity of water available at the home, either for ritual washing of the right hand before meals in some societies or hygienic handwashing after defecation and before handling food are practiced in response to user education.

House and Yard Cleaning

House and yard cleaning are tasks related to a) washing hard dirt, cement or other type floors; b) washing mats or other floor coverings; and c) sprinkling water on dusty yards and/or street. The physical characteristics of water used for these purposes is not important. In fact, wastewater from cooking, washing, bathing, etc. is often used for house and yard cleaning tasks. Frequency of house and yard cleaning may be dictated by distance/convenience when wastewater is not used. Reliability of water supply is a factor, especially in the dry season when sprinkling often becomes a several times a day task. Unfortunately, this is often the time when system reliability is lowest. Sprinkling is done because people associate dust with discomfort/bad health. A health educator can use this association to introduce other related concepts into the community. Household cleaning may not be associated with health, but a health educator should make that connection and also extend the idea of home cleanliness to village cleanliness.

Home Gardens

Home gardens can have economic as well as nutritional benefits for rural households. In encouraging household cultivation and consumption of vegetables, for example, the provision of a reliable year-round water supply can be a critical factor. In many cases the products of home gardens can become a valued supplement to family income. Women tend to be primary managers and thus beneficiaries of home gardens and their family can become beneficiaries of improved diets if part of the production is maintained for home consumption. Communities in Bangladesh, and elsewhere (Gambia, Senegal) have used shallow tube wells to irrigate their homestead plots to produce what are called winter vegetables. Most of the vegetables find good local markets. The growing prevelance of carrots in the diets of children is an important adjunct to programs combatting vitamin A blindness. Prior to the introduction of the shallow tube wells the production of vegetables during the dry season was seriously constrained.

The provision of water from these tube wells has also been used to fill mini-fish tanks and to keep them full year-round. In other situations, such as in parts of Indonesia, provision of stand pipes and tube wells has enabled families to cultivate fruit trees and spices like cloves during the dry season.

There appears to be a general willingness and desire in communities to cultivate home gardens if there are reliable sources of water. The size of the gardens is related to distance of homes from water source, particularly during dry seasons. Household waste water is often used to irrigate very small kitchen gardens. With the provision of nearby wells and shallow tube wells, the size of gardens appears to grow substantially.

Slack periods of agricultural labor demand coincide with dry season conditions which favor garden production. Female labor availability is also increased by the time freed when time devoted to drawing water is decreased. The key consideration in provision of water for these purposes is availability throughout the year. Other important factors are quantity and distance of source. Placing water supply in communities can affect the home gardening opportunities. Limited accessibility to water sources can skew benefits of gardens to rural elites. In the case of fish ponds, initial capital investments may preclude participation by the poor.

Water for Animals

Animals need for water can be divided into two categories: drinking and bathing.

Animal water needs for drinking do not need to meet the standards of drinking water for human consumption; neither do water needs for animal bathing or cleaning require to be the same quality as bathing water standards for human hygiene.

The only important factors or requirements which water required for animals drinking needs would seem to be:

1. Quantities — should be sufficient to meet needs
2. Reliability — as to availability when needed
3. Distance — should be within reasonable distance
4. Equity — it should be equally available to meet the needs of each household

The remaining factors would not seem to matter much except the temperature.

As for the water needed for animal cleaning and bathing it would seem that the quality would vary over a wide range depending on the type of the animal and on whether it is a domesticated pet kept inside the house or a horse or a cow kept outdoors.

How to Determine These Values

Commitment to building, using and maintaining new water supply facilities is best assured when communities actively participate in projects. Using a dialogue approach, agencies should encourage communities to play a major role in: (1) defining their existing situation; (2) choosing among technically feasible alternatives; (3) determining methods of implementation; (4) evaluating the form of community contributions; and (5) setting up social controls for continued use and maintenance.

A dialogue approach requires a significant amount of time-consuming consultation with the community; therefore, the optimum use of scarce technical resources will require that water supply and sanitation agencies coordinate their activities with other national entities such as health clinics, which already have trained (or trainable) promoters at the village and town levels. These promoters, or "facilitators," are usually experienced in promotion and extension, and they are the crucial link between the agency and the community.

The facilitator must be at least minimally trained in social science techniques in order to provide planners with information about community attitudes, perceptions, preferences and doubts. At the same time, she or he must understand and be able to communicate the technical and economic aspects of available alternative technologies to permit communities to make appropriate choices. Such knowledge can be provided through on-the-job training, visits to an on-going project in other localities, and participation in demonstration projects at health centers or school before active promotion of the technologies in the communities.

Identification of projects will require knowledge of where such personnel are available. Even with targeting, however, individual project selection criteria must be specific, and preliminary technical feasibility studies should be brief in order to adequately screen projects. In this way, the demand for services can be controlled and villager frustration avoided. A first step in identifying projects is to determine with community members what they value most in a water supply system. These values can be assessed through several techniques:

A questionnaire can be designed to provide community input during the design stage of project implementation. Its purpose would be to find out what community members think about their present water supply and how they would respond to an opportunity to change these supplies.

The survey can first attempt to find out how people perceive their environment. Do they think of it as a healthy place to live? What are their criteria for evaluating a good or healthy environment? Do they see a relationship between water supply and good health? Do they view water supply as a problem at all? If they do, why is it a problem and how important is it in relation to other perceived problems?

Secondly, the survey should investigate existing practices related to water use and preferences for improvements. What are the various uses of water? What are the characteristics of water supplies valued for each use? What are the problems associated with obtaining water? What level of service is desirable and what is acceptable? What are perceived constraints in realizing the desired improvements?

To supplement the survey, various anthropological techniques can be used, including direct observation of water-carrying tasks and water reuse practices, indirect observation of personal hygiene and latrine use habits, interviews with local leaders and individuals involved in sanitation programs, informal conversations with local store owners and craftsmen, and observation of the daily life of the communities.

All of the surveys must be authorized from agencies involved at the national, regional and local levels before beginning the investigations. At the local level care must be taken to explain to community leaders the purpose of the field work.

Implications for Project Development

From this cursory survey of values attached to various uses of water, it seems obvious that it is with respect to drinking and other use in the home, water for gardens, and water for domestic animals that place the greatest demands on systems for reliable quantities, but that only drinking and cooking in most instances are related to qualitative (physical) features. Other uses: bathing, washing, and house and yard cleaning, appear capable of tremendous flexibility in the facing of changing levels of quantity and quality. The implications for project development are several:

1. Technology selection
2. Project management, i.e., operations and maintenance
3. Adjunctive project components, i.e., sanitation and user education
4. Conflicts

Technology Selection

Community-based values must be combined with environmental/physical constraints and with institutional constraints in determining just which technology or technology options can be considered. Obviously, funding considerations must also be taken into account. By balancing off each consideration against the others in the context of dialogue with community members, one can arrive at a proper technology choice.

Management

If communities in fact value a water supply system such that they will put up part of the money, labor, or materials for its construction, then that is a good indication that the system is worth maintaining over the long-term. Community members will probably be wiling to pay for maintenance if the system proves reliable, but they may need training, organizational assistance, access to technical assistance, spare parts, material and fuel.

Adjunctive Project Components

1. Excreta Disposal: Project efforts should focus on obvious connections to values placed on water supply, such as the handling of wastewater (for kitchen gardens), anal cleansing (in Muslim areas) and hand washing after defecation and before food handling. If excreta disposal facilities are a necessary adjunct to these efforts, they should be supported.
2. User Education: Again, user education should focus on direct connections to water supply, such as:
   - Water source protection
     - where water is valued, chiefly for animal use
     - where water is valued chiefly for its color and taste

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- Handling of wastewater
  - where perceived health benefits are highly valued (keeping down mosquitoes)
- Use of water
  - where drinking water quality is highly valued

Conflicts of Community Values with Other Factors

Conflicts between developing systems that communities value and national plans, or donor expectations can be caused by constraints such as:

- Environmental: water resource soil climate
- Social: ethnic or political divisions
- Institutional: skills, training control
- Technical: operation and management
- Financial: limited resources

Dialog with the community about values, needs and resources in relationship to designing and planning a system appropriate to the locale is an important first step. Conflicts between community values and the institutional needs of the government and of donors (in this case, AID) need to be discussed and resolved as easly in the planning process as possible. there is an absolute need for each party to be open and candid about its goals, purposes and constraints. Hidden agendas will ultimately work against the success of the project.

ASSESSING A COMMUNITY'S VALUATION OF A WATER SUPPLY

The Community's View of its Present Water Supply

Factors most likely to influence willingness of a community to support a new water supply system relate to the community's perception of its present situation. If water is readily available from existing sources in the amounts needed, a community may not want to pay either in cash or in kind for a new system. On the other hand, if the present source is inconvenient or the supply is inadequate, communities will be more likely to support a new system if it promises to meet expectations and does not exceed the community's resources.

Factors other than convenience and quantity of water available may be less appreciated. Historically, members of the community may know that they have more of some diseases than occur in other communities, but may not appreciate the relationship to their existing water supply. Examples of this include water-borne intestinal infections. The adverse effects of some water sources may be less well understood and should be explained when communities are considering a decision on whether to support a community water supply project. For example, the risk of blindness from onchocerciasis is increased for people who use water sources that are near breeding sites of the vector black flies than it is for people who avoid these dangerous areas.

Willingness to Pay

A good indicator of the communities' commitment to pay will be a survey or assessment of past efforts (history) of community projects. For example, has the community worked collectively through farmers co-ops, adult groups, and youth groups to build schools, roads, health clinics, or managed community-wide projects? How is the community organized and how are decisions made? Has the community collected money for past projects? How are collective funds managed and who decides how the funds are spent? Another important consideration is the economic base of the community and whether or not the community can actually afford, even though they might be willing, the costs of the project.

The most direct way to establish the community's value on an expressed need is the willingness to contribute funds and/or labor and/or materials to the initial system and to agree to regular or special payments for operation and maintenance of the plant.

In order for the community to reach this point, a dialog with community leaders and especially the likely primary beneficiaries will have to be undertaken. The dialogue will develop the felt needs of the community among which may be an expressed need for greater availability of water. If it can be established that the felt need for a more convenient water system has high priority, the dialog can be narrowed to discussions of what the community as a whole and the various identifiable segments of it picture their needs in terms of type of installation, frequency and kind of use.

The articulated wishes of the community must now be related to the available range of possible systems from the supply and technical viewpoint. A judgement must be made as to how basic or more advanced the system could be in the context of the present capabilities of the community.

A second stage dialogue can now take place in which discussions are narrowed to possible options and the implications of these for cost both initial and subsequently in operations and maintenance. The community should make its choice based on what it decides it is willing to pay. The payment for initial installation should be cash and/or kind. For operations and maintenance a payment for use should be agreed upon.

Over what time period is the community willing to pay? Do they consider that it will be one payment for the life of the project or are they willing to pay on a weekly, monthly, or annual basis to ensure the continued operation and maintenance of the system?

Willingness to pay must also encompass in-kind contributions such as labor, accessible natural resources (sand, gravel, lumber, etc.) and the management and organizational time required for the design, implementation and continued operation and maintenance of the system. Thus, willingness to pay can be considered to include voluntary labor and the provision of a village member to operate and maintain the system and the time that the village water committee spends in supporting the project.

In a subsistence-barter environment, which is by and large the situation in most rural communities where water systems are implemented, how can this dynamic be construed as a willingness to pay? Obviously, there are food products, local crafts, etc. which are produced by the community as surpluses. Normally these surpluses are exchanged or bartered for other wanted goods and services in lieu of the use of money. Can this type of barter system, which is the economic base of community life, be channeled or seen as a willingness to pay?

It is also necessary that the community identify an operator(s) for training and a supervising group whose task will be to see that the installed system is maintained and who will collect payment and pay incurred costs.

If these issues can be clearly defined the community has articulated the value it places on the proposed water system.

IMPLICATIONS FOR POLICY

1. Community characteristics that bode well for investment in water supply systems.
2. Assuring equity in distribution of systems among communities.
3. Greater flexibility in policy

UNRESOLVED ISSUES FOR R & E

1. Determining manageability of technologies in a given community in advance, i.e., the capacity to maintain and repair a system.
2. How willingness to pay, level of payment, and resulting technology relate to both perceived and real benefits.

1. PLANNING, IMPLEMENTING AND EVALUATING COMMUNITY WATER PROJECTS

General Policy Recommendations

1. Broaden the funding base. AID should fund rural community water projects from the food and nutrition (rural development) account.

2. Foster projects which will be self-supporting. Water projects should be designed with the goal of their being self-supporting, with some measure of capital recovery if feasible, preferably through direct payment by the beneficiaries or through some form of cross subsidy. When feasible, funds collected for operation and maintenance should remain with the local water organization.

3. Maximize the impact of scarce AID resources. AID cannot respond to the full scope of rural community water supply needs by direct funding of village or local level projects. Therefore, we should direct resources toward the development of two types of host country institutions which are essential, but missing in many developing countries. These are:

   - A financial institution which will provide a source of capital to cover all or a part of the construction cost.

   - A technical organization to provide assistance in planning, design, construction, operation and maintenance.

4. Relationship of supply and disposal projects. Whether or not latrine/excreta disposal projects are designed and implemented separately from water projects should depend on the density of the population being served, physical characteristics of the project zone and per capita water use.

2. FINANCING AND FUNDING

Recommendations

1. AID should recognize the multiple benefits of water supply and sanitation projects and thus permit them to be funded from the Food and Nutrition (FAA, Section 103) Account as well as the Health (Section 104) Development Assistance Account.

2. The type of system (well, hand pump, community fountain, household connections) should be affordable by the beneficiaries and appropriate to their expectations as well as their ability to operate and maintain. This implies the need to closely involve the community in project planning and implementation.

3. Users should always be required to contribute in cash or kind to the costs of maintenance. In the case of simpler systems (e.g., wells, hand pumps) they should also contribute cash, materials or labor to construction costs.

4. The rate structure and specfic funding and financing responsibilities (institutional and individual) should be established before the project commences. There must be a clear understanding of and agreement to financial responsibilities by AID, the host government, local governments and agencies, and beneficiaries before construction begins.

5. All Water Supply and Sanitation Project Papers should require strong economic and financial justification, particularly with respect to the issues of recurrent cost financing and system maintenance. Project Papers which do not provide adequate evidence of financial sustainability and local absorption of recurrent/operating costs should be rejected.

6. Water Supply and Sanitation projects should contain provision for a strong technical institution or authority which oversees construction and establishment of local water systems and which serves as a source of assistance to communities and users associations once they become responsible for on-going operations and maintenance. Wherever possible, existing institutions should be used; where necessary, new ones should be created.

7. AID should seek wherever possible to encourage the development of private loan financing with U.S. Government guarantees as an alternative to conventional loan and grant financing (ESF) of water supply and sanitation projects.

3. APPROPRIATE TECHNOLOGY

Definition

We recommend acceptance of the following definition: appropriate technology is the most cost-effective, feasible and acceptable means to provide community water supply and sanitation services that the users and appropriate authority can afford and are willing and capable of operating and maintaining.

Recommendations

1. AID should contribute to increased indigenous capacity for operation, maintenance and repair of water systems. The probability of project success will be increased by stressing lost country standardization of equipment. When it is not possible to manufacture this equipment within country AID should relax its source and origin requirements.
2. AID should encourage through financial incentives if necessary lost country ministries to provide training and to develop and improve their capacity for inspection, collection and evaluation of consumption and operating data (which could lead to system redesign and improvement).
3. In the approval of projects AID should stress the importance of selecting appropriate technologies which provide reasonable improvement in the accessibility and reliability of water systems. These factors are generally more important as improved water quality in community acceptance and project viability.
4. Hardware development for improved water systems should be carried out in lost countries and be limited to their priority needs.

4. INSTITUTIONAL CAPABILITIES

Key Findings and Recommendations

In reviewing institutional capability the following items were identified as key findings:

- The commitment of the host government to community water supply is critical to ensure program or project success.
- Successful project implementation requires that clear lines of legal authority exist which clearly defined administrative, financial and technical responsibility. In cases where more than one organization is involved there must be a working agreement to ensure coordination.
- Host country organizations responsible for project implementation should be subjected to an in-depth institutional analysis during project design; this should assess established capacity in five functional areas: planning, operations, commercial, financial and administrative support. The institutional assessment should include organizations with responsibilities for secondary aspects of the project such as health education and wastewater management.
- Training needs as identified in the institutional analysis should be directly addressed in the project design or be provided for in a specilly designed complementary training project. In addition to the traditional concern of training engineers, emphasis should be given to the training of training specialists, administrative staff, managerial staff and skilled labor.
- Projects should include a management information system which will provide solutions to performance problems. This information system should include items such as progress reports, procurements, operational schedules, material inventory, equipment control and financial statements.

- Successful project implementation requires that provisions exist for the long-term provision of operation and maintenance funds to finance both local and foreign currency costs.

Group 6

DETERMINATION OF APPROPRIATE COMPONENTS FOR A WATER SYSTEM

I. Introduction

The determination as to the appropriate components of a water supply system is not a task which lends itself to the formulation of inflexible, over-generalized rules or policy guidelines. Instead, this determination should take account of the particular circumstances of the case in question and should result from a multi-stage planning process.

The three basic steps of this planning process are:

A. Needs Assessmsnt - The needs assessment should focus on the perceived felt needs of the community. It should first be established that water is peeceived as a priority problem. If such is the case the nature of the perceived project with the existing souce must be defined. In particular, it should be determined to what extent the problmm is perceived as one of an available/accessible quantity as opposed to water qaulity. System design should be consistent with local pwrceptions of the problem so as to insure community interest/support. In some extraorginary cases, need could reflect instead the concerns of groups outside the community, i.e. public health officials etc.

B. Feasibility Studies - Feasibility should be assessed objectively in the following dimensions: technical assessment/sanitary survey; financial analysis/determination of levels of service; and, social analysis/assessment of community capacity.

C. System Design - The design of a "water supply system" in conformity with perceived community needs and social economic and technical conditions

By going through such a process, one can determine the type of project which will be valued by the community while being technically sound. This approach leads away from iron-clad rules concerning the inclusion or exclusion of a wide range of project components in addition to the warer supply system itself. We instead propose a notion of a "minimally acceptsble system" which includes components that <u>all</u> water systems should have.

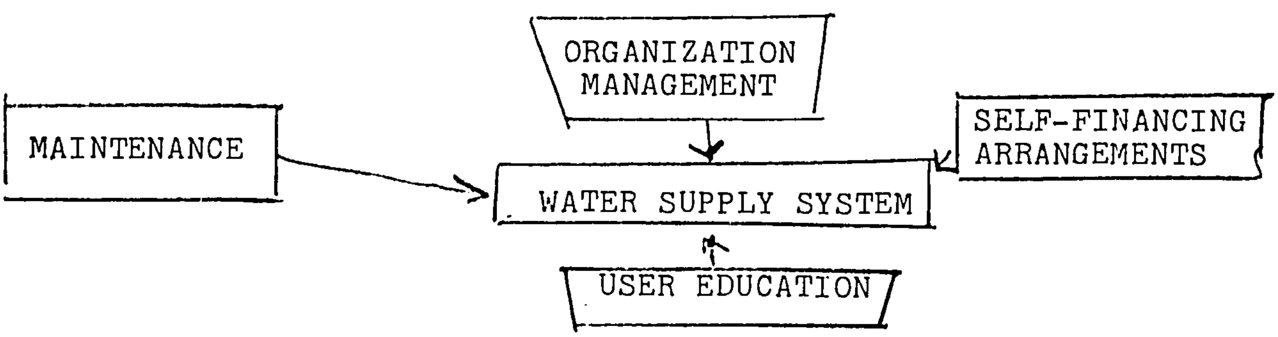
II, Minimum Project Components

The minimally acceptable system should be understood to include:

A. The appropriately designed water supply system itself as the centerpiece;

B. Additional components essential to ensure long-term system viability (provisions for system maintenance and maximum self-financing, with appropriate community, regional and/or national organization); and,

C. User Education



Additionally, it is understood that throughout project design and implementation there should be a commitment to upgrading indigenous human resources through training. Likewise monitoring and evaluation are condidered essential elements of the organization of the project. The extent and type of monitoring or evaluation will depend on the interest for information at the following levels:

1. Community Level - at a minimum, need basic monitoring to observe important problems and plan for improvements

2. Government/AID Level - at a minimum, should include the following:

a. Analysis of critical indicators of project operations

b. analysis of criticsl indicators of discrete project objectives (health impact, income generation etc.)

c. Mechanism for coninuous replanning ~~based~~ based on above analysis.

Our ideas concerning maintenance, financing and user education are summarized below:

1. Maintenance: The maintenance componet ~~should be~~ insuring long-term viability should be given ~~equal~~ priority importance. ~~as traditionally~~ Maintenance education should begin prior to actual construction of the system with intermidiate technical status achieved prior to the completion of the installation. Starting the training at the initial stages of program design reinforces the concept of community participation and commitment. In addition it expedites construction by providing skill workers to assist in the consturction effort. In addition, it provides the "hand-on" experience necessary for the repair function once the system has

become operative. The trouble shooting element of the educational program should emphasize changes in system performance which point to future groblems (i.e. preventive maintenance). The idea is to avoid surprise breakdowns, allow a time cushion in which to bbtain technical assistance, and to limit the down time of the system. Parts procurement shall be considered as a part of the maintenance job as is "user education" as necessary.

In addition, every effort should be made to keep the techniction in the area and on the job. This may include structuring training so as not to include skills marketable in urban areas.

2. Self-Financing Arrangements: This is defined as a means developed and employed to assure system viability by providing the duns to cover recurring costs of operation, maintenance; and, long-term replacement of capital investments. Some methods could include: government subsidy, proportional user fees, taxation, non-water related co-op activities; and water related co-op activities.

3, User Education: The minimum level of education appropriate to the zystem and its design features necessary to protect its ciability (quality and quantity) and maximize the system's benefits (social and health). It is not "health education" in the traditional sense. Examaples of user education are given below:

- Open well systems - eliminating direct and indirect contamination and proper withdrawal/transfer techniques

- Standpipe - importance of drainiage and flow monitoring/ valve maintenance.

III, Ancillary Components

Depending on the particular circumstances of a village, region or country, the minimally acceptable system could constitute the entire project intervention or could be coupled with one of several types of ancillary activities. This could be accomplished either within the confines of a single inteegrated project or in parallel projects. Actual project interventions could thus take on different emphasis depending on which, if any, additional components are linked to the basic water supply project.

Any ancillary activity would depend on the positive resolution of the following four elements:

1/ Perceived need of the community

2. Relevance to water project/criteria for selection

3. Institutional relationships

4. Long-term Financing

Should these elements not be resolved at the outset of the water activity, then the long term viability of the discreet water project would be the primary focus of action, and ancillary activities would be initiated according to community demand and awareness.

Three major ancillary activities to which water supply could be linked in project interventions are:

A. Health Education - Health education for a water project involves the education of people to an awareness of the illnesses in their community that are related to water and the necessary measures to avoid these illnesses.

Eighty percent of diseases in developing countries are water/sanitation related; however, better wa-er systems do not always results in improvements in health. A lack of information and knowledge concerning proper hygiene can minimize improvements ub gealth - or even have a negative effect. A health education program - when deemed necessary - needs to be planned simultaneously and in conjunction with the project, beginning early and ideally extending over several years after the project is completed. Many health education programs for water projects have been inadequately developed and implemented with inadequate resources and discontinued too soon. Successful implementation requires skillful planning, development and application of appropriate education methods - and a sharing of responsibility among the many individuals concerned: government officials, engineers, educators, community leaders, community workers etc. In additionm it is important to remember that the true value of some edicational efforts cannot be measured in terms of immeidate and specific achievements. It often takes as long as a generation before p-tterns of behavior change can be seen.

B. Sanitation - Ancillary activities involving sanitation are covered under the following categories:

1. Elimination of Waste Material (human, animal, water, garbage, abd environmental hazzards)

2. Environmental Control (stagnant warer, vector control, habitat protection and source protection)

3. Food Protection

The degree to which these activities would be incorporated into the water activiy would depned on the interest or need in the community and/or the community's willingness to finance long term interventions.

C. Invome Generating Activitie - The introduction of a viable and stable water system generally results in increased available manpower as well as a valuable developmental resource: water. Water projects need to initially address income generation to the extent that available fiscal resources fall short of the financing neeessary to create and maintain a viable water system (i.e. investment, recurring costs, maintenance/operation, and replacement). Oce long~~term~~ term viability has been guaranteed, then efforts should be explored to capitalize on the develop,ental opportunities created by water availability.

These three types of activities are given as examples of possible complements to a water supply project; numerous other possibilities exist.

IV. Recommendations

(attached sheet)

Recommendations

1. The specific components of a water system will vary with the communities, regions and countries. Effective needs assessments are essential to determining relevant appropriate components of particular water projects.

2. The minimally acceptable components of a water system include: the water system itself; provisions for maintenance; self-financing; and organization/management to ensure long-term system viability; and user education.

3. The decision to include health education, sanitation, income generation and other ancillary components in water system should be based on the needs assessment and a feasibility study and not be categorically separated.

   Discussion: In many countries in water projects are implemented by Ministry of Health, Ministry of Education, etc. Three projects is to small a sample to base recommendation.

4. Water projects in most cases should be designed to be self-supporting preferably through direct payment of the beneficiaries or through some form of cross subsidy with urban systems.

5. Training of host country staff needs to be very specific in the project design.

Unresolved Issues

1. Community participation

Additional Research

1. How to predict villages ability to pay for and support a water system.
2. Survey additional water/sanitation projects which include health education and sanitation and assess their effectiveness.

PARTICIPANT'S ASSESSMENT

Community Water Supply Conference
January 24-28, 1982
Marriottsville, MD U.S.A.

The Office of Evaluation will be presenting evaluation conferences on other sectors. Your response to this questionnaire and your comments will assist in assessing the effectiveness of the conference format and management. We would appreciate your sharing your observations with us.

1. Overall Conference Effectiveness

The objective was to provide guidance on the planning, implementation and evaluation of community water projects. Please indicate, with a check, the extent to which you feel the conference will affect these activities.

	Very Low	Low	Aver-age	High	Very High
Planning	____	____	____	____	____
Implementation	____	____	____	____	____
Evaluation	____	____	____	____	____

Comments: (Please use other side of page if necessary.)

2. Conference Format

Please indicate how you rank the effectiveness of the following conference components.

	Very Low	Low	Aver-age	High	Very High
Day 1					
Registration	____	____	____	____	____
Day 2					
Plenary Session	____	____	____	____	____
Evaluation Findings and Issues (Dan Dworkin)	____	____	____	____	____
Panel — Community Water Supplies: Alternative Views	____	____	____	____	____
Work Groups — Begin Discussions and Drafting	____	____	____	____	____
Expanding the Data Base — Evening Informal Presentations	____	____	____	____	____

	Very Low	Low	Average	High	Very High
Day 3					
Work Groups — Complete the Initial Draft	____	____	____	____	____
Panel — Appropriate Technology	____	____	____	____	____
Presentation — Shallow Well Development in Tanzania - C.J. Bonnier	____	____	____	____	____
Water Development in Malawi - Film	____	____	____	____	____
Day 4					
Work Groups — Review and Comment	____	____	____	____	____
Revise Drafts Utilizing Work Groups' Comments	____	____	____	____	____
Day 5					
Work Group Presentations	____	____	____	____	____
Response by AID Acting Administrator and Final Discussion	____	____	____	____	____
Coordinating Committee Meeting on Possible Post-Conference Actions	____	____	____	____	____

Comments:

3. Conference Logistics

Please indicate your ratings of the following.

	Very Low	Low	Average	High	Very High
Conference Setting (Marriottsville Center)	____	____	____	____	____
Accommodations	____	____	____	____	____
Meals	____	____	____	____	____
Performance of Conference Contractor (MetaMetrics)	____	____	____	____	____

Comments:

ℐV

4. Overall Rating

Please indicate how you would rate the conference with other similar conferences.

Very Low	Low	Average	High	Very High
_____	_____	_____	_____	_____

	Yes	No
Did you find the conference to be worthwhile?	_____	_____
Did you find the conference to be enjoyable?	_____	_____
Were the conference reports and materials helpful?	_____	_____
Will you incorporate the ideas presented in the conference in your development work?	_____	_____

Comments:

5. Please indicate your sense of the balance of the conference format between presentations and workshops:

There should have been more presentations.	_____
The balance was appropriate.	_____
There should have been more time for workshops.	_____

Comments:

6. Please share with us any other comments or suggestions you have about the conference. Thank you for sharing your observations on the conference. The responses will be tabulated and included in the conference preceedings.

7. Feel free to sign this form if you prefer. Please check your affiliation.

Host country national	_____
AID/Washington	_____
AID/Mission	_____
Other U.S. Agency	_____
Other	_____

System backgrounds of group participants

POLICY-ORIENTED RECOMMENDATIONS

1. The components to be included in water supply projects can only be determined on a case by case basis.
2. The minimally acceptable water supply project shall include the water supply system itself, provisions for maintenance, maximum self-financing, and user education/training, and the organization/management required to ensure long-term system viability.
3. The inclusion of ancillary components in a water supply project should be decided on the basis of the needs assessment, the feasibility studies, and an indication of community interest and prospects for long-term support. Such ancillary components include, but are not restricted to, those of health education, sanitation, and income-generating activities.
4. The training of local staff, where necessary, should be built into all phases of project activity to ensure the long-term viability of the water systems.
5. The development of host country manufacturing capability for the various components of water systems may contribute to a reduction in maintenance-related difficulties; however, the expeditious procurement of supplies is the key to minimizing interruptions in service. This responsibility should be given to the system operator.