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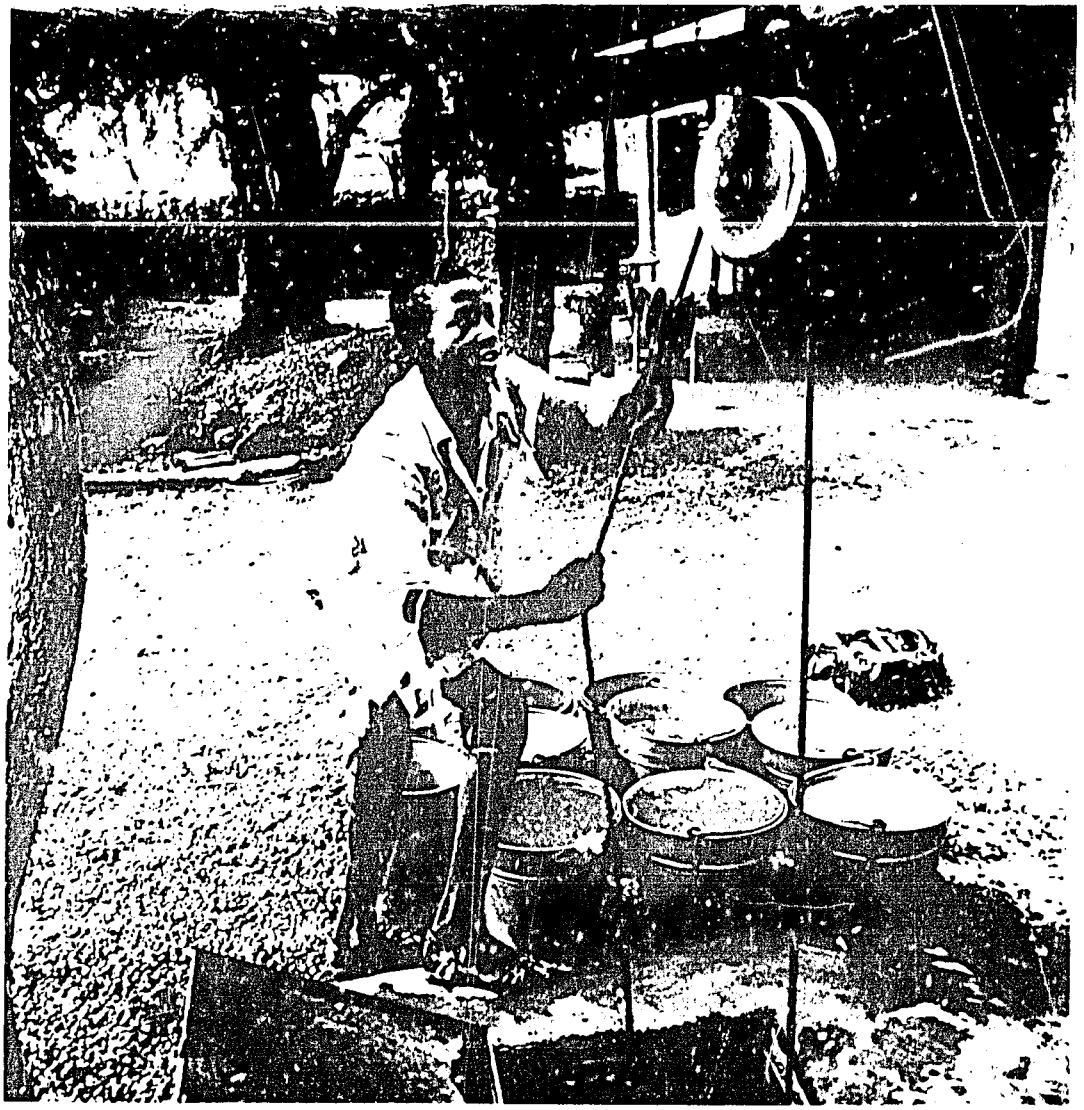

LESSONS LEARNED
From the WASH Project

Ten Years of
Water and Sanitation Experience
In Developing Countries

WATER AND SANITATION FOR HEALTH PROJECT

Lessons Learned from the WASH Project

Ten Years of Water and Sanitation Experience in Developing Countries

Compiled by the Staff of the
Water and Sanitation for Health Project

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TO DAVID YOHALEM

for years of dedicated support to the WASH Project

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Foreword

The United States government voiced strong support for development assistance in water and sanitation at international conferences and meetings that led eventually to the declaration by the United Nations of an International Drinking Water Supply and Sanitation Decade (1981-1990). We supported resolutions endorsing the provision of safe water supply and sanitation at the U.N. Conference on Human Settlements in 1976, at the U.N. Water Conference in 1977, at the Alma Ata Conference on Primary Health Care in 1978, and at the U.N. General Assembly inaugurating the Water Decade.

The U. S. Agency for International Development is a leading international donor among those that provide financial support and technical assistance for water supply and sanitation in developing countries. During the Water Decade years, A.I.D. support has totalled approximately $1.9 billion. It has been A.I.D.'s policy to concentrate its efforts on rural areas and urban slums. Generally A.I.D. considers projects where (1) a clear need is evidenced by inadequate or highly contaminated water supplies and poor or non-existent sanitation systems, (2) lack of basic water and sanitation pose a public health hazard, (3) people are willing to bear some of the costs of their systems, (4) the government is committed to invest in water and sanitation and has institutions and personnel with the capability to carry out projects, and (5) the infrastructure is developed enough to make routine travel and communication possible.

One of the first steps that A.I.D. took to meet the Water Decade's call for increased support was to create the Water and Sanitation for Health Project (WASH) to augment the Office of Health's ability to provide technical assistance for the sector. WASH was designed to provide A.I.D. project officers with—in the words of a July 9, 1981, "Front Lines" article on WASH—a "complete tool bag of technical services, but without the red tape characteristic of most A.I.D. projects." The tools in the bag are technical assistance, information support, technology transfer, and manpower development and training.

WASH is centrally funded by A.I.D. as a multi-year project that operates for all intents and purposes as the water and sanitation "unit" of the Office of Health. It is a private sector mechanism that can respond flexibly and quickly to A.I.D.'s needs and that offers A.I.D. valuable administrative and technical assistance. In setting up WASH, Camp Dresser & McKee International Inc., an environmental consulting firm that has been awarded the contract through three bidding procedures, put together an impressive consortium of specialized institutions to provide the project with the range of specialties it would have to call on to provide truly multidisciplinary services. WASH set up its own very effective management system. As the "Front Lines" article stated: "WASH strikes right to the heart of

[funding and administrative] delays which the General Services Administration repeatedly has blamed on time-consuming contracting and procurement."

The project has received consistently good reports from A.I.D.'s overseas missions and bureaus with which it has worked. From 600 plus technical assistance assignments that WASH has undertaken in 60 some countries many successes stand out. Three representative examples show how wide-ranging WASH technical assistance is.

In Sri Lanka WASH technical assistance to the USAID Water Supply and Sanitation Sector Project helped the National Water Supply and Drainage Board introduce a range of upgrading actions and reforms including an in-house computerized billing system, decentralized offices to improve consumer outreach, an effective complaints monitoring system, rectification of 20,000 faulty meters, and an increase in tariffs, including the lifting of an arbitrary cap. The projected impact of these moves is considerable: an increase of almost 10 percent in monthly collections and reduced wastage and abuse of domestic water supplies. In a time of reduced resources, such savings mean that coverage can be extended to more households.

In Zaire, the USAID mission has been working since the early 1980s to assist in the development of an effective rural water and sanitation sector, starting with assistance in preparing a workable strategy. Over the years, WASH has provided technical assistance in training, audio-visual aids, institutional development, and the much needed area of operation and maintenance. Zaire's response to the Decade has been to engage in careful, realistic planning; although its resources are limited, it is now in a position to use them wisely for projects that should last over the long term. WASH shares to some extent in that success.

In Bolivia, WASH has assisted CARE in an ambitious integrated rural water and sanitation project that has provided water through household connections and water-sealed latrines to 10,000 households. WASH's contribution has been to conduct project planning and evaluation workshops at key moments in the evolution of the project and to assure that the community participation, hygiene education, and operation and maintenance aspects of the project were given the emphasis they deserve.

These accomplishments have become part of the Decade story: 600 million more people served with a drinkable water supply, 360 million more with sanitation, and many additional countries with sector or "Decade" plans in place for providing water and sanitation for all. Other accomplishments of the Decade are more "abstract": Put simply, as a result of the Decade, those of us who work in water and sanitation in developing countries know much more about what we are doing. We have learned a great deal about what technologies work best and are least expensive, about how to design durable water systems, about how to assure that new water systems will actually bring forth the health impacts expected, about how to help developing countries build up their water and sanitation institutions so that they can meet the demands of accelerated water and sanitation activities, about how to control water-related diseases, and so on. In recounting what lessons the WASH Project has learned, this report touches on many of these abstract accomplishments.

A.I.D. has found the WASH model of central funding for specialized technical assistance services to be very successful. The Vector Biology and Control Project (VBC), Communication and Marketing for Child Survival (HEALTHCOM), Technology for Primary Health Care (PRITECH), among others, are centrally funded projects organized along lines similar to WASH. Some of these projects have asked WASH for assistance in setting up their management systems.

Through the years, the A.I.D.-WASH association has been a fruitful one. Not only has WASH consistently provided effective technical assistance to meet A.I.D.'s needs, but WASH has also had a positive impact on A.I.D. in ways not directly related to technical assistance per se. WASH has helped A.I.D. identify areas in water and sanitation where research is needed or where more emphasis should be put. WASH has provided background information on topics of emerging interest in the field. WASH has assisted A.I.D. in working more collaboratively with and in leveraging resources from other external support agencies, both bilateral and non-governmental organizations. WASH has created an institutional memory for A.I.D. in the water and sanitation sector and has become a repository of information with few rivals. Techniques pioneered by WASH for participatory project planning, for briefing consultants and helping them to work as a team, and for communicating project results have been used widely by A.I.D. WASH has consistently encouraged A.I.D. (and other development organizations) to put as many of its resources as possible into water and sanitation as the most fundamental component of a broad-based economic growth strategy.

The Decade is officially ending, but new collaborative groups are taking its place to continue the worldwide effort now that the momentum is up. A.I.D. will continue to carry out an active program in water and sanitation through the WASH Project, which is funded through 1998. In the years to come, new lessons will no doubt be added to those in this volume as A.I.D./WASH moves into new areas such as urban and peri-urban water systems and environmental protection.

For me personally, and for John H. Austin, Eugene McJunkin, and Vic Wehman, the cognizant technical officers for the WASH Project that preceded me, it has been professionally an extremely rewarding experience to work with the fine staff of the WASH Project and to assist them in meeting the challenge of providing technical assistance that is timely, effective, and—most important—wholly responsive to the needs of clients.

Arthur Dennis Long, SDC, P.E.
Cognizant Technical Officer
for the WASH Project
April 1990

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Before the manuscript was put into its final form, we asked four individuals from WASH's Senior Advisory Committee to review it. Thanks to their advice and suggestions, this report is more readable, accurate, and thorough. We are greatly indebted to all four: Daniel A. Okun, Horst Otterstetter, Barbara Pillsbury, and John Tomaro.

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I wish to thank Betsy Reddaway, WASH's publications manager, for coordinating the details of production, Carol Tilton for able wordprocessing, and Dan Campbell, the WASH librarian, for providing excellent information backup during the preparation of this report.

Finally, I would like to express my appreciation to A.I.D. for setting up this innovative project and giving us all the opportunity to work productively for goals we believe in strongly.

J. Ellis Turner
WASH Project Director

Preface

It has been nearly ten years since the Water and Sanitation for Health (WASH) Project was established by the Agency for International Development (A.I.D.) in response to the proclamation by the United Nations of an International Drinking Water Supply and Sanitation Decade. WASH has changed in these ten years. At first, the project had an engineering orientation. A great deal of attention was lavished on refining and testing rugged handpumps for use in rural villages. An early report on the WASH Project in "Front Lines," a quarterly newspaper about A.I.D. activities, mentioned that handpumps modeled after the A.I.D.-type handpump were being manufactured under WASH technical oversight in several countries. In trying to develop a handpump strong enough "to withstand a water buffalo scratching against it," WASH and A.I.D. were putting faith in the notion that the solution to water and sanitation problems lay essentially in technology.

Gradually, over the years, while not rejecting the role of engineering by any means, WASH shifted its emphasis, concentrating more and more on the *context* of water and sanitation technologies: the planning that must precede the installation of improved facilities, the communities in which they are installed, the way the people use and maintain them, what new behaviors they necessitate, how they are paid for, and so on. The extent of this switch should not be exaggerated, however, for the WASH Project operated in a multidisciplinary manner from the outset and always demonstrated interest in the "software" aspects of water and sanitation. One of the first WASH tasks was to provide advice to A.I.D. about the kind of training needed in water and sanitation projects.

Many of the lessons in this book reflect WASH's transition to the realization that bringing about improvements in water and sanitation is mainly a human rather than a technical problem. Consequently, many of the lessons can be applied to almost all development activities, not just water and sanitation. Water and sanitation development is *development* of the most fundamental nature. Lack of safe water and adequate sanitation stops the advance of civilization dead in its tracks. Further, the essential ingredients of a good water and sanitation project are likely to be the same as those of a good primary health care or family planning project.

The lessons in this book were developed by the WASH staff and reflect their experience, not just as part of the WASH team but also as individual specialists experienced in the field. Naturally, WASH cannot take credit for having formulated all these lessons on its own; the insights of many persons and organizations with whom WASH works have contributed to the lessons. In fact, as the Water Decade draws to a close and many external support agencies and developing country governments take stock, they speak almost with one voice about what the

experience of the Decade has taught. Thus, the lessons in this volume are validated and substantiated.

When the idea of producing a "Lessons Learned" volume was first conceived, each WASH task manager was asked to write down the lessons that grew out of WASH experience in his or her specialty. After a few discussion meetings, the first draft report was compiled. It contained a whopping 103 lessons! Obviously that was too many to be useful. An editor refined the first draft and organized, consolidated, and prioritized the lessons so that the most crucial could be given prominence without sacrificing the many valuable "mini-lessons."

A number of basic stylistic principles were followed in preparing "Lessons Learned." First, we wanted it to be relatively free of jargon and acronyms and written in a straightforward style. Second, we decided against using footnotes and references to written documents. The report is not meant to be academic but is a practical work drawing on the collective experience of the WASH staff. Third, we wanted the format to be easy to follow.

The report has its limitations, the principal one being that most of WASH's experience has been in *rural* water and sanitation projects. Thus, the volume has little to say about urban and peri-urban systems. For example, WASH has amassed a significant amount of know-how about organizing communities so that they can participate in the design and planning—and later in the operation and maintenance—of their water and sanitation systems. But it is still unclear how many of these techniques are applicable to communities in the burgeoning urban fringe areas of developing countries.

The WASH experience is also limited by the very nature of the project: WASH provides short-term technical assistance at various points in the project cycle, but normally is not involved long enough to see how a project evolves over the long term and to follow up on project activities. Thus, the report is virtually silent on how long-term technical assistance should be provided and few of its lessons speak to problems related to the maturation of programs and institutions.

An attempt was made to present the lessons in their proper context and to elaborate upon them enough so that they are understandable. This book is not simply a list of "disembodied" lessons. Nor does it claim to be comprehensive. Readers may find that a topic they feel is of prime importance is not covered in these pages. If this book is silent on some topics, that in no way implies that those topics are not important. We knew we would not be able to cover every aspect of a subject so vast as water and sanitation, but chose instead to drive home a few central concepts—ones that have been important to WASH.

The lessons are stated simply and often seem self-evident. A reader's response may be that the lessons are "nothing new," that "everyone" already knows these lessons. To some extent, that perception is accurate. The lessons are not startling. But it is also accurate to say that the most obvious and well-known lessons are often overlooked or ignored even by seasoned practitioners.

In the October 1989 edition of "Waterlines," Ingvar Andersson, Head of the Water Section of the Swedish International Development Agency (SIDA), describes his agency's experience in Tanzania. After explaining that conditions in

Tanzania appeared "ideal" for the development of water supply and sanitation, he writes,

> One could expect then that the water supply programme in Tanzania would be very successful. The reality has been a high level of project failure, and very little impact. The majority of supplies installed are not in use, either because they do not work or they do not meet the real needs of the population.

Andersson blames the economic crises of the government to some extent but also mentions other factors responsible for the "poor success rate in the water sector": "inappropriate technology choice; neglect of operation and maintenance aspects; failure to include health education and sanitation improvements; the tendency to plan from above on a large scale with little or no consideration given to local social conditions; . . . and the almost complete lack of community involvement, in particular that of women. . . . A major overall problem has been that improvements to water supplies have been treated as purely technical problems, rather than as a problem of social change requiring the full participation of the communities involved."

Andersson's analysis reads like a litany from the lessons in this volume. It is my guess that SIDA workers were not unaware, for example, that operation and maintenance is important. But it is one thing to understand a concept and quite another to translate that understanding into effective action. The lessons are easy to articulate but difficult to implement. Difficult because they require careful advance planning and often depend upon time-consuming processes such as building up institutions and training personnel. Difficult because there are no short cuts.

For example, it seems that "everyone knows" this lesson: Water supply projects do not achieve their full impact unless they are linked first to hygiene education and then to sanitation. This well-understood lesson notwithstanding, the unsanitary use of improved water supplies is a worldwide problem—water, clean at the source, is polluted in transit or in the home and thus continues to be a source of illness. Yet, creating the necessary links, setting up hygiene education programs that are culturally appropriate, effective, and feasible given local institutions and manpower, is difficult. It requires that the local target community be involved from the outset, that project personnel be able to work together for common goals, that governments find ways to coordinate the work of various, sometimes competing, ministries, that money be spent on activities that have no *direct* impact on increasing coverage, and so on. It seems simpler, in fact it *is* simpler, to avoid working out these complications and settle for sending in a well-drilling team. But, if our goal is improved health and sustainable systems, we must opt for the more complicated process of creating the necessary linkages.

In short, to put these lessons in practice calls for a concerted, persistent effort. If compromises must be made with the principles articulated here, we must make them with our eyes wide open to what will be lost in impact and sustainability. The key is careful planning.

* * *

It is not only the WASH Project that has changed in the last ten years. The world has changed too. Those changes are compelling WASH to make some careful corrections in its course. New lessons will be learned in the coming years.

The most noteworthy changes in the world are demographic. In 1980, 3.312 billion people lived in the developing countries of the world. Today that number has increased by 22 percent to 4.036 billion. In developing countries, this demographic pressure, combined with debt crises and stagnant economies, has had the effect of reducing the resources available for water and sanitation development. In providing water and sanitation, countries have had to run just to stand still and are looking for ways to reduce and recover costs. To meet this need, WASH has increased its capability in finance and management and is developing useful tools to help water agency personnel make informed decisions about levels of service, ability and willingness of users to pay, and innovative ways to capitalize new systems.

We have a lot to learn about the important area of finance. But we do know that it is unrealistic to expect external donor support to expand. Feeling the pinch of domestic priorities and budget deficits, large donors have less and less to give away or lend. They certainly do not have the resources to significantly expand coverage at rates much beyond the present rate—and the present rate is just barely keeping up with population growth. Developing countries must shoulder an ever-greater share of the burden on their own, and to do that their moribund economies must be revived so that local markets can be tapped for capital and recurrent financing.

All the market stimulation, cost-cutting, and efficiency in the world, however, are not likely to make full water and sanitation coverage possible if the population continues to grow at its present rate. A recent WASH survey of Central American Initiative activities in water and sanitation presents the dilemma. Between 1984 and 1989 the United States funneled substantial support to Belize, Guatemala, Honduras, El Salvador, and Costa Rica to increase water and sanitation coverage. During that push, 1.8 million people gained access to improved water and 3 million to an improved sanitation facility: not a bad record in absolute numbers. But viewed in terms of percent covered, the advances are much less impressive: for water supply only 66 to 73 percent in urban areas and 41 to 49 percent in rural areas. Population growth overwhelmed the advances. Put in another way, from 1988 to 1989, 615,000 additional people were served with water systems. However, during the same one-year period, the population in the region increased by approximately the same number. Similar figures can be found for other regions of the developing world, making it clear that without family planning, the goal of water and sanitation for all will recede farther and farther into the future.

In the last ten years the world has become not simply more populous, but also more urban. Today 33.6 percent of the people in developing countries live

in cities. In 1980, when the WASH Project got its start, developing countries were 29.2 percent urban; by 2000 that percentage will rise to 39.3. For many of these people the "city" is a slum area—a bidonville or shantytown—with no real urban infrastructure and where people do not have access to water and sanitation alternatives available to them in the rural communities they left. Accordingly, WASH is concentrating on peri-urban water and sanitation issues and has inaugurated a peri-urban information network and clearinghouse. Were a second volume of "Lessons Learned" to be published, certainly many lessons would reflect new WASH learning in this area.

Population and urbanization have put greater stress on the environment, and environmental problems have come to the fore. A recent U.N. report speaks of "environmental refugees": "Growing human pressure on the natural environment has either rendered ecosystems more vulnerable or triggered off a self-reinforcing process of natural degradation, or both." Increased industrialization and affluence create more waste, and disposing of such waste presents problems that challenge current technologies and strain our resources. All too often it is a water source that is polluted and often the pollutant is a toxic chemical.

WASH is increasingly being called on for environmental assessments and for providing technical assistance in the areas of solid waste and industrial pollution. The "sanitation" aspects of water and sanitation for health promise to be more complicated in the years to come.

Finally, a problem now beginning to emerge that was scarcely spoken of ten years ago is the worldwide scarcity—or at least uneven distribution—of fresh water. The newsletter of the Society for International Development recently stated, in an article calling for a series of Global Water Policy and Technology Summits, "As world populations continue to expand rapidly, the ability of our inter-dependent global ecosystem to provide enough potable water, let alone food and space, to support the burgeoning human populace will be quickly outstripped. Water will become a scarce resource more valuable than oil, or perhaps even gold. . . ." "Water International," in a report on the 1988 IWRA 6th World Congress on Water Resources, predicted, "Water scarcity is expected to develop into a first rate issue within a few years time only. . . . in the 1990's water will replace oil as the major crisis-generating issue on a global scale."

How this problem will manifest itself vis-à-vis WASH is still unknown, but a current task that required WASH to help set up a hydrological monitoring and evaluation unit to carry out an aquifer recharge program for the government of Oman may provide a glimpse of what is to come. The final report on the task states, "The rapid development in Oman since 1970 has seen an increased and largely uncontrolled withdrawal of groundwater by pumping from wells to such an extent that the extraction volume frequently exceeds the natural recharge of this most valuable resource. This has been accompanied by an overall decline in water quality, the depletion of many aquifers, and rapid salt water intrusion in many areas along the northern coastline."

In the coming years, as WASH is called upon to provide technical assistance in still relatively unexplored areas, the project will be accumulating experience and learning. It will continue to make every possible effort not only to identify

new areas and inform itself on them, through applied research and studies, but also to disseminate the fruit of its learning as widely as possible to assist other organizations similarly dedicated to the goal of water and sanitation for all.

J. Ellis Turner
WASH Project Director
April 1990

INTRODUCTION: BASIC PRINCIPLES

The Concept of Development

More than a hundred countries have advanced from one type of colonial status or another to independent nationhood over the past half-century, and the economic, social, and political development of these countries has become a major goal of the entire international community. Although there is no precise definition of development, it is widely understood to be a process resulting at least in higher productivity and living standards, enhanced local problem-solving capability, and increased access to essential goods and services. "Developed" countries are those that have already gone through the process; "developing" nations are those still in transition.

The development process, to be successful, must be total, eventually covering all areas of national life. However, in order to set priorities and allocate scarce resources, governments commonly pursue development goals within specialized areas, each with its own problems and its own set of relevant policies and technologies. Traditionally, these specialized areas of development—agriculture, education, and health, for example—are called "sectors." The sector provides the organizing focus for the planning and implementation of development activities.

One of the most important sectors for development has been water supply and sanitation. Improved facilities in this area are essential to improved health for the general population and for child survival in particular, and are fundamental for the development of many industries and businesses. Major water supply and sanitation facilities, especially those serving urban areas and economic centers, form part of the national infrastructure, like roads and electric power grids. Accordingly, the international development community has made a substantial investment in water supply and sanitation development.

The Role of the WASH Project

The United States has been a leader in the worldwide development effort, having provided since the 1940s hundreds of millions of dollars in direct development assistance, economic support, and loan guarantees for a broad range of development activities. The chief implementing agency for bilateral U.S. assistance is the Agency for International Development (A.I.D.), which works through regional bureaus, headquarters offices, and some missions and offices around the world. The United States is also a major contributor to multilateral development agencies such as UNICEF or the World Bank.

Since improving socioeconomic conditions and creating infrastructure in developing nations have been major goals of A.I.D., water supply and sanitation projects have been included as a part of the total financing effort, although this

fact has been somewhat obscured by the organization of the agency and the structure of its budget. Technical assistance in water supply and sanitation development was always used by A.I.D. to support and complement its project financing, but with the launching of the International Drinking Water Supply and Sanitation Decade in 1979-80, the agency decided to augment and streamline its technical assistance capability. In July 1980, it funded the Water and Sanitation for Health (WASH) Project.

The funding mechanism was a multi-year, multi-million-dollar contract, secured through competitive bidding, with a consortium of organizations headed by Camp Dresser and McKee International Inc. (CDM), a firm specializing in environmental engineering services. The WASH Project has operated since 1980, and although there have been two other bid proceedings (most recently in 1988), the CDM consortium has continued as the contractor.

The WASH Project was conceived as an innovative way to marshall and deploy resources in the water supply and sanitation field. From the outset, its program focus has been primarily on rural areas. It is an in-place network that provides information, technology transfer, technical assistance, and training resources to support A.I.D. efforts to help client countries throughout the world. The work is done by the contractor under the technical direction of an A.I.D. project manager.

The WASH mechanism does not replace other mechanisms (such as indefinite quantity contracts) for providing technical assistance, but it does work more quickly and with fewer administrative burdens. It has thus become the major A.I.D. vehicle for technical assistance in the water supply and sanitation sector.

Since its inception, WASH has worked in sixty countries in Africa, Asia, and Latin America on over 600 activities, most of them in response to requests from A.I.D. overseas missions. In addition, it has assisted other U.S. government agencies (such as the Peace Corps) and numerous nongovernmental organizations (such as CARE, Catholic Relief Services, and World Vision). All the activities are aimed at giving developing countries the know-how and tools they need to strengthen their institutions, improve their personnel, and find economical and efficient ways to attain the water supply and sanitation goals they have set. WASH has also helped A.I.D. develop regional and country policies and strategies for its water supply and sanitation programs.

Lessons and Principles: How This Report Is Organized

With nearly ten years of experience now behind it, the WASH Project has built up a significant body of knowledge regarding what makes for success both in the provision of technical assistance and in the development of rural water supply and sanitation projects. All of this knowledge has been, of course, built on the foundation of learning and experience from the many technical assistance efforts and water supply and sanitation projects that predate WASH. The WASH experience has been shared with the international community through conferences and workshops and through the issuance of field and technical reports. Field reports describe how a specific problem in a specific country was handled while

technical reports describe research efforts or present generic guidelines that can be used in many countries to solve water supply and sanitation problems.

Drawing upon the reflections of many of the people who have operated the WASH Project and upon the published record, this report distills the WASH experience into nineteen key "lessons learned" in water supply and sanitation development. Many of these lessons are not unique to WASH; often they match conclusions reached by the broader development community. These lessons do not reflect all of the learning WASH has done or all of the useful insights into development that the project has gleaned. They do, however, represent the essence of the WASH experience and reflect the major points of the WASH methodology.

The lessons fall into two general categories. The first category (Section 1) deals with establishing and operating a technical assistance program. These lessons may be of greatest interest to donor organizations carrying out international technical assistance, but many also apply to central governments undertaking local technical assistance. The second category (Sections 2-4) contains lessons from the field that should be of special concern to any group of people charged with the responsibility for planning, implementing, financing, or evaluating water supply and sanitation programs and projects.

The format—years of development experience translated into nineteen specific lessons—has the advantage of adding sharpness and practicality to the presentation, and it is employed for that reason. However, real world development is an extraordinarily complex undertaking involving a maze of inconsistent and sometimes contradictory needs and actions. It is not nearly so simple or clear-cut as nineteen lessons would imply. The lessons are intended to highlight priority issues and concerns, recognizing that all of them are considerably interwoven. The lessons are organized around major functions such as "the design of technical assistance" or "operating and maintaining systems." The overall discussion of each function provides support or a context for the lessons themselves. The functions are, in turn, related to certain broad principles of development.

The principles that furnish the organizational scheme for the document may also be considered as lessons, for they also represent, at a higher conceptual level, conclusions drawn from WASH experience. The principles and lessons collectively constitute an outline of a WASH methodology for rural water and sanitation development. While some aspects of this methodology may have application in urban and peri-urban settings, WASH presents it as a rural methodology based on the project's predominantly rural experience.

The central feature of this methodology is but a specific application of a broad democratic premise: that whatever the level of decision-making, ordinary people can be trusted to solve their own problems if they are given the chance, and no policy or program is likely to succeed unless they are. The four major principles related to this premise and confirmed by WASH experience pertain to participatory technical assistance that results in the transfer of skills, linkage of development activities, system sustainability as the measure of success, and shared responsibility for development outcomes.

Technical Assistance

The first principle is that **technical assistance is most successful when it helps people learn to do things for themselves in the long run.** The principle is reflected in the way the technical assistance function is conceived and the way the assistance is designed and delivered. It is also apparent in the attention paid to effective communication and information exchange.

WASH conceives of technical assistance as an interactive process between the persons offering help and the persons receiving it. The role of technical consultants is not to make decisions for host country personnel but to facilitate a process in which they can make decisions for themselves. Since they are the ones who must live with the decisions, it is more important that a solution adopted have their support than that it be endorsed by technical experts, except in exclusively technical areas. This rule applies at both planning and implementation stages of development.

This style of technical assistance also tends to involve large numbers of people in decision-making. The precise number depends on circumstances, but always the lone expert dispensing wisdom from on high is eschewed in favor of inclusive processes and group decisions. WASH itself operates this way and so practices what it preaches to agencies in developing nations.

Five lessons flow from this general principle about how to assure the effectiveness of technical assistance:

- Lesson One: **Local institution-building** is the key to transferring sustainable skills.
- Lesson Two: Technical assistance in water supply and sanitation requires an **interdisciplinary approach**, not a narrow, specialized one.
- Lesson Three: A **participatory approach**—facilitation not dictation—maximizes the chance for sustainable programs and projects.
- Lesson Four: **Coordination and collaboration** are important but often depend more on professional networking and personal relationships than on institutional and contractual relationships.
- Lesson Five: An **active information service** can expand the reach of technical assistance as well as its visibility and credibility.

Effective Linkage

The second principle is that **water supply and sanitation development proceeds most effectively when its various elements are linked at all levels.** Water supply and sanitation facilities are considered essential parts of a developing nation's infrastructure if health indicators are to improve. However, construction of such facilities is unlikely to have a measurable impact on health unless it takes place as part of a broader development effort.

In the first place, the benefit of access to safe water can be negated by poor sanitation practices, so that the installation of water supply facilities should be

accompanied by improved means of excreta disposal. Second, facilities themselves mean little; they must be used properly to be effective. Thus facilities development should be accompanied by hygiene education efforts. But hygiene education, like all technical assistance, is not a matter of expert instruction; it must be rooted in the community, utilizing accepted village practices and local trainers. In particular, women, who are the family leaders in matters of health, must be involved. In other words, hygiene education efforts only work when they are an outgrowth of broad community participation.

Finally, even when all the activities in the water supply and sanitation sector are soundly linked, health improvements may be frustrated if there is no linkage with policies and programs outside the sector. For example, development of water and land resources (for hydroelectric and irrigation purposes) or agricultural practices or housing projects may have outcomes that have profound implications for water supply and sanitation.

Thus, four key lessons:

- Lesson Six: Water supply projects do not achieve their full impact unless they are linked first to **hygiene education** and then to sanitation.
- Lesson Seven: **Health benefits** are the major—but not the sole—justification for support for water supply and sanitation projects; such projects also have wide economic benefits.
- Lesson Eight: **Behavioral changes** combined with greater access to facilities are the basis for health benefits through improved water supply and sanitation.
- Lesson Nine: A **participatory approach to planning** helps ensure linkages and cooperation in implementation.

System Sustainability

The third principle is that **the basic measure for success of both the national system for development and the community management systems it creates is sustainability—the ability to perform effectively and indefinitely after donor assistance has been terminated.** It is still not unusual to see progress in water supply and sanitation development described in terms of number of wells installed or number of latrines constructed. However, most practitioners today, due in part to efforts by WASH and others, recognize the fallacy in such assessments. There is true development only when facilities continue to operate after the aid agencies depart, when the communities are in control of their own affairs, and when adequate government services are in place to provide appropriate levels of assistance.

Obviously, sustainability must begin at the planning stage when the proper linkages are established and a technology appropriate to the situation is prescribed. But putting the system in place is only the beginning of a chain of sustainability that must be forged. A sustainable system should have a financial plan that allows it to generate enough revenue to pay for operation and skilled

maintenance. There must be sustainable supporting institutions, nationally and locally, and trained personnel to staff the institutions.

The lessons on system sustainability emphasize the importance of strong institutions, trained personnel, appropriate choice of technology, well-organized operation and maintenance systems, and adequate financing for the long-term:

- Lesson Ten: Successful **institutional development** projects strive for comprehensiveness and wide participation.
- Lesson Eleven: **Training** yields the best results when it employs participatory, experiential methods.
- Lesson Twelve: Full consideration of **appropriate engineering design** and application is essential to system sustainability.
- Lesson Thirteen: Making plans for **operation and maintenance** before facilities are constructed and in place helps to ensure that sustainable technologies are selected.
- Lesson Fourteen: Plans for system **finance** that ignore the cost of long-term operation and maintenance are inadequate.

Shared Responsibility

The final principle is that **sustainable development is more likely to occur if each of the key participants recognizes and assumes its appropriate role and shoulders its share of the responsibility.** A typical developing nation has at least five types of participants: the national government (which may include regional as well as central governments), donor agencies (bilateral and multilateral), nongovernmental organizations, local communities and beneficiaries, and the private sector.

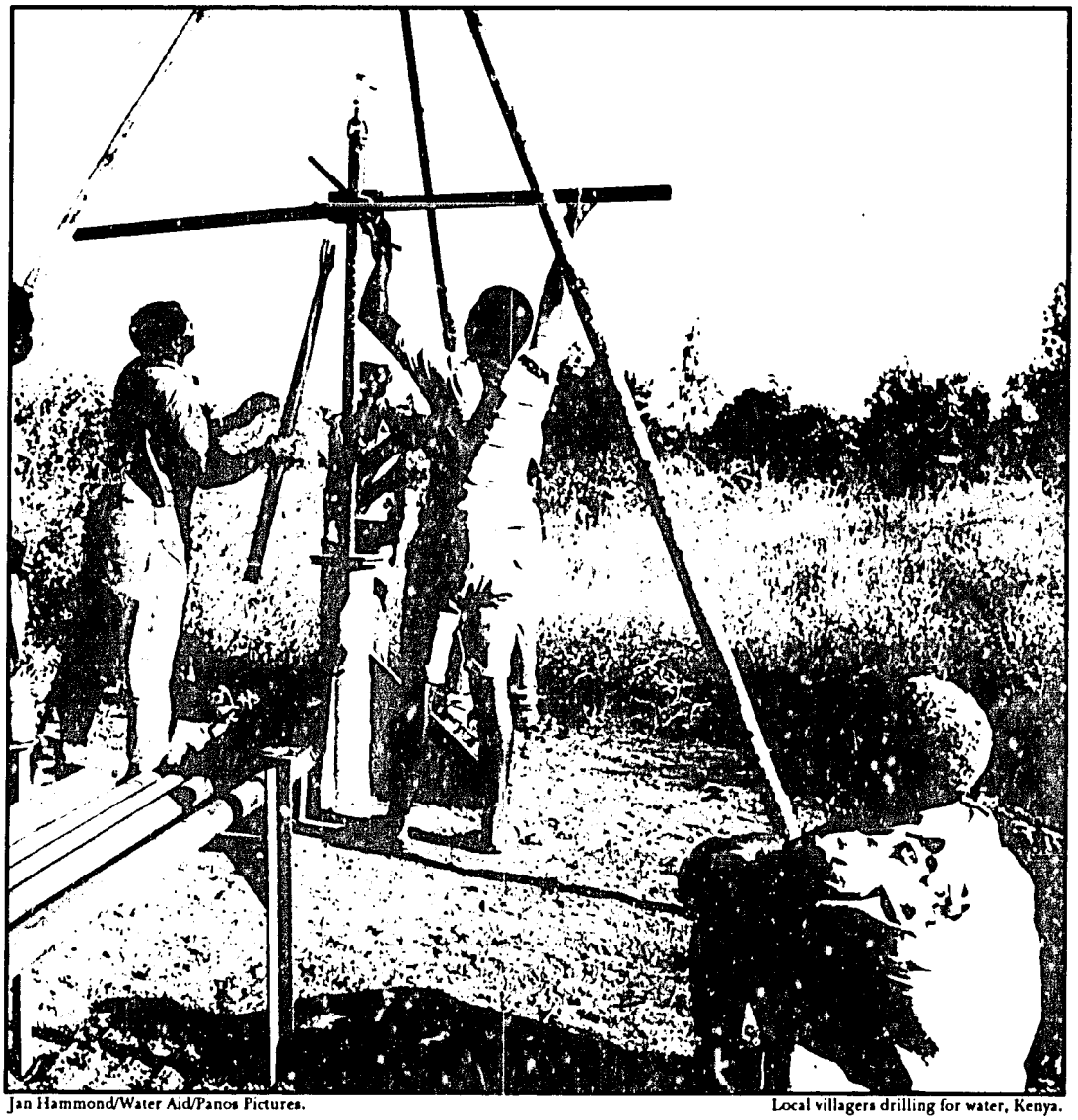
Very broadly speaking, the basic division of labor is that the national government should assume control of the development process, establishing policies and priorities, and the communities should assume responsibility for the facilities, including operation and maintenance. Donors can provide capital financing and technical assistance in accordance with government priorities, with nongovernmental organizations working in special areas not covered by major donors. The private sector should provide necessary goods and services on a vendor basis.

Thus, the final five lessons:

- Lesson Fifteen: The **national government role** is to assume primary responsibility for sector management, including planning, donor coordination, policy reform, regulation, and institutional and financial aspects of development.
- Lesson Sixteen: The **donor role** is to provide coordinated support in the context of national plans.
- Lesson Seventeen: The **NGO role** is most effective if it is played out in the context of national development plans.

- Lesson Eighteen: The **community role** is to own and manage the facilities constructed and to be actively involved in decision-making in all phases of project development.
- Lesson Nineteen: **Private enterprise** has a definite role in water supply and sanitation; that role is determined by the overall governmental strategy for the sector.

The principles and lessons in water and sanitation development described here are mutually supportive. Thus if technical assistance builds capability and if effective linkages are established and responsibilities are appropriately shared, systems are more likely to be sustainable. Sustainable systems, in turn, encourage the further expansion of capability and a greater sharing of responsibilities and building of linkages.



Jan Hammond/Water Aid/Panos Pictures. Local villagers drilling for water, Kenya.

1. TECHNICAL ASSISTANCE

Government-to-government development assistance is essentially a post-World War II innovation. The idea that it might be in the interest of one country to help another develop its economy and society first gained acceptability in the reconstruction of Europe and Asia and then became prevailing doctrine as a part of the revolution against colonialism that swept the world in subsequent decades.

At first, most of the assistance took the form of loans and grants for building or rebuilding physical infrastructure—"capital investment." The American Marshall Plan for Europe was the prototype. As new nations began to emerge throughout Asia and Africa, however, it was clear that a far costlier and longer-lasting development challenge was faced. No nation was willing to underwrite the total tremendous cash outlay that would be required for development in this

"Third World." Thus, beginning with the famous Point Four program in 1948, developed nations began to commit *people*, in addition to capital, as a type of development assistance. This cost money but was easier to sell at home than cash outlays. Such help was called "technical assistance" to distinguish it from direct financial transfers.

No matter how well-intentioned, doing things for other people does not lead to development.

The early technical assistance took the form of "expert advice." The expatriate engineer designing bridges or even holding down a government post in a developing nation was the quintessential technical assistant. The type is still found in the Third World today. However, there has been increasing recognition of the fact that, no matter how well-intentioned, doing things for other people does not lead to development. As this fact has been more and more accepted, the definition of technical assistance itself has changed.

Both bilateral and multilateral aid programs have now become prominent features of international relations, and they consist of infusions of both capital and technical assistance. Technical assistance today still means people offering help, but the intent of the help generally is not simply to solve a short-run problem but to build local capacity for solving future problems, not simply to apply a technology but to transfer the technology, not simply to provide skills but to build skills. It is this concept of technical assistance that WASH treats as a principle in carrying out water supply and sanitation development: **Technical assistance is most successful when it helps people learn to do things for themselves in the long run.**

The lessons learned by WASH with regard to technical assistance are divided into five categories. First, one lesson further elucidates the basic concept of technical assistance. This is followed by lessons that relate to, second, how a technical assistance system should be structured and, third, how the assistance is delivered in practice. Fourth, since the technical assistance system must operate in the context of other agencies, some of which are also technical assistance providers, there is also a lesson to be learned regarding networking and coordination of effort. Finally, information exchange, while an integral part of technical assistance, is an extension of it that requires separate consideration.

The Function of Technical Assistance

The WASH Project seeks not just to aid in the development of water supply and sanitation facilities but to ensure that the facilities developed are used by the population. If this is to occur, the facilities should be operated and maintained correctly, be fiscally sound and functional, and be supported by strong local and national institutions. These are the goals of the technical assistance that WASH designs and delivers.

The process of technical assistance is just as important as the substance.

In the context of these goals, the process of technical assistance becomes just as important as the substance. Whatever the substance of the technical assistance activity, the correct role for the provider is to carry out the assistance requested in a way that builds capability. This approach has at least two positive results: first, it helps to ensure that skills—not just information—are transferred, and, second, in the long run, it helps to create a situation in which technical assistance is no longer required. Thus the first WASH lesson:

***Lesson One*: Local institution-building is the key to transferring sustainable skills.**

National policies and economic considerations may facilitate institution-building or make it all but impossible to achieve.

Institution-building occurs in a context external to it which may determine its eventual success or failure. National policies and economic considerations, for example, may facilitate institution-building or make it all but impossible to achieve. In this, as in other areas of technical assistance, the national capacity and framework for absorbing assistance has as much to do with its impact as the quality of the assistance itself.

In many cases, technical assistance, far from strengthening local institutional capability, is delivered in a way that is actually detrimental to it. This happens with both external technical assistance from an outside agency and internal technical assistance such as that provided by an expatriate working full-time in an agency or giving long-term assistance prior to turning control fully over to local groups or officials.

Characteristics of effective assistance. In both cases, the problem is usually one of not perceiving institution-building as a major purpose of technical assistance and thus of not structuring the assistance so that this takes place. "I am the expert" remains the preferred modus operandi of many technical assistance consultants, al-

though it is rare to find this approach institutionally codified or even approved among technical assistance organizations. Expatriates, whether serving as employees or long-term advisors, sometimes retain vestiges of paternalism which clearly is a major barrier to institution-building.

Whatever the cause, the result is the same. Technical assistance—in terms of information or advice—is provided but, at best, has limited long-term impact because it is not a result of an organic process designed to help people learn to solve their own problems and build the ability to permit them to do so. At worst, WASH experience indicates, technical assistance fosters a permanent need for outside help because the local people are not permitted to develop the expertise that would make such help unnecessary or even employ the expertise they may already possess. In cases where long-term advisors and other expatriates have conceived of their mission as local capacity-building, such as in Swaziland and Sri Lanka, they have provided needed leadership and assistance but have also served as a catalyst for sustainable programs.

If programs involving donor-sponsored employees are operated without clear institution-building objectives, they often have the result of actively discouraging the local government from developing the ability to meet its own needs.

This problem also manifests itself when a donor agency pays the salary of consultants working in the water and sanitation sector in the host-country government. This is currently the case in several ongoing A.I.D.-sponsored projects and in many projects supported by other donors as well. Although this approach satisfactorily achieves the immediate goal of getting water and sanitation problems addressed, it has no institution-building component and does nothing to ensure that the effort continues once the donor-sponsored employee leaves.

Even where there is a host country/counterpart support requirement, its intent is often inadvertently subverted when donors allow funds from other donor programs within the agency to cover the counterpart support requirement. Unless there is a commitment from the host government and a permanent local employee of the agency learns how to do what the donor-sponsored person has been doing and how to support what has already been accomplished, the entire investment is seriously at risk.

If programs involving donor-sponsored employees are operated without clear institution-building objectives, they often have the result of actively discouraging the local government from developing the ability to meet its own needs. Where such programs do focus strongly on

local capacity, as with many projects in Latin America carried out some years ago by A.I.D. and its predecessor agency, the International Cooperation Agency, they are outstandingly successful in achieving both sector development and good relations between countries.

In WASH experience, two of the most important factors in institution-building are the duration of technical assistance efforts and the timing of capital infusions.

If a technical assistance provider expects to have a real impact on the water supply and sanitation sector and on the institutions that support the sector, it should be prepared to participate over the long term.

Duration of technical assistance. Institution-building is not easy to do and takes time, factors which undoubtedly contribute to its relative rarity. If a technical assistance provider expects to have a real impact on the water supply and sanitation sector and on the institutions that support the sector, it should be prepared to participate over the long term. Similarly, governments receiving the technical assistance should also be committed to long-term efforts.

Sustainable programs evolve; they are not created and put in place. Much of the success of this evolutionary process depends on institutional and human relationships. The technical assistance provider should be seen as a consistent, reliable, and available partner, working with the government in an ongoing process of identifying problems and devising solutions, a process that may take years before a sustainable program is in place.

Unfortunately, this timetable often does not fit in with the needs of donors, whose top priority usually lies in getting capital out into the field where it is needed for projects. All too often, this takes place in the absence of realistic considerations of whether the recipient country has the institutional structure and the capability to absorb and use the money successfully for its designated purpose.

Experience makes clear that no amount of capital invested will bring about development unless the country has the capability to use the capital effectively.

Timing of capital infusions. Experience makes clear that no amount of capital invested will bring about development unless the country has the capability to use the capital effectively. Many Third World countries simply do not have the institutional infrastructure or the expertise to carry out sustainable programs on their own. Even so, this fact is frequently ignored until problems become visible and threaten to overwhelm a program. WASH has seen numerous occasions when a country realized the need to develop the institutional capacity only after the construction of a facility. In Sri Lanka, for example, the World Bank held up a major loan at the last minute until the Sri Lankan government brought in a

USAID technical assistance team and agreed to an institution-strengthening project.

The Design of Technical Assistance

Lack of a close working relationship between the technical assistance contractor and the sponsoring government agency introduces delay and inefficiency, at best, and inertia and wasted resources, at worst.

There are many factors involved in designing a worldwide technical assistance effort like WASH. Clearly, there is a need to establish and maintain a close working relationship with the sponsoring government agency. The complexities of the undertaking demand flexibility, streamlined procedures, shared understandings of goals and responsibilities, and mutual confidence between contractor and funding agency. Lack of a close working relationship between the two introduces delay and inefficiency, at best, and inertia and wasted resources, at worst. The WASH approach has been to keep A.I.D. fully informed at all times of relevant activities and to foster a collegial relationship between the staffs so that communication is occurring on a daily basis. This has enabled both contractor and agency to anticipate problems, clarify issues and procedures as they arise, and learn from mistakes.

Effective central management by the technical assistance contractor or agency is required since a wide-ranging technical assistance project is potentially a management nightmare.

Effective central management by the technical assistance contractor or agency is also required since a wide-ranging technical assistance project is potentially a management nightmare. The variety of human resources to be assembled and coordinated, the logistical and administrative support to be arranged, the geographically far-flung activities to be implemented simultaneously, and the sometimes politically sensitive nature of the projects to be undertaken call for a project design and structure that is highly complex.

One ever-present danger in a technical assistance large program is being overwhelmed by requests for help and their attendant details and paperwork.

There is also a need for systematic procedures in responding to requests. One ever-present danger in a technical assistance program of the magnitude of WASH is being overwhelmed by requests for help and their attendant details and paperwork. The only way to avoid this is by establishing systems and procedures that routinize every operation insofar as possible. WASH has established effective standardized procedures for most of its experiences—from fielding teams and sending cables to writing letters, reviewing reports, and distributing copies. In the area of responding to requests for assistance, WASH has developed a system that has worked so

well that parts of it have been adopted by other A.I.D.-funded technical assistance projects and the Peace Corps.

Probably the most demanding aspect of WASH from a design standpoint is the multifaceted and complex nature of technical assistance and of water supply and sanitation development. Unquestionably, the belief that technical assistance means community- and institution-building results in a need for far more diverse and specialized skills than would be required if technical assistance were defined only as giving advice or even solving problems. Similarly, the commitment to linkage and sustainability as basic principles introduces "software" needs that would not exist if WASH believed that water and sanitation development were largely a matter of choosing the right hardware. Given these principles, a second lesson is manifest:

The belief that technical assistance means community- and institution-building results in a need for far more diverse and specialized skills than would be required if technical assistance were defined only as giving advice or even solving problems.

Lesson Two: **Technical assistance in water supply and sanitation requires an interdisciplinary approach, not a narrow, specialized one.**

An interdisciplinary orientation was a key feature of WASH from the time of its conception, although at that point it was stressed most at the level of technical assistance teams. Believing that if an interdisciplinary approach were valid in the field team context, it should also be valid in others, WASH has used this approach in structuring the consortium that operates WASH, in staffing, and in technical assistance activity management, as will be seen below.

Assuring access to specialists in varied disciplines. The need for strong multidisciplinary and interdisciplinary capability virtually dictated the consortium structure under which WASH operates. There is a prime contractor (Camp Dresser & McKee International Inc.) and a number of subcontracting organizations, each with its own set of disciplinary strengths and resources. All are members of the WASH consortium in which they are professionally equals but administratively answerable to Camp Dresser & McKee International Inc. The majority of the subcontractors have at least one senior person on the WASH staff, while the prime contractor provides the top management and support staff. All consortium members are responsible, if called upon, for providing consultants and staff in their area of expertise. Thus there

are consortium members whose specialty is engineering (Camp Dresser & McKee), health (University Research Corporation), communications and information (International Science and Technology Institute), human resource development (Training Resources Group), community participation, hygiene education, and finance (Research Triangle Institute), applied research (the University of North Carolina), and others with other specific skills.

Active debate among staff is encouraged; management decisions are made in a participatory manner; constant communication and information exchange are required.

Core Staff. The WASH core staff represents most of the key disciplines important in water supply and sanitation development, and staff members are encouraged to interact frequently in all aspects of their professional lives. Active debate among staff is encouraged; management decisions are made in a participatory manner; constant communication and information exchange are required. When requests for technical assistance are received from USAID missions, a senior staff member is designated as manager. While this decision is sometimes based on substantive expertise, it is as often determined by past experience, interest, or work load. All senior staff should be willing and able to manage activities outside their own disciplines and to remain up-to-date with all WASH activities to provide back-up when an activity manager is carrying out a field assignment. Major decisions on activities are based more often on vigorous discussion among senior staff than on the solitary judgment of the activity manager or the project director.

Consultant teams. WASH also uses an interdisciplinary approach in assembling and fielding consultant teams to carry out technical assistance activities. It is up to the activity manager, working with the mission requesting assistance, to determine and put together the right mix of skills, expertise, and experience to accomplish the task. In the very early years of WASH, most of the technical assistance activities emphasized traditional engineering approaches to water supply development; however, requests have become much broader and less hardware-oriented over time. The increasingly diverse range of problems that WASH is asked to address requires more diversified consultant teams working in the same collegial, participatory manner as the WASH staff itself does. Thus assembling and fielding consultant teams is as much an art as a science.

WASH's extensive consultant roster is organized according to nineteen skill categories important in water

supply and sanitation development. In choosing consultants WASH has learned to place a high premium on Third World experience generally and water and sanitation-related experience specifically.

WASH deliberately avoids using as consultants highly qualified domestic experts with no Third World experience and no fluency in foreign languages because many such people are in the end unable to relate to the developing country experience. Although the project makes an effort to attract new talent to its roster, there are many advantages in using consultants with previous WASH experience because they are already familiar with and supportive of the WASH technical assistance methodology and philosophy. At present, WASH is attempting to increase the number of Third World nationals on its roster to broaden its consultant pool and make better use of the talent available in developing countries.

The Delivery of Technical Assistance

One of the most significant findings of the past decade of development assistance is the essential role of active community participation at every stage of a project. The obvious corollary is that sustainable development programs also require active client participation at every stage beginning with planning. Yet far too often, technical assistance providers preach the former to the client while largely ignoring the latter as they set about providing technical assistance. The result is much the same as at the community level: programs and projects fail because those left with implementation responsibility had no say in their planning or design.

When clients are equal participants in the process of identifying problems and developing solutions, they learn from the process and capacity-building occurs.

Active participation in the process of identifying problems and developing solutions, which is the crux of most technical assistance efforts, is itself a learning experience. When clients are equal participants, they learn from the process and capacity-building occurs. Dictating solutions may solve short-term problems but it does nothing to increase the likelihood of long-term development. The lesson is clear:

***Lesson Three*: A participatory approach—facilitation not dictation—maximizes the chance for sustainable programs and projects.**

A participatory approach results in greater support for the solutions arrived at and a greater likelihood that the effort will continue after the technical assistance team has departed. When people participate in making a decision, selecting among alternatives, or developing a plan, they are much more likely to support it and work to see it succeed. The best solutions are those that foster sustainable development, and sustainable development must, by definition, be carried out by the country involved.

In most technical assistance activities in the water supply and sanitation area, there is no single "right" or even "best" answer. Generally, the right answer is the one that is implementable and that depends more on the psychological investment of those who will implement it than on the elegance of the solution. Psychological investment correlates directly with level of involvement in framing the solution. Thus, for example, the "best" country plan for the International Drinking Water Supply and Sanitation Decade for Swaziland is the plan that the Swazi government was actively involved in developing because that is a plan the government will believe in, support with money and other resources, and work to make succeed.

The role of the technical assistance provider is to facilitate the decision-making process, making intellectual contributions to that process, to be sure, but giving priority to ensuring that all are heard and are involved in making decisions.

The role of the technical assistance provider, then, is to facilitate the decision-making process, making intellectual contributions to that process, to be sure, but giving priority to ensuring that all are heard and are involved in making decisions. This is by no means an easy task, particularly for those unaccustomed to this role. WASH has developed several techniques that have been most useful in keeping its technical assistance activities focused on facilitation rather than dictation.

Preparing technical assistance teams. The team planning meeting is the major ingredient in the WASH technical assistance process. This meeting, usually run by the staff activity manager and attended by all team members, is participatory in nature and has multiple objectives. Its primary purpose is to brief the consultants on the background of the assignment, clarify goals and purposes of the activity, and develop an outline of the end product and a work plan. This work plan is the central tool for defining and implementing the assignment. It serves as the basis for developing a consensus on the scope and nature of the assignment among the team members and between the team and the client.

Another objective is to build an effective team and pass on relevant WASH experience. Individuals vary in the

degree to which they are comfortable as members of interdisciplinary, participatory teams which include the client as a key player. It is important for team members to compromise with the client on issues that do not damage the integrity of the project while holding firm on those that do. There are many more of the former than the latter, but the more common problem in consultant teams is resisting compromise. The team planning meeting gives the activity manager and the team leader the opportunity to spot such potential problems and take steps to solve them.

The most important rule in successfully delivering technical assistance is to provide the assistance the client wants, not the assistance the provider thinks the client needs.

Defining client needs. While most clients expect and want the intelligent contributions of the technical assistance team, they do not want to be dictated to or patronized. The most important rule in successfully delivering technical assistance is to provide the assistance the client wants, not the assistance the provider thinks the client needs. In order to obey this rule, it is first necessary to clearly identify the client, whose identity is not always immediately apparent. The most useful question to ask in this regard is, "Who really wants to know the answers to the questions this activity is addressing?"

This is a prominent topic of discussion at team planning meetings because WASH has learned that a successful activity is contingent on a shared understanding, among team members and between the team and the client, of the purpose of the activity and what it seeks to achieve. Once the client has been identified, it becomes a member of the team and the process of clarifying the client's objectives can begin. This process is an iterative, ongoing one which begins with initial discussions on receipt of the request for assistance and only concludes when the draft report is submitted on departure.

The ultimate failure in technical assistance is to complete the assignment and submit the report only to be told that this was not really what the client wanted or needed after all.

This participatory approach to determining client needs and objectives is particularly important because clients do not always have a clear idea of exactly what they want. Even when they know, they may not be able to articulate it clearly. In a large, complex activity, a reconnaissance visit to clarify client needs may be required before the scope of work is even prepared. The process of clarifying needs and objectives is sometimes a lengthy one, but it is always worthwhile because all clients know what they do *not* want when they see it. The ultimate failure in technical assistance is to complete the assignment and submit the report only to be told that this was not really what the client wanted or needed after all.

Maintaining continuity of personnel. Some projects on which WASH has provided technical assistance are so ambitious or complex (or both) that a series of visits are required over a multi-year period or over the life of the project. These assignments include periodic project trouble shooting, project monitoring workshops, a series of human resource development activities, or project assessments. Experience indicates that involving the same personnel in many of these assignments greatly increases the efficiency and effectiveness of the technical assistance efforts. The institutional memory tapped in this way reduces the burden on mission staff, permits more rapid start-up of activities, and alleviates the anxiety of clients who have learned to trust and value the particular consultant's work.

One example of the benefits of multiple visits is the work in Sri Lanka over the past several years. In early 1985, a WASH consultant planned and conducted a project start-up workshop for a large A.I.D. institution-strengthening project. Since then, that same consultant has teamed with others and returned to implement a series of three management training workshops for senior staff of the national domestic water supply authority. This continuity has been a major factor in the success of the technical assistance.

Debriefing clients and consultant teams. The debriefing process is the culmination of technical assistance activities and is important both to the client and to the technical assistance provider as an indicator of the effectiveness of the activity. If clients are—as they should be—fully involved in the assignment throughout, they will be generally aware at all times of how the work is progressing and much more likely to accept the results. When the assignment is nearing completion, it is important to convey to the client what has been done or found out on a fast, synthesized, but unambiguous basis. Before leaving the country, consultant teams present a draft report in as full a form as possible that puts their work quickly and clearly in the context of the client's desires. Time is also allowed to sit down and review the results with the client face to face so that misunderstandings can be clarified or additional viewpoints incorporated.

When the assignment is nearing completion, it is important to convey to the client what has been done or found out on a fast, synthesized, but unambiguous basis.

From the technical assistance provider's viewpoint, the consultant team is the most accessible information source on the assignment and can provide a wealth of useful feedback on both the substance and process of the activ-

ity. To capture this, WASH uses both informal and formal debriefings along with written reports.

Timing may be everything where debriefings are concerned. Memories and perceptions are clearest immediately after the assignment, and since much of the informal institutional memory of an organization making heavy use of consultants is vested in them, the more that can be done to capture their experience, the less the risk that something of potential importance will slip through the cracks. Activity managers also urgently need to develop a quick sense of whether the assignment went well or not. Some activities inevitably go badly and leave the client less than fully satisfied. If this is known right away and the situation is followed up correctly, the negative impact can be minimized. The technical assistance provider can offer to redo the assignment or take other steps to rectify and salvage the situation. Obviously, a bad situation becomes less salvageable as time passes, so initial debriefings should occur within a few days after the team has returned.

Timing may be everything where debriefings are concerned.

Following up on activities. When a technical assistance activity ends, the primary responsibility for implementation shifts to the client. The consultants have done their work and prepared their report; the client has accepted the results and is prepared to go forward with the effort. The ultimate success of the activity depends on whether the latter—continued effort—really occurs, and this will not be known unless follow-up is done to find out what the impact or results of a particular activity have been.

In many technical assistance projects, follow-up receives a low priority. Although all are aware intellectually of the need for it, the press of other business—new activities to plan and manage or paperwork to be completed—frequently has more immediacy and receives greater attention. Little time may be left to seek out information on past activities, see if the objectives really were met, reflect on experience, and apply lessons learned since to completed efforts. Because of the way it operates—responding to A.I.D. mission requests of assistance—WASH often does not have the opportunity to vigorously follow up all assignments, but where it is able to do so, the results are rewarding.

One example of the rewards of follow-up is the project's work in Malawi. In 1983, WASH carried out a midterm evaluation of the USAID water supply project and recommended that more emphasis be placed on

health education and sanitation. WASH then implemented workshops to develop a hygiene education handbook and to train trainers in its use. The handbook is now used not only for water supply and sanitation projects but for other health initiatives as well. WASH next helped design a project monitoring system and initiated efforts to assess health impacts. This series of follow-up activities contributed to the overall effectiveness of the project. Subsequent studies suggested that the project had a positive impact on reducing diarrheal disease. In addition, higher attendance at well-baby clinics and higher rates of immunizations were reported in villages involved in the hygiene education and sanitation activities.

Coordination and Networking

Coordination and networking have several significant benefits for technical assistance projects. Coordination of activities with other multilateral and bilateral agencies and other A.I.D.-funded projects permits more effective use of resources, sets the stage for collaborative efforts, helps to prevent duplication of effort, and permits the project to play on a wider, more visible stage. Networking—the process of building and maintaining mutually beneficial professional relationships with colleagues in other organizations—brings greater visibility to the project and its work, enhances its credibility, provides access to expertise and information beyond its internal resources, suggests opportunities for coordinated and collaborative efforts, and expands awareness of the importance and impact of water supply and sanitation development.

Agreeing on the need for collaboration is not enough. If the people working in institutions are unwilling or unable to develop relationships with their colleagues, to share information, and to collaborate on activities, a policy in favor of collaboration will remain nothing more than words on paper.

Unfortunately, agreeing on the need for collaboration is not enough. If the people working in institutions are unwilling or unable to develop relationships with their colleagues, to share information, and to collaborate on activities, a policy in favor of collaboration will remain nothing more than words on paper. The lesson is in some respects a discouraging one because it is not susceptible to planned interventions:

***Lesson Four*: Coordination and collaboration are important but often depend more on professional networking and personal relationships than on institutional and contractual relationships.**

Today, the trend seems to be toward greater coordination and collaboration, and a favorable climate exists for achieving these both at management and field levels. Part of the impetus for this is declining resources for development projects and a greater emphasis on affecting Third World government policies, both of which support and encourage this trend. Technical assistance organizations should be ready and able to take advantage of this opportunity and initiate and participate in joint efforts.

Management coordination. At present, WASH is involved in joint activities with a number of international and bilateral agencies in the areas of operation and maintenance, information, applied research, cost recovery and financial management, community management, training, community participation, and the role of women. These activities take the form of joint conferences, jointly prepared and presented papers, and joint technical assistance teams. While these efforts are proceeding smoothly and advantageously, there are some potential problems in collaborative efforts that should be recognized and addressed to the extent possible.

Perhaps the most important problem is that collaboration and coordination are time-consuming, substantially more so than doing everything oneself. There are many meetings that must be held, telephone calls to be made, and memoranda to be written. An already hectic and stressful operation becomes even more complex as pressures are felt from institutions other than one's funding agency. There may be competing priorities for time and other resources. Total control over the quality and direction of the work is lost. Even with these potential problems, the potential pay-offs are great so long as the primary purpose and priority of the organizations are kept firmly in mind.

Field coordination. Just as an institutional policy supporting coordination does not necessarily lead to cooperative efforts, so coordination at the management level may or may not lead to coordination in the field. Not all field technical assistance efforts, of course, require coordination, but many do. It is not at all unusual for water supply and sanitation technical assistance teams from different agencies within the same country or counterpart agencies in other countries to meet by accident in the same hotel. Even if the headquarters offices back home are aware of the fact and have agreed to coordinate efforts and have so informed their respective teams,

whether this occurs in any useful way or not depends almost entirely on the willingness of team leaders and members to make it happen.

This is not to say that management level coordination plans are totally irrelevant. Certainly an atmosphere and an approach that encourages and supports coordination is better than one which does not, and making it clear that performance will be evaluated in part on the degree of coordination and collaboration achieved is a powerful stimulus. However, since managers are likely to be physically far away and unaware of much of the detail of what is occurring until after it has happened, their ability to impact field situations is very limited.

The best way to foster coordination in field situations is to look for consultants to act as team leaders who believe in the value of coordination and collaboration and will be sensitive to and even seek out opportunities on the ground.

It is probably impossible to take a non-collaborative personality and change it, whatever pressures or directives come from above. The best way to foster coordination in field situations is to look for consultants to act as team leaders who believe in the value of coordination and collaboration and will be sensitive to and even seek out opportunities on the ground. This belief can then be fostered by encouraging networking and communications and by demonstrating coordination at management levels.

Information Exchange

While there is no question that the most effective transfer of technologies, skills, and information occurs through technical assistance activities in the field, the need for such transfer far outstrips the resources available to provide technical assistance. One important way in which this gap can be narrowed is through the development and dissemination of written materials. WASH field experience and management analyses benefit a much wider group of people than those directly exposed to WASH only because the project has an information service which is an integral part of its operation and is given the same status and priority as its field technical assistance activities.

Developing and distributing materials drawn from its work also plays an important role in increasing the project's visibility and credibility. In other words, dissemination of materials has a marketing impact at substantially less cost and with a much wider audience than other techniques such as conference participation or reconnais-

sance visits. For these reasons, WASH has given high priority to capturing as much of its knowledge and methodology as possible on paper and making these publications widely available. Thus, the lesson:

***Lesson Five*: An active information service can expand the reach of technical assistance as well as its visibility and credibility.**

An information component extends a project's reach by letting it benefit from the work of others.

WASH produces both technical reports and field reports, many in French and Spanish as well as English. The former are higher-quality materials in which issues are generally examined in depth, experience is synthesized, and greater attention is paid to review, revision, and presentation. The latter are the result of technical assistance activities, and highest priority is given to capturing and disseminating the results of the field activity quickly rather than to producing a perfect document. WASH makes both types of documents freely available to interested parties and routinely distributes them to those on the WASH mailing lists. By the end of fiscal year 1989, WASH had published 63 technical reports and 271 field reports.

An information service also extends a project's reach by letting it benefit from the work of others. Efforts in information exchange have resulted in a collection of over 5,000 water, sanitation, and health-related documents, one of the most comprehensive collections of information on water supply and sanitation available. An important function of this collection is to provide access for WASH staff and consultants to a broad range of documents addressing common problems from a variety of technical, cultural, and political viewpoints. This can be extremely useful in preparing consultant teams, responding to technical assistance requests, and keeping staff and consultants aware of what is happening elsewhere in water supply and sanitation development.

The information service is the center of competence in planning, designing, and implementing technical information systems.

In addition to carrying out marketing, dissemination, and library functions, an information service also provides technical assistance, institutional memory, and specialized collections and networks.

Technical assistance backup. As the need for and benefits of organized technical information systems have become more widely appreciated in the developing nations, more requests have been received for technical assistance in planning, designing, and implementing such systems.

Three countries—Fiji, Thailand, and Zaire—have requested and received assistance from WASH in information activities. A technical assistance activity in data-base management was also carried out in Thailand in conjunction with a water resources center which may become a library. WASH is at present involved in a collaborative effort with the World Health Organization Country External Support Information (CESI) system.

Institutional memory. The collection, organization, and maintenance of information about the experiences and accomplishments of an organization permit it to build on its past successes and avoid repeating its past mistakes. The information service is the institutional memory both of WASH and of A.I.D.'s water supply and sanitation sector. In addition to maintaining the collection of WASH field and technical reports, the WASH library also has a collection of over 200 internal field reports, interim reports, conference presentations, and other materials not suitable for formal publication. All of these materials are invaluable in training and orienting new WASH staff as well as in providing back-up to technical assistance teams.

Information exchange activities lead to the development of communications networks—interactive arrangements among organizations or individuals for the purpose of sharing information.

Specialized collections and networks. Information exchange activities lead to the development of communications networks—interactive arrangements among organizations or individuals for the purpose of sharing information. When the information collected is organized around one or more specialized topics, specialized networks tend to develop as well. WASH has used these techniques to target its information exchange efforts on high priority topics and organizations concerned with them and has become an international focal point for information in the areas of guinea worm disease, rainwater harvesting, and peri-urban issues. The networks associated with these topics are extensive and include interested individuals and organizations worldwide.

Cooperation with other organizations is a critical component in maintaining effective networks. In the case of guinea worm disease, WASH is cooperating with the Centers for Disease Control in the translation and distribution of a newsletter. WASH is also collaborating with AID's Vector Biology and Control Project in collecting information and responding to information requests on guinea worm disease.

The existence of these specialized collections and networks has had several positive results. There is an increased flow of information from WASH to influential actors in water supply and sanitation development; there is increased contact between staff and development practitioners; and there is greater visibility for the project within the development community.

Cooper + Hammond/Panos Pictures. Purifying polluted drinking water, Bangladesh.

2. EFFECTIVE LINKAGE

The concept of "linkage" emerged as a reaction to a perceived overemphasis on technology in the early stages of water supply and sanitation development. As the practice is usually described (and sometimes caricatured), early developers, who were mostly technically oriented consultants, went into countries and installed facilities to provide water or dispose of wastewater. They then departed and left the communities with their new facilities to shift for themselves, whereupon the community residents let the facilities fall into disrepair through disuse and were soon back where they started.

However widespread this was in reality, it occurred often enough to convince the development community that more than facilities construction was required. Community participation and hygiene education components thus began to be

built into facilities development projects, and the special role of women in this regard was stressed. Since even this did not always yield better health results, the importance of supporting health measures, such as nutrition, disease control, and primary health care, was also encouraged in the context of water supply and sanitation projects. Eventually many areas outside the health sector were identified as targets for what was now being called linkage. WASH has found that linkage is such a central factor in successful water supply and sanitation development that it has become one of the project's principles: **Water supply and sanitation development proceeds most effectively when its various elements are linked at all levels.**

Water supply and sanitation development are inextricably related from a health standpoint and, although improvements in either have the potential for positive health impacts, neither alone will have the impact of both together.

Linkages within the Water Supply and Sanitation Sector

The connection between sanitation and water supply is implied by the name of the sector but is too often ignored in practice. Water supply and sanitation development are inextricably related from a health standpoint and, although improvements in either have the potential for positive health impacts, neither alone will have the impact of both together. Usually improvements in sanitation practices are now a part of educational efforts accompanying new water supplies, but improvements in sanitation facilities receive far less emphasis in project development. It is true that greater amounts of water for cleaning and hygiene make it possible to overcome poor sanitation practices to some extent. However, unsanitary waste disposal is one of the leading causes of water contamination and of many waterborne and water-related diseases and can be addressed more effectively by facilities improvements. Ideally, then, interventions to improve water supplies and sanitation facilities would be planned as a unit and would occur in communities simultaneously.

Hygiene education is the essential link in bringing about behavioral changes and thus in realizing system sustainability and achieving health benefits from water supply and sanitation improvements. If the people know how to use the new facility and do use it, they are more likely to maintain it and to be healthier in the long run because of it. Thus, the key lesson regarding linkage within the sector:

***Lesson Six*: Water supply projects do not achieve their full impact unless they are linked first to hygiene education and then to sanitation.**

Behavioral changes are unlikely to take place in the absence of hygiene education because people will not necessarily know why it is better to use the new facility or how to use it properly. The germ theory of disease, so taken for granted in much of the industrialized world, is unknown to much of the Third World's poor, rural population. Old ways of doing things may have become so ingrained that people resist new ones or do not even think about them. Or, having had only limited amounts of water for their entire lifetimes, people may not know of the many beneficial uses to which it can be put. Behavior changes can only realistically be expected to occur if hygiene education takes place along with system improvements.

In ideal circumstances, hygiene education should not be the first point of interaction between those carrying out the project and those intended to benefit from it. Community involvement with the project should be ongoing and should have begun at the planning stage. If this type of participation has occurred, the community will already have learned to trust the people in charge of the project and will be much more likely to believe what is said about the facilities' benefits and their proper use.

The critical factor in the success of hygiene education is reaching people and changing the way they do some very private, personal things—defecating, washing, cooking, getting and carrying water.

The critical factor in the success of hygiene education is reaching people and changing the way they do some very private, personal things—defecating, washing, cooking, getting and carrying water. In most societies, the most important people to educate are the women because they control the household activities, are most concerned with the health of the family, and are the primary source of information on domestic matters for the remainder of the family. WASH has found two aspects of hygiene education to be of special importance in maximizing its effectiveness—the materials and the educators.

Audiovisual Materials. Hygiene education is usually assumed to require audiovisual materials (which is true) of a sophisticated and expensive nature (which is not). Evidence is that well-designed audiovisual materials can inform, inspire, and motivate both community members and public health workers. Unfortunately, some international donors, perhaps unwittingly, have created the impression through their own materials that, to be effec-

tive, such teaching aids require the use of expensive or hard-to-obtain equipment and supplies. Many low-budget organizations, such as national hygiene education units, then assume that they cannot produce anything of real value. In fact, this is far from true.

Locally produced hygiene education materials can be equally as effective as, or even more effective than, high-cost, externally produced materials.

Studies conducted by WASH and reinforced by experience with projects in Africa and Asia show that locally produced hygiene education materials can be equally as effective as, or even more effective than, high-cost, externally produced materials. It is more important for materials to reflect an understanding of the crucial role of hygiene education and community participation in changing behavior than for them to be costly or sophisticated. The materials need to be related to potential health improvements, encourage changes in user behaviors, and promote full participation of the affected group. They need to be simple and direct and designed to support a limited number of teaching points.

WASH experience also suggests that before materials are prepared, there should be careful studies of the attitudes, beliefs, practices, and past experiences of the target audiences with water supply and sanitation so that the materials can be tailored to the context in which they will be used. The media to be used should be selected based on available funds, production materials, and equipment; appropriate media may include flash cards, games, posters, pamphlets, or puppets.

Before materials are prepared, there should be careful studies of the attitudes, beliefs, practices, and past experiences of the target audiences so that the materials can be tailored to the context in which they will be used.

Hygiene Educators. Trained hygiene educators are essential to develop, make, and use the materials. It is much better if these educators come from the local community or surrounding areas as their acceptability and credibility will be higher. If this is not possible, the educators should deliver their message through or with the assistance of local people. A hygiene education program in Sri Lanka, for example, was successful in part because the hygiene educators came from the communities being served. In Yemen, a recent hygiene education campaign could not have been conducted without local assistance from each of the villages.

The use of local people is also important for project sustainability. By leaving behind a cadre of persons who can continue to educate fellow villagers in improved water use habits, an external development institution strengthens the capability of the community to continue operating the system long after the development project has ended. The ideal situation is for the educators to train

the community's committee members so that they can train the rest of the community. This is difficult because part of the effort must then focus on substantive content and part on teacher training. However, the opportunity to use hygiene education as a vehicle for capacity-building makes the extra effort worthwhile.

It is best in most cultures to use women as hygiene educators because, in most countries, it is not acceptable for men to talk with women about matters of personal hygiene. Nor can a man enter a woman's home as freely as another woman can. In conservative cultures, this is essential. In the Yemeni example mentioned above, it would have been impossible for a man to gain the same access to the women in the community that the female hygiene educator had.

Development Policy Context

The scope of a country's water supply and sanitation development program depends partly on resources and partly on the country's social, economic, and political systems.

Water supply and sanitation development takes place in a real-world setting of scarce funds, competing priorities, human resource and other institutional limitations, and social and political systems that both shape it and determine its eventual success. Thus, the scope of a country's water supply and sanitation development program depends partly on resources and partly on the country's social, economic, and political systems. Both fiscal and human/institutional resources are needed, and both are in short supply in most Third World settings. These limitations probably will never be eliminated entirely and will always seriously impact the extent to which a country can realistically attempt to address its needs in the sector.

As important as resources is the social, economic, and political context within which water supply and sanitation development takes place. Virtually everything within a country has an impact on this context and on the ultimate success of development efforts. Population growth, for example, can so far outstrip facilities development that even after many years of investment in water supply and sanitation, the absolute number of people unserved may be greater than when the effort began (see Table 1). Traditions of governmental responsibility and policy formulation and implementation play a key role. If the political system is such that the government cannot rationally and objectively develop and carry out policies,

TABLE 1

Water Supply and Sanitation Coverage in Developing Countries
(in millions)

	1980		1985		1990	
	served	unserved	served	unserved	served	unserved
Water						
urban	614	376	800	400	983	463
rural	735	1645	1000	1500	1100	1514
TOTAL	1349	2021	1800	1900	2083	1977
Sanitation						
urban	300	690	420	780	550	896
rural	238	2142	350	2150	392	2222
TOTAL	538	2832	770	2930	942	3118

Source: Carlo Rietveld, "Water Supply and Sanitation in Fast-Growing Cities," paper presented in the inaugural session of the Collaborative Council, The Hague, Netherlands, November 1988, which is based on information from the World Health Organization, the World Bank, the International Drinking Water Supply and Sanitation Decade, and the International Institute for Environment and Development and the World Resources Institute.

plans, programs, and projects, water supply and sanitation development efforts will obviously be negatively affected. Similarly, if there is no infrastructure in place to support water supply and sanitation improvements—electric power to run pumps, roads and vehicles to transport people and materials—development efforts will be seriously restricted.

In developing nations, it is important that water supply and sanitation be given a reasonably high priority to aid in ensuring that the necessary linkages with other governmental activities and other development efforts take place.

In developing nations, it is important that water supply and sanitation be given a reasonably high priority to aid in ensuring that the necessary linkages with other governmental activities and other development efforts take place. In most Third World contexts, several ministries may be involved in different aspects of water supply and sanitation development. Even if most of the responsibility rests with one ministry, more than one department will almost certainly be involved. Assigning water supply and sanitation a high priority can help give the effort the access it needs to human and financial resources in other departments and ministries and can foster better coordination of efforts and more effective use of resources.

The often-quoted statement of Dr. Halfdan Mahler, former director-general of the World Health Organization, that "the number of water taps per 1,000 persons is a better indicator of health than the number of hospital beds" synthesizes the primary rationale for investment in

water supply and sanitation development. The lesson remains the same as it was when Dr. Mahler spoke:

***Lesson Seven*: Health benefits are the major—but not the sole—justification for support for water supply and sanitation on projects; such projects also have wide economic benefits.**

Water supply and sanitation is a fundamental building block in the development process, impacting economic development, employment, agriculture, housing, health, and numerous other sectors.

Water supply and sanitation is a fundamental building block in the development process, impacting economic development, employment, agriculture, housing, health, and numerous other sectors. Thus, water supply and sanitation development usually brings about a great many benefits, spread broadly across societal concerns. The need for water supply and sanitation improvements and the benefits from them are usually most direct and visible in the health area, however, and support and financing for water supply and sanitation projects are usually most effectively justified on health grounds.

Health benefits result both from better quality of water and greater quantities. There are a number of water-borne diseases (e.g., guinea worm, cholera) in which transmission occurs as a result of drinking contaminated water. In other cases, the transmission cycle is through contact with the water (e.g., schistosomiasis) or through the water providing a breeding site for the vector (e.g., malaria). Inadequate water for cleaning and poor sanitation practices often result in diarrheal diseases. Disease and poor health take an economic toll as well as one in human suffering. The incidence of many of these diseases can be reduced, and some can be eliminated entirely by improvements in water supply and sanitation facilities. Water and sanitation improvements also have an ancillary health benefit. Communities that have participated in such improvements are more receptive to primary health care interventions and are more likely to make use of services available from health centers.

The incidence of many water-borne diseases can be reduced, and some can be eliminated entirely by improvements in water supply and sanitation facilities.

From a political standpoint, health improvements are popular, and water supply and sanitation investment a relatively noncontroversial way of bringing them about. If handled properly, improved water supplies and sanitation facilities enjoy great popular support. They also provide immediately apparent benefits to the community.

Study after study indicates that children benefit greatly from improvements in water supply and sanitation. Not only are children perennial favorites of politi-

cians worldwide, they are also an excellent rallying point for donor agencies and the general population. Improved water supplies and sanitation practices are instrumental in reducing infant mortality, preventing diarrhea, and improving child nutrition and overall health, and this fact can and should be used as a powerful lever in developing support for water supply and sanitation improvements. Figure 1 shows the correlation between child mortality and water and sanitation coverage.

Unlike most other types of health interventions, water supply and sanitation improvements result in a whole range of secondary, nonhealth benefits of an economic and social nature.

Unlike most other types of health interventions, water supply and sanitation improvements result in a whole range of secondary, non-health benefits of an economic and social nature. While released time from finding and transporting water, greater agricultural productivity, improved community organization, and better quality of life benefit everyone, it is the lives of women that are most directly impacted. In fact, the role of women in the community and in the larger society can be enormously affected by water supply and sanitation development. At one level, women's everyday lives are made easier by water supply and sanitation improvements. At another, their roles in bringing these improvements about can lead to increased status in their communities and in their countries.

Impacts on Health

Unless the users for whom water and sanitation projects are intended modify their previous forms of behavior in obtaining water and disposing of excreta, there will be no health benefit.

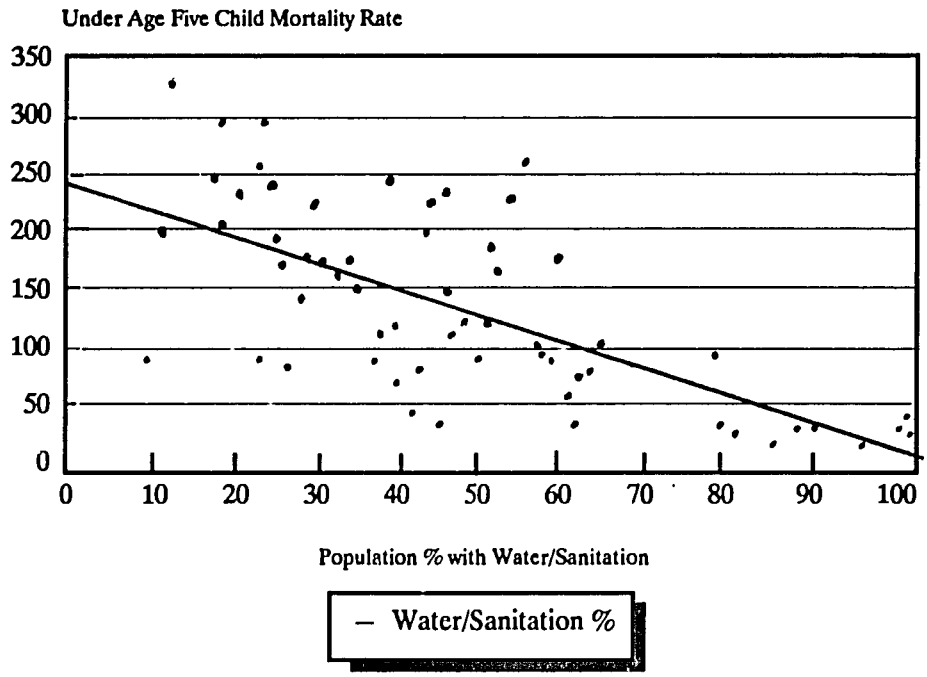
The key to health improvements from water supply and sanitation facilities lies in the way in which people use the facilities. Facilities development projects can go only so far. They can increase the quality and quantity of water and provide safe methods of excreta disposal, but unless the users for whom the projects are intended modify their previous forms of behavior in obtaining water and disposing of excreta, there will be no health benefit. Thus, the lesson:

***Lesson Eight*: Behavioral changes combined with greater access to facilities are the basis for health benefits through improved water supply and sanitation.**

Examples of behavior that lead to improved health include using water from a new or protected source rather than an old, polluted one; increasing water use or adding

FIGURE 1

Water and Sanitation Coverage and Child Mortality in Developing Countries



new uses; using a new latrine; and washing hands after using the latrine. In other words, action is required on the part of the user if health benefits are to accrue from new or improved facilities. Behavioral change is the essential linkage that converts project inputs into project benefits; access to facilities alone is not enough.

Even when behavior change is achieved from long-term interventions such as water supply and sanitation it may take many years before health impacts can be measured. During that time, many other unrelated factors inevitably arise that also impact health but that are difficult to isolate from the water-supply- and-sanitation-related factors. Not only are long-term studies extremely expensive, but the available analytical methods do not easily lend themselves to this type of impact measurement and the studies may in the end be fatally flawed.

Even when behavior change is achieved from long-term interventions such as water supply and sanitation it may take many years before health impacts can be measured.

In recent years, then, the attention of researchers, analysts, and development planners has shifted away from the measurement of ultimate health impacts of water and sanitation projects and toward identification of intermediate indicators that can serve as surrogates for the ultimate impacts. In practice, the indicators are often

related to the use of the facilities and to changes in human behavior reflected by or leading to that usage.

Measuring outcomes. There are three basic levels of project outcomes: the physical or *efficiency* level defining project operation, the behavioral or *effectiveness* level defining project performance, and the *impact* level defining ultimate project consequences.

The efficiency level consists of the immediate or direct consequences of project development, which include all project inputs, operations, and outputs under the control of project officials. These consequences can usually be assessed in straightforward physical units, e.g., x dollars were invested, y activities were carried out, and z facilities were built.

The second level of outcomes, the effectiveness level, involves usage of the project facilities and the effect of the project on behavior. How do people use and care for the water facility? How have their former habits of water use and sanitation changed as a result of the project? What kinds of committees, rules, or other social mechanisms have the communities established to maintain the facilities and encourage their proper use by the people ? Project officials cannot directly control these consequences, but they can try to influence the behavioral patterns favorably in the communities.

The final outcome level is the impact level, which speaks to the ultimate health, economic, and social consequences of the project. To the policymaker, these are the long-run benefits that water and sanitation projects are intended to achieve. Whether or not these impacts ever occur depends on the project outcomes at the earlier efficiency and effectiveness levels as well as a number of external factors. Measurement of these impacts is usually not practical because of the rigorous methodology and costs that are required.

Evaluators assume that if facilities are installed and are operating and if changes in behavior have occurred, then the project has probably had a positive impact on health, even though it may not be possible to measure that impact.

Often intermediate efficiency and effectiveness indicators can be used as "surrogate" measures of ultimate impact. Evaluators assume that if facilities are installed and are operating and if changes in behavior have occurred, then the project has probably had a positive impact on health, even though it may not be possible to measure that impact. For example, if evaluators find project activities have brought about a marked increase in the percentage of women in a given community who wash their hands with soap before handling food or an increase in the quantity of water used, then it is assumed

that the project has had a positive health impact. WASH began using such indicators to measure health impact in 1981 and has since incorporated these indicators into its procedures for evaluating water supply and sanitation projects.

Diarrheal disease control. The chief cause of growth failure in the children of the Third World is poor nutrition, and a major contributor to lack of nutrition is diarrhea. It is a standard, though mistaken, practice in many developing countries to withhold food from children with diarrhea. Also, repeated bouts of diarrhea inhibit the ability of the body to absorb food. Thus, children already at risk because of the effects of diarrhea are also at risk nutritionally. The relationship between incidence of diarrheal disease and nutrition is stronger than for any other disease. Diarrhea, along with shortages of food, keeps growth rates below standard for most poor children despite medical and nutritional interventions.

Although it is difficult to establish the precise impact of improved water supply and sanitation on diarrheal incidence, the linkage is well-supported. Quantity of water, as well as quality, has been shown to be a key factor in reducing diarrheal diseases because of the more frequent bathing, more careful washing of food, and greater general cleanliness that result from increased availability of water.

Although it is difficult to establish the precise impact of improved water supply and sanitation on diarrheal incidence, the linkage is well-supported.

A recent WASH report surveyed 142 studies of the impact of improved water and sanitation facilities on six water-related diseases. The study concluded that broad health impacts can be expected from improvements in water and sanitation: people are less likely to contract the diseases, and, when they do, the case is usually less severe. Tables 2 and 3, taken from the study, show the heavy toll that water-related diseases take in developing countries and the range of expected reductions in morbidity that various studies showed.

Complementary child survival strategies. In recent years, more immediate and less costly interventions to improve child health and nutrition have received a great deal of attention from donor organizations. Perhaps the two most popular have been oral rehydration therapy (ORT) and immunizations. ORT is a technique for stopping dehydration, the major health effect of diarrhea. ORT involves mixing and administering a solution of oral rehydration salts and water. It is a simple treatment

TABLE 2

Incidence and Effects of Selected Diseases in Developing Countries
(excluding China)

Disease	Incidence	Estimated deaths/year
Diarrhea	875 million *	4,600,000
Ascariasis	900 million	20,000
Guinea worm	4 million	**
Schistosomiasis	200 million	**
Hookworm	800 million	**
Trachoma	500 million	***

* Estimated cases per year
** Effect is usually debilitation rather than death
*** Major disability is blindness

Source: Steven A. Esry *et al.*, "Health Benefits from Improvements in Water Supply and Sanitation: Survey and Analysis of the Literature on Selected Diseases," WASH Technical Report No. 66, April 1990.

TABLE 3

Expected Reduction in Morbidity from Improved Water Supply and Sanitation

	All Studies			Better Studies		
	No.	Median	Range	No.	Median	Range
Diarrheal Diseases	55	26%	0%-100%	20	29%	0%-68%
Ascariasis	11	28%	0%-70%	4	29%	15%-70%
Guinea worm	7	76%	37%-98%	2	78%	75%-81%
Hookworm	9	4%	0%-100%	-	-	--
Schistosomiasis	4	73%	59%-87%	3	77%	59%-87%
Trachoma	13	50%	0%-91%	7	27%	0%-79%

Source: Esry, *et al.*

that, with training, a mother can carry out satisfactorily in the home, assuming that she has packets of the salts and clean water with which to mix them. While ORT has no long-run preventive capacity, it is extremely effective in reversing dehydration.

Immunization programs against diseases for which vaccines can be developed have been an integral part of child health throughout the developed world for many years. Immunization has been used in the Third World for some diseases--smallpox, for example—but has never been as widespread as it has been in the industrialized nations. Unquestionably, immunizations are extremely effective and cost-efficient in controlling diseases such as diphtheria, polio, and measles if the population can be comprehensively treated.

As donors have faced shrinking budgets and have sought ways to make the most effective use of limited funds, they have placed increasing emphasis on the use of interventions such as ORT and immunization programs, sometimes to the exclusion of long-term development programs such as water supply and sanitation.

As donors have faced shrinking budgets and have sought ways to make the most effective use of limited funds, they have placed increasing emphasis on the use of interventions, such as ORT and immunizations, sometimes to the exclusion of long-term development programs such as water supply and sanitation. Both long-term development and specific-disease-related interventions have validity, and a combination of the two is the best strategy. Water supply and sanitation development can play a key complementary role in maximizing the effectiveness of these, and other, specific interventions.

Both immunization and ORT require an act of faith on the part of the mother who may have no understanding of the roles that germs, viruses, serums, and chemicals play in disease. In the case of immunizations, the mother must understand that a full series of shots at precisely spaced intervals must occur. In the case of ORT, she must know how to mix the solution and how and when to administer it. Both the ideas and the education required to implement them may be met with a great deal of initial resistance in the absence of an adequate trust level between those administering the program and the target population.

WASH has found that it is much easier first to build that trust level and familiarize the community with the education process in the context of water supply and sanitation projects. Typically in these projects the need, if only from the standpoint of convenience, is clear to the community, and all are enthusiastic about and willing to support the effort. Once a successful project has been undertaken, the community has both more confidence in

itself and in the health care system and will be more receptive to additional, more sophisticated health interventions.

Several studies show that communities involved in earlier participatory projects such as water supply projects have a higher rate of participation in both immunization and ORT programs.

A study in Haiti, for example, found that communities that had undertaken water projects were more likely to avail themselves of health services such as pre- and post-natal care and well-baby clinics. Several studies undertaken by the WASH Project show that communities involved in earlier participatory projects such as water supply projects have a higher rate of participation in both immunization and ORT programs. WASH studies indicate that participation in immunization programs in Togo and Indonesia was greater in communities that had carried out participatory water supply projects.

Guinea worm control. Dracunculiasis, or guinea worm disease, is an outstanding example of a disease that responds dramatically to water supply improvements. It is a disfiguring, debilitating disease caused by worms entering the body through drinking water. Enormous reductions in the incidence of the disease occur when safe water supplies are provided. In fact, in areas where it is prevalent, guinea worm morbidity can be used as a measure of improvements in water supplies.

WASH has lent active support to the guinea worm eradication campaign as a potential means of entry to communities needing water supply improvements and as a means of expanding understanding of the water supply and sanitation sector. The project has carried out small-scale research on the impact of guinea worm on mothers and children (e.g., breastfeeding effects) and on loss of income resulting from the disease. It has developed training manuals on the subject and has undertaken to get them into the hands of as many information "gatekeepers"—e.g., community health workers and teachers—as possible. It has prepared and distributed guidelines on guinea worm control projects in areas where the disease is endemic. WASH has made materials available in both English and French, and its materials are being used in medical schools in Ghana. It created the guinea worm network, now one of the largest of the WASH information transfer networks.

All of this activity on a disease-control issue has enabled WASH not only to establish linkages with individuals and institutions outside the water supply and sanitation sector, but also to expand interest in and

support for water supply because of its disease control implications.

Linkage and Planning

Developing successful water supply and sanitation programs and projects requires establishing both public and private linkages within the sector and with other sectors whose activities impact on water and sanitation. Forging of these linkages should begin during the planning process.

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In most cases, achieving national health goals will require linkages between water supply and sanitation, which likely will be handled by different ministries, and with the overall community health effort in areas like hygiene education, nutrition, oral rehydration therapy, and immunization.

Other ministries will be undertaking activities that affect and/or support the water supply and sanitation effort. If the agriculture ministry, for example, is carrying out irrigation projects in rural areas, these may be linked with the water supply and sanitation work. The involvement of the transportation ministry may be needed to assist in coordinating delivery of materials and people to the project sites. If there are active economic or business development programs targeting rural communities, these should be taken into account in the water supply and sanitation effort. Linkages with agencies outside of government—private voluntary organizations and private businesses—may increase the resources available to water supply and sanitation development and lead to improved standards of design and maintenance.

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Consideration should be given at the beginning of the planning process to all of the linkages it is necessary to establish. These linkages are then most likely to occur if the following lesson is observed:

***Lesson Nine*: A participatory approach to planning helps ensure linkages and cooperation in implementation.**

WASH has found, especially through its work in Swaziland, that the most effective way to ensure that linkages occur and that cooperation is elicited from the widest possible range of agencies and institutions is to take an inclusive, participatory approach to the planning pro-

If the various interests are not heard at the planning stage, they probably will not cooperate at the implementation stage, and the activities may founder as a result.

cess. It is certainly appropriate to have one agency coordinating the process, but that agency should not be the sole author of the resulting plan.

Wide-ranging consultation with all agencies and organizations involved. In the water supply and sanitation sector, all agencies that have a stake in the sector should be heard in the planning--health, natural resources, agriculture, housing, land use, and so on.

Nor should participation be limited to official government agencies. International donors and nongovernmental organizations should also be consulted to the extent possible. If they decline to participate formally, and they may, they should be consulted informally. The communities that will benefit from the development work should also be included in the planning process. The consumers of goods and services (the community) often have a different viewpoint than the providers (the government agencies), and this viewpoint should be heard and taken into account. The community leaders who actually have influence, as opposed to those who have titles suggesting influence, are the most important ones to involve.

This approach to planning is important not so much to ensure that everything is taken into account—presumably central planners could do that—but to permit all of the interests, some of them competing, to impact the plan. If the critical interests are not heard at the planning stage, they probably will not cooperate at the implementation stage, and the activities may founder as a result. Everyone with a stake in the outcome should have the opportunity to make some impact on the plan at the outset.

If coordination is to benefit the development process at all, it must do so at the working level.

People at different levels should also be involved in the planning process. Many times, planning is coordinated at the highest conceptual levels, through a task force of senior officials, for example, only to fall apart at the implementation stages. Obviously, if coordination is to benefit the development process at all, it must do so at the working level. This can be fostered in two ways. First, make certain that those involved at the policy level are active managers who are able to make decisions, speak for their agencies, and direct the agency staff. Second, involve those at the working level in the process at appropriate points, ensuring that they, too, have the opportunity to impact the process and to meet and begin to develop relationships with their colleagues in other agencies.

The timing of planning—both in terms of chronology and duration—should also receive careful consideration to maximize the effectiveness of the process.

"Rolling" work plans. There is an understandable, and correct, tendency on the part of people involved in a major undertaking to say "first, let's make a plan." However, if sweeping master plans are developed without any prior experience and without attending to the institution-strengthening needs of the country, they are doomed to failure. Planning at a certain level is, of course, always required to make sure that resources are efficiently used and needs identified. At the very beginning of an effort, plans should consist of a goal concept with "rolling" work plans, i.e., plans subject to continuous review and revision. It should be work planning, not master planning.

If sweeping master plans are developed without any prior experience and without attending to the institution-strengthening needs of the country, they are doomed to failure.

WASH has worked effectively using this approach in Swaziland and Thailand. In Swaziland, formal master planning did not begin until after four years of experience in developing and strengthening institutions and building facilities. The result has been a much better and more realistic national master plan than would otherwise have been possible.

Short-term targets, long-term strategies. If planning is to be effective, it should provide guidance both for short-term actions and targets and longer-term strategies and goals. The best way to do this is to divide the overall sector plan into two parts. The action plan should include definite targets that can be achieved, clear steps to take for achieving them, and short time frames for completion. A master plan should be no less realistic, but it can be more general, giving ranges for the goals it supports.

If planning is to be effective, it should provide guidance both for short-term actions and targets and longer-term strategies and goals.

For example, an action plan might promise x boreholes to be drilled in one year in y communities, identify the source of funds, and set forth the steps to be taken to make this happen. The master plan, on the other hand, might promise water coverage to all communities above a certain population or in a geographic area, with possible funding sources noted.

Both types of plans should be the result of ongoing processes rather than one-time events. A national seminar or similar affair may kick off the effort, but there should be regular—at least annual—meetings of the key planning participants and frequent one-on-one or small group consultations between meetings. The intent is constantly to evaluate the plan of development against

the reality of development and revise the plan accordingly. Plans are not ends in themselves and should not be treated either as static documents or holy writ. Their usefulness lies in rationally guiding the allocation and expenditure of resources, and this cannot occur unless what is learned through experience is poured back into the plan.

WASH has found its team planning concept useful at the project planning level and has adapted it for general use in development projects. This approach involves bringing together all of the parties involved in a project to set priorities, define the scope of work, and develop a work plan. This helps to ensure a shared vision of the project and to delineate the roles and responsibilities of all involved.

Philip W. Roark/WASH Project.

Young girl tries out India Mark II pump, Ghana.

3. SYSTEM SUSTAINABILITY

"Sustainability," a concept borrowed from the discipline of systems analysis, is a measure for judging system performance. It refers to the ability of a system to continue performing its functions at an acceptable level and for an indefinite period of time using only the inputs specified in the system's design. To be sustainable the system must include all of the resources, including financial resources, required for continuing support. In the development lexicon, however, the financial resources cannot include continuing support from donor agencies. In the field of water supply and sanitation, sustainability has increasingly been favored by the development community as a guide to wise investment. In particular, donor agencies are reluctant to continue putting capital funds into development programs and facilities that may soon fail to function. In WASH terms, the principle

may be stated like this: **The basic measure for success of both the national system for development and the community systems is sustainability—the ability to perform effectively and indefinitely after donor assistance has been terminated.**

The sustainability test is applied at two levels in water supply and sanitation development. It measures both the success of the sector itself, i.e., the national system for development, and of the community systems that are created to provide water supply and sanitation service to specific residents. The key variables that determine sustainability are institutions, human resources, technology, operation and maintenance procedures, and financing. Thus, the overall program for developing the sector may fail because the institutions established are inadequate for the task, or staff or financial resources are lacking, or the technology used is inappropriate. Likewise, particular water systems may fail because the community cannot generate sufficient revenue to cover the cost of operation and maintenance.

In rural areas of the Third World, the sustainability of water and sanitation systems depends ultimately on communities—residents, consumers.

In rural areas of the Third World, the sustainability of water and sanitation systems depends ultimately on communities—residents, consumers. A water system, by definition, provides a service; unless people use the service, the system is useless. This is one reason why linkage is so important as a development principle. If community participation and hygiene education are linked to facilities development, it is far more likely that the system in place can be sustained because the community can be relied upon to use it; and if they use it, they are more likely to finance and maintain it. Thus the rural community is not simply one variable in system sustainability but the essence of sustainability itself.

Institutional Development

At present, development of the water supply and sanitation sector in Third World nations is usually handled as a responsibility of the national government. Institutional development projects must operate within this socio-political context, building upon whatever institutional base exists in the country. Therefore, most projects are likely to focus on strengthening government institutions so they can do the job of implementing and coordinating water supply and sanitation programs.

Institutional performance is always greatly impacted by the political environment. Weaknesses and corruption that exist in the government as a whole will almost certainly be reflected in the water supply and sanitation sector. The government should be supportive of the kinds of changes needed to strengthen a water supply and sanitation institution. It should be willing to make the needed reforms in areas like organizational autonomy and the setting of tariffs. The economy must be able to sustain the increased costs of improved services. The general health of the economy is a key factor influencing available incomes, willingness to pay for services, and public investment allocations. The population must have a sufficient demand for improved services. If the demand does not exist or cannot be stimulated, no institution will be able to work effectively.

Institutional performance is always greatly impacted by the political environment.

Projects designed to increase the capability of an institution should first look at its overall performance and effectiveness. WASH has identified nine categories in which the institution's performance should be fully investigated and assessed before plans can be made to address the institution's needs. These categories are organizational autonomy, leadership, management and administration, commercial orientation, consumer orientation, technical capability, developing and maintaining staff, organizational culture, and interactions with key external institutions. The profile that emerges from this assessment will indicate which areas of the institution need strengthening.

In carrying out institution-strengthening projects, it is important to heed the following lesson:

Projects designed to increase the capability of an institution should first look at its overall performance and effectiveness.

***Lesson Ten*: Successful institutional development projects strive for comprehensiveness and wide participation.**

"Comprehensive in scope" means that all of the institutional systems (i.e., operation and maintenance, administration, commercial, technical) should be addressed simultaneously and should involve people at the top, middle, and bottom of the institution. An example of an institutional development project encompassing the entire institution is the A.I.D.-funded Water and Sanitation Sector Project in Sri Lanka. In this project, the designers put together a system-wide effort to strengthen all aspects of the National Water Supply and Drainage Board, in-

cluding engineering, stores and supplies, water quality and treatment process control, operation and maintenance, public health and sanitation, management and commercial, organizational structure and decentralization, and personnel and training. The project has had major impacts in increased collections (from 31 percent of operation and maintenance costs in 1984 to a current 74 percent) and reduced billing lag times (from six months to thirty days). One of the major strengths of the project has been the approach of looking at the entire institution rather than just a single aspect.

If they are to succeed, it is imperative that institutional development projects be participatory in nature.

If they are to succeed, it is imperative that institutional development projects be participatory in nature. An institutional development project differs from a capital development project in the effect it has on individuals. A reorganization, change in personnel policy, or management improvement affects employees in a very direct way. It is important that the project be seen as beneficial and not as a threat to the positions and careers of individuals. Projects that do not involve the institution's people actively in all stages of the effort may ultimately be subverted by forces within the institution itself. As always, people will be more committed to change if they have been a part of the process.

Project design and review. There are a number of effective ways to involve the institution's people in the project. A core group can be put together at the design stage to provide advice and information to the designers. The group can review suggestions and strategies from the designers, propose ideas, and contribute to the overall effort. A project design workshop can be conducted with the key decision-makers to actively involve them in the design. A steering committee or smaller management committee can be established for project implementation to serve as a regular forum for discussing progress and problems. The particular technique to be used should be determined by the situation; the important thing is that definite action be taken to ensure participation by all concerned.

Strengthening institutional capability is a complex matter that takes time, skill, and flexibility. It is essentially a human process, and people do not change overnight.

Strengthening institutional capability is a complex matter that takes time, skill, and flexibility. It is essentially a human process, and people do not change overnight or at all unless properly handled. Institutional development is more unpredictable than capital construction and requires different skills. Although short-term consultants play a role in these projects, it is the

long-term advisor who is pivotal. WASH has worked with many long-term advisors and has determined that the effective ones share certain skills and characteristics.

First, long-term advisors should be able to establish and maintain trust with their counterparts. This requires awareness of their own shortcomings and willingness to learn from others, to admit mistakes, and to take risks. Second, they should be able to transfer skills by assessing learning needs, obtaining agreement on the need for change, setting up and implementing a strategy, and evaluating how it worked. Finally, they should be able to translate outside ideas to the reality of a local situation. The ability to determine the norms of the local institution and adapt approaches used elsewhere to the local environment is critical.

Long-term advisors should be able to establish and maintain trust with their counterparts.

Institutional change is usually more complicated than it appears initially and requires great willingness to revise plans and strategies in accordance with events. Project progress should be monitored constantly so that problems can be detected before they become major obstacles. It is important to step back occasionally, review project goals, and solve problems that have arisen. WASH has successfully used the technique of regular project review workshops to ensure that projects stay on track.

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This technique has worked especially well in Sri Lanka, Ecuador, Zaire, and Tunisia. In Sri Lanka, for example, where WASH has conducted annual project review workshops for the Water and Sanitation Sector Project. The WASH team is made up of two consultants, one skilled in project management, the other in a relevant technical area. While the same management consultant has participated in all workshops, a different technical consultant has been involved each time, based on need. The first year, a financial analyst was required; the second, a personnel management specialist; the third, a strategic planner. The overall result has been to provide an annual assessment of project progress and a basis on which to adjust directions to better meet the institution's needs.

Inevitably, questions of institutional structure arise as an adjunct to decisions on what is needed to strengthen the institution. Many different institutional structures can successfully be used to carry out water supply and sanitation development programs. Every country operates a little differently depending on how the government itself is structured and on how its water supply and

Inevitably, questions of institutional structure arise as an adjunct to decisions on what is needed to strengthen the institution.

sanitation sector has evolved. No model structures have yet been developed by social scientists that have the weight of careful evaluation behind them. Structure is, in any event, substantially less important than the people working within the structure. Dedicated, well-trained people will find a way to get the job done whatever the structure, and the most perfect organigram will have no impact if the people within its boxes do not have the will and capability to implement the program.

Although there is no perfect or model institutional structure, WASH has isolated three factors that are especially important in designing an institutional framework.

Specialized implementing institutions. Implementing institutions are those that carry out specific projects in the field—drilling the wells, building the latrines, carrying out training programs, repairing systems. There should be constant operational linkages among water supply, sanitation, and hygiene education components of implementing institutions since they are all mutually dependent and must be coordinated if sustainable systems are to result. In most cases, there should also be operational linkages between urban and rural water supply and sanitation ministries, if only to ensure that the entire population is being considered and that peri-urban areas, for example, are not being ignored because they do not fit squarely into either ministry's portfolio.

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Within the "rural" category, water supply and sanitation may be housed together but often are not, and a *distinct hygiene education* component is often separate from both. In the context of rural areas of developing nations, water supply tends to be considerably more complex than sanitation and is much more likely to involve engineers and other specialists. Sanitation, on the other hand, is usually treated as a community self-help activity since the most common type of sanitation program is latrine construction. Hygiene education requires different skills from either since it involves bringing about behavioral changes rather than building facilities.

Coordinating institutions. Broad planning, priority-setting, and resource allocation decisions for the whole water supply and sanitation sector are not made by the implementing institutions themselves. These matters are decided at higher, policy levels and probably are best handled by a specially-created institution, most likely a task force, council, or work group of some type. If an inter-ministerial group has been formed to carry out

national planning, it probably will also be the appropriate coordinating and fund-allocating institution. It is important that this group include high-level representatives from all ministries concerned—e.g., agriculture, health, natural resources, education—so that its decisions reflect the broadest possible consensus and have wide support.

An inter-ministerial group formed to carry out national planning should include high-level representatives from all ministries concerned—e.g., agriculture, health, natural resources, education—so that its decisions reflect the broadest possible consensus and have wide support.

The function of the inter-ministerial group is to put the policy imprimatur on coordinating actions. If actual coordination is to occur, this group needs a working arm of professional staff members. Although this staff can be small, it is important to have at least some staff directly available to disseminate information, arrange logistics, and carry out the decisions of the policy group on a day-to-day basis.

Community-level institutions. If a system is to be sustainable, it is imperative that institutions be created or strengthened at the community level to own and manage it. It is always best to build on existing institutions, formal or informal, rather than create new ones. Most communities already have some appropriate body or committee that deals with community affairs, and this should be the basis for the water supply and/or sanitation authority. It is important that such groups include representatives from all of the key parts of the community—both sexes, all ethnic or tribal groups, all economic levels—so that the decisions it makes reflect the desires of the entire community.

Even if institutions already exist at the community level, some additional training will be needed to equip the community to understand and contribute to the development process and afterward as it manages the system. Institutional development and strengthening is just as important at the community level as it is at national or regional levels and should be viewed as an ongoing process that begins no later than the system design stage.

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Human Resources Development

Human resources development (HRD) includes education, training, long-range planning for personnel needs at both the institutional and sector-wide levels, recruitment and selection of personnel, personnel management policies in areas such as compensation and incentives, and management development. It encom-

passes all of the people—technical and nontechnical, high level and low—who play a role in the water supply and sanitation sector along with people in other, related sectors.

Since people almost always work in some type of institutional setting, human resources and institutions are highly interdependent. Institutional performance is the result of the performance of the individuals working there, and individual performance is greatly affected by the institutional context in which work takes place.

Although most development agencies understand the relationship between human resource development and institutional performance, they have generally had limited success in designing projects that effectively bring the two together. WASH has been able to do so in its technical assistance by stressing the need to have an overall institutional perspective when carrying out HRD efforts.

Although most development agencies understand the relationship between human resource development and institutional performance, they have generally had limited success in designing projects that effectively bring the two together.

In Bolivia, for example, WASH carried out a series of workshops on rural water supply operation and maintenance for the Department of Environmental Sanitation in the Ministry of Health. The trainers quickly recognized that they could not design the workshops in the absence of clear departmental policies on operation and maintenance. In order to link these workshops to the broader goals of the department, WASH organized a one-day workshop for key decision-makers to help the department define its operation and maintenance policies. These were then used as a basis for workshop design.

Regarding the performance of individuals, despite a fairly widespread understanding of the importance of training, its quality in most Third World countries is generally poor. Training techniques such as lectures or rote-oriented learning are considered outmoded in the United States and other Western countries but nevertheless continue to be used in the developing nations, often by donors as well as national governments. The lesson WASH has learned is that:

***Lesson Eleven*: Training yields the best results when it employs participatory, experiential methods.**

In participatory training, trainees are actively involved in the learning process, share in the responsibility for learning, and are asked to relate what happens in the workshop to their own lives. This approach works best

for several reasons. First, the essence of development is to empower people to take charge of their own development process and to foster a spirit of self-reliance. Participatory training, as elaborated by experiential learning models, puts the responsibility for learning directly on the shoulders of the trainees, telling them that learning will not occur unless they accept that responsibility.

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Second, in much of the developing world, people learn by doing, not by being taught in formal settings. Experiential learning responds directly to this tradition by placing a heavy emphasis on "doing." Third, the experiential approach to learning does not offer prescriptions. The participants generally feel that they have as much to contribute as the trainers and therefore have a greater sense of ownership over what they learn. Fourth, because the pace of change in the developing world has been rapid, there is a real willingness to try new approaches. In spite of the fact that participants are accustomed through school to rote learning, they respond extremely well to training requiring active participation.

Developing training materials. Good training is not inexpensive, however. Effective materials are not put together overnight; a significant commitment of time and resources is necessary. The cost of developing a training guide includes not only the initial draft but also pilot testing, revisions after each test, and final editing and production. Approximately twenty-five hours of materials preparation for each hour of instruction is a good rule of thumb. Thus, a training guide for a thirty-hour workshop would take almost ninety-five days of effort. In addition, field tests can be quite costly. However, unless resources are devoted to doing a careful needs assessment, field tests, and final editing and production, the final product is not likely to be effective. It is also important that training materials be as concise and succinct as possible. Because the host-country trainers who will use the materials will probably not be experienced, it is important that the material be easy to use, contain visuals and handouts, and not be unnecessarily wordy.

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WASH has prepared training guides on a number of subjects (for example, latrine construction, spring capping, and hygiene education) and has found the best approach to be combining the skills of a training specialist and a technical specialist. Most technical specialists

cannot write training manuals. Rather, they end up producing a technical reference manual and have great difficulty enunciating learning objectives, trainer instructions, and specific training activities. For these reasons, it is best to have the training specialist take the lead in writing the training guide and act as a coordinator for the technical inputs.

Training is usually thought of as a need mostly at the professional and technical levels. In fact, training needs are much broader than this.

Defining training needs. Training is usually thought of as a need mostly at the professional and technical levels. At the professional level, this typically means the training of engineers or public health specialists. At the technical level, it means the training of such personnel as well-drillers, pipe-fitters, and pump repair specialists.

In fact, training needs are much broader than this. Within most institutions, those handling accounting, budgeting, personnel, and procurement also need training. Management and supervisory training are often needed. And, at the community level, training needs include not just the local caretaker but also the local committee responsible for recordkeeping and hygiene education.

In Malawi, where WASH assisted in the design of the water and sanitation component of the Promoting Health Interventions for Child Survival project, provision was made for expanded training activity at all levels of the Ministry of Works and Supplies, which was responsible for water supplies, and the Ministry of Health, which was responsible for sanitation and hygiene education. In-service training programs were recommended for both ministries for engineers, health inspectors, health assistants, construction supervisors, system operators, and health surveillance and monitoring assistants. Selected off-shore training in engineering and management was suggested for senior staff. In addition, an extensive series of orientation courses, leadership workshops, and hygiene education sessions were held for community leaders, village committee members, and community repair teams.

Much donor-sponsored training consists of single shot, ad hoc workshops. Unfortunately, single events have limited impact.

Designing training programs. Much donor-sponsored training consists of single shot, ad hoc workshops. Unfortunately, single events have limited impact. Without follow-up and a supportive institutional environment, achievements from a single workshop will soon evaporate. Training is most successful when it is designed as a series of events building on each other. Even better is to design a comprehensive training plan, as WASH has done in several countries.

In Zaire, for example, as part of the training strategy for SANRU II (a rural primary health care program), WASH conducted three training-of-trainers workshops to create a national training team. Each workshop was conducted by two consultants, one of whom was able to participate in all three workshops. This provided continuity and allowed the consultants to sequence the material carefully in each workshop and review what had been previously covered. The result of this approach was a core of well-prepared Zairian trainers.

In Bolivia, WASH designed a training strategy consisting of four workshops to improve the Department of Environmental Sanitation's capability in operation and maintenance of rural water supply systems. The first workshop focused on training rural supervisors in the general concepts of operation and maintenance. The second concentrated on improving the skills of the supervisors in pump maintenance. The third was aimed at designing two courses to train community operators and local committees in carrying out their responsibilities in operating and maintaining systems in their communities and in developing the training skills to deliver the workshops. The fourth workshop was a pilot test and revision of the courses for the community operators and committees. This sequence of workshops proved to be very effective in developing a group of technicians skilled in operation and maintenance and in putting into place the basic elements of an operation and maintenance system.

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Technology and Technical Standards

From the viewpoint of applying technology to achieve successful projects, sustainability of water supply and sanitation systems is essentially a function of appropriate engineering design and application. While it is true that appropriateness is an important factor in selecting technologies, it is also true that the need for appropriateness goes beyond pure technology to include engineering and construction practice, setting standards and norms, and involving the community in technical decisions. Thus, the WASH lesson:

***Lesson Twelve*: Full consideration of appropriate engineering design and application is essential to system sustainability.**

In general, technology itself is not a major problem in rural water supply and sanitation development. There is always room for technological improvements, of course, and there seems to be inadequate applied research on the higher-end technologies, such as desalination, with a view to adapting them for developing nation contexts. While further technical advances and improvements will certainly occur, current technology is, in the main, adequate to the task of solving the rural water supply and wastewater disposal problems of developing nations. Technology cannot now, and never could, solve the problems by itself, however. It is the ways in which technologies are applied that determine whether or not they are solutions.

Technology alone cannot now, and never could, solve the rural water supply and wastewater disposal problems of developing nations. It is the ways in which technologies are applied that determine whether or not they are solutions.

Technology selection. Because operation and maintenance problems are highly visible, the development community perceives them to be the single biggest issue facing water supply and sanitation. Poor operation and maintenance is only the manifestation of a series of underlying problems, however. Failures at the operation and maintenance stage are normally the result of not adequately taking into account social, financial, institutional, and technological factors at the design and implementation stages.

In order for a technology to be suitable for use in a particular location, it should pass several socioeconomic tests. First, the technology should be conceptually and physically within the capabilities of the persons responsible for the operation and repair of the system. Handpumps can often be repaired by bicycle mechanics after a relatively short training period. Water treatment plants, on the other hand, generally require a cadre of skilled staff.

Second, spare parts and equipment must be available in order to maintain and repair the chosen technology. Importing spare parts and tools from other countries usually causes logistical and foreign exchange problems. For example, in Botswana, WASH was asked to assist with the repair of two broken-down American well drilling rigs. The WASH consultant put together a list of needed parts, all of which had to come from the rig manufacturer who was located in Pennsylvania. Initially, it appeared that the spare parts could be available in three months; however, it transpired that many of them had to be specially made. In the end, it took seven months to get the parts needed to repair the rigs.

Ideally, replacement parts should be locally manufactured and easily available. However, few developing nations are fully self-sufficient in this regard. At a minimum, spare parts and tools should be stocked in regional stores to assure their accessibility to rural communities.

In selecting a technology, technical as well as social, economic, and institutional considerations come into play.

Third, the cost of operating the technology must be within the financial means of the responsible institution. Peri-urban dwellers may not be able to afford the fees necessary for household connections but could pay for and be satisfied, at least temporarily, with standpipe service. Similarly, many rural residents may not be able to pay user fees necessary to operate a diesel pump but could afford less costly handpumps. Costs to be considered include not only operation and maintenance costs but replacement costs, as well. Systems using renewable energies such as wind or solar power generally have low operation and maintenance costs but high replacement costs.

In selecting a technology, technical as well as social, economic, and institutional considerations come into play. If such an "integrated" decision-making process is used, it is more likely that a rural community will select the best—i.e., the most appropriate—water pumping system or light-weight drill rig.

The point, then, is that the appropriateness of a technical solution depends on the specific situation. There is no approved list of interchangeable "appropriate technologies," any one of which is acceptable in a given type of setting. A technology appropriate in one situation may lead to problems in another. Some nations can use a higher level of technology than others. There are notable differences not only among countries but also among different areas within the same country—electric power may be reliable, technical back-stopping may be more accessible, or operation and maintenance capability may be more sophisticated.

A technology appropriate in one situation may lead to problems in another.

Not only local conditions but also local practices need to be taken into account, and these, too, can vary from one country or locality to the next. Guatemalans and Hondurans, for example, use quite different processes to make concrete, and these processes impact engineering approaches and solutions. Engineers should know what these local practices are before they begin to think about appropriate engineering solutions.

Engineering construction and practice. In the Third World, poor engineering practice and low-quality con-

In the Third World, poor engineering practice and low-quality construction are more common problems than too-sophisticated technologies.

struction are more common problems than too-sophisticated technologies. Many systems are simply badly, inefficiently, and sometimes incorrectly designed, revealing fundamental misunderstandings of basic engineering principles. In part, this results from flawed training and in part from a lack of practical skill and experience. Engineering is an art as much as a science, and there is a basic need for training in the former along with education in the latter. On the construction side, failure to build according to design specifications, faulty materials, and inadequate construction supervision are among the culprits.

Standards and norms. Appropriate standards and norms come into play in a variety of ways in the developing nation context. First, the issue of spare parts, alluded to above, is usually complicated by donor policies requiring that their own country's equipment be purchased for systems for which they have provided money. In some systems, each different pumping station has been built by a different country so that each uses different equipment. There is no way a developing nation can sustain so many different technologies. This problem can best be addressed by establishing consistent national design and installation standards for any system built in the country. Such standards might center all systems of a certain size and type around the same type of equipment.

If the government takes the lead in establishing consistent national design and installation standards for any system built in the country and thus demonstrates its willingness and ability to take charge of the development process, donors will be much more likely to be flexible in implementing their "Buy American," "Buy British," "Buy German" policies.

If the government takes the lead in doing this and thus demonstrates its willingness and ability to take charge of the development process, donors will be much more likely to be flexible in implementing their "Buy American," "Buy British," "Buy German" policies. Benin, for example, has successfully insisted that only India Mark II pumps of local manufacture be used in its handpump systems. These pumps are manufactured in neighboring Togo, and the Beninois can cross the border to buy pumps and parts without any problem. Belize has a similar policy, also focused on the Mark II pump, and more and more countries are adopting this approach.

Standards are also important in protecting communities and programs from well-intentioned but poorly designed projects. In some countries, nongovernmental organizations have been very active in independently constructing low-quality, stop-gap facilities which quickly become inoperable. Not only does this disappoint the community but it often reflects adversely on the country's

water supply and sanitation program, despite the fact that the project was not part of that program. This can make it very difficult to work with the same community on a more sustainable project. Although the participation of NGOs is very desirable and important in many contexts, the government should insist that any facilities built meet reasonable minimum standards.

Appropriate norms and standards also come into play in the context of water quality. Adopting external standards and attempting to force them into a different context is as great a mistake as trying to force a given technology into an unsuitable situation. The governments of developing nations need to evaluate the appropriateness of external water quality standards or design their own standards, looking first at what they want the standards to achieve. WHO guidelines, for example, are often mistakenly treated as "standards." In some contexts it may be unrealistic or too expensive to meet the guidelines completely, as that may substantially reduce the number of people for whom water can be supplied at all. Building less costly systems may mean lower water quality, but at least more people may be given access to water of a quality acceptable to the country involved. These are institutional, social, and political decisions that must be taken at the national government level, recognizing that compromising standards is always one option. Donors, at the same time, should be more flexible in imposing standards, particularly those that are unrealistically high priced.

Given that local operation and maintenance is often the key to sustainable rural systems and thus to the appropriateness of the technology selected, community involvement in technical decisions should receive a high priority.

Evidence suggests that this approach to norms and standards, along with the use of truly appropriate technologies, is leading to lower costs of achieving coverage and may reduce unit costs dramatically. This would permit sustainable coverage to be extended to a greater number of people at the same cost.

Community involvement. Given that local operation and maintenance is often the key to sustainable rural systems and thus to the appropriateness of the technology selected, community involvement in technical decisions should receive a high priority. Convenience is often the most significant factor governing community interest in and use of new facilities. It is more important to most users to have a water supply nearby than to have clean water. Thus, conveniently located polluted sources are sometimes still used in spite of a new well that provides safe, clean water but is further away or requires greater

effort to obtain the water. Latrines may be ignored if there are convenient bushes nearby or if people consider latrines unhealthy.

Rural consumers should understand and be convinced of the importance of using and maintaining water supply and sanitation systems. Although they may initially consider convenience the overriding consideration, through appropriate hygiene education they can be brought to appreciate the health benefits of improved facilities. However, if this is to occur, the consumers should be involved in the project from design through implementation, operation and maintenance, and evaluation. Project managers and staff sometimes make the mistake of talking only to traditional community leaders, who are usually men, while neglecting the main users of water systems, who are usually women. Water projects should make a conscious effort to involve women at every step—from determining perceived community needs to serving on the village water committees and carrying out specific project tasks.

Water and sanitation systems that build upon technologies already in use within communities, that are culturally accepted, and that have a proven record of success have a good chance of being adopted and sustained.

Water and sanitation systems that build upon technologies already in use within communities, that are culturally accepted, and that have a proven record of success have a much better chance of being adopted and sustained. Radical innovations are often met skeptically and with a lack of enthusiasm by community members.

A good example of building on old technologies is the use of rainwater harvesting in Thailand, where rainwater has been collected from rooftops for domestic use for thousands of years. In an effort to improve this technology, the Asian Institute of Technology has studied the problem of durable containers to collect the water and keep it safe from contamination. Improvements have been made using low-cost, local materials. Self-operating diversion buckets designed to avoid the first flush of rain from roofs have been one important improvement.

The convenience factor may initially mean that the community members are only interested in piped water with individual household connections. However, once they understand the implications of this for both initial cost and continuing operation and maintenance costs, they may find alternate technologies more acceptable. The key in all cases is to listen to the community's expression of its needs, suggest the most appropriate solutions and the positive and negative features of each,

and let the community make the choice. Its support for and commitment to the project will be much enhanced.

In translating perceived community needs into technology selections, it is important that the consumers be given a clear understanding of the ramifications of each choice in simple but not patronizing terms. Community members are not likely to be technical experts, nor do they need to be since there are usually a variety of technologies that will adequately address the hardware needs of the project.

In translating perceived community needs into technology selections, it is important that the consumers be given a clear understanding of the ramifications of each choice in simple but not patronizing terms.

For example, some villages in Burkina Faso were skeptical of drilled wells with handpumps, because of past experience, and preferred the assured supply of a large-diameter well that could be opened if the pump failed. For communities with numerous animals, open wells may allow water to be drawn faster than by hand pumping because several people can use buckets and ropes at the same time. The technical solution lay in modifying the well design to include both a handpump and water access. This gave the villagers confidence in the reliability of the water supply and its convenient accessibility.

Operation and Maintenance

As noted above, planning for operation and maintenance should begin at the project design stage when various technologies are being considered for use. Broad, general consideration of operation and maintenance needs is not enough; it is too easy to avoid really dealing with the pitfalls of operation and maintenance unless careful thought is devoted to the matter and serious planning is done.

Planning for O&M should begin at the project design stage when various technologies are being considered for use.

Too often, operation and maintenance plans are given short shrift, and the assumption is made that operation and maintenance will be handled by the central water agency, which may well intend to take on that responsibility. It is not until the systems are in place that the magnitude of operation and maintenance needs is manifested. Then it becomes clear that other arrangements will have to be made. At that point, it is often too late to do anything really satisfactory in the long run. Operation and maintenance plans cannot be tacked on as an afterthought but should be prepared very early in the design process and must be realistic and consistent with available resources. This is much likelier to be the case if they are

prepared in detail. The importance of the following lesson cannot be over-emphasized:

Lesson Thirteen: **Making plans for operation and maintenance before facilities are constructed and in place helps to ensure that sustainable technologies are selected.**

O&M plans cannot be tacked on as an afterthought but should be prepared very early in the design process and must be realistic and consistent with available resources.

The operation and maintenance plan should address who is going to operate and maintain the system, how, and when, as well as what materials, equipment, and parts will be used, who will pay for them, and in what manner. It should include the following:

- Personnel plans—How many people at what level of expertise and compensation will be required on a regular basis, supplemented by what kind of specialized expertise?
- Human resource development plans—who will operate and maintain the systems? Where are they? How accessible is specialized expertise? How much training have the intended operators had, and how much additional training will they need? Who will provide that training? Where? How?
- Procedures—What operations will be performed? How often? Under whose supervision?
- Plans for obtaining supplies—What parts, materials, and equipment will be needed? How much will they cost? Where will they come from? What are the logistics of getting them?
- Budgets and financial plans—How much will all of this cost? Who will bear the financial burden? How much is the community willing to pay? What other financial resources are available? How will money be collected?

O&M plans should be fine-tuned during the trial period of project implementation before technical assistance is terminated to allow communities time to adapt to their new obligations.

Unless all of these questions are answered and plans are made before the facilities are constructed, it is likely that another unsustainable system will be the result. The operation and maintenance plans should be fine-tuned during the trial period of project implementation before technical assistance is terminated to allow communities time to adapt to their new obligations. While this can be a time-consuming process, it is time well spent when compared to the potential waste of resources if this is not done.

It is certain that a key part of any operation and maintenance plan will be the human resource compo-

nent, i.e., the people who will actually operate and maintain the system. These people will most likely include community members, specialized repair people, and, in some cases, private sector firms.

Community responsibility. It is very likely that operation and maintenance plans will place a significant share of the responsibility on the community. This can be an excellent solution if the community has or can develop the capability to shoulder this responsibility. If community members are involved in the entire development process from the beginning and are supportive of and committed to it, they will very likely be willing to carry out much of the operation and maintenance. They probably will not have the knowledge to do so, however, and will need ongoing support as well as initial training.

It is certain that a key part of any O&M plan will be the human resource component, i.e., the people who will actually operate and maintain the system.

The training needs of community members should be determined when operation and maintenance plans are being made, and a training plan should be drawn up at that time. Training can either be on-site, one-on-one training or group training on a regional basis, or some combination of the two. Training should be performance-based, that is, it should be designed to transfer the ability to perform specific, required tasks, and should be participatory in nature. Arrangements for follow-up technical assistance should be included in training plans along with provision for higher-level back-up expertise in case of system breakdowns that cannot be handled at the community level.

Specialized repair people. Depending on the technology involved, there will be some operation and maintenance tasks requiring a higher level of skill than can realistically be created at the community level. Repairing a diesel or solar-powered pump, for example, is likely to be beyond the capability of community members. Or the technology chosen may not be appropriate for community operation and maintenance. In Latin America, for example, despite extensive and varied training efforts, great difficulty is still encountered in community maintenance of slow sand filtration systems.

The training needs of community members should be determined when O&M plans are being made, and a training plan should be drawn up at that time.

In these cases, arrangements will have to be made for access to a higher level of expertise. This may be handled by creation of a regional or district operation and maintenance center with more specialized personnel on call for a number of communities. In small countries, a national center might be more appropriate. Or the private sector may be able to provide the needed services,

particularly if the system is located near a large population center. However this problem is dealt with, it should be recognized and planned for; it is highly unlikely that community members will be able to carry out all operation and maintenance tasks unaided, nor should they be expected to do so.

Where an active private sector exists and offers the expertise needed for system O&M, it should certainly be considered for inclusion in system plans.

Private sector firms. The degree to which the private sector offers a viable operation and maintenance alternative or source of additional expertise is largely dependent on the country's economic system. In nations with free markets, such as Lesotho, there are likely to be a number of private plumbing firms which may, depending on location, be interested in carrying out some or all of the operation and maintenance tasks on smaller systems. In some countries, the private sector includes small, one- or two-person regional water system repair companies developed as a result of a market need. The profit motive may lead to better and cheaper service as a result of market competition. (It can also sometimes lead to monopolistic pricing, of course, but competition often serves as a damper.)

Where an active private sector exists and offers the expertise needed for system operation and maintenance, it should certainly be considered for inclusion in system plans. It may be that the capability needed is available at less cost and greater efficiency than would be involved in training community members. Care should be taken to ensure that the private sector service chosen is reliable, actually has the expertise it claims, and is prepared to be accountable to the community for its work. The community should retain responsibility for system management, and training of community members may be necessary to enhance their capability to monitor the performance of private sector contractors.

Financing

Financing plans are almost always one component of plans for system development. They specify where funds will be obtained for constructing a given system. However, an integral part of sustainability is the financing of ongoing operations, whether at the program or system level. Neither programs nor systems are sustainable if they depend on donors for long-term financial support for operations. Nor are community-based systems likely

to be sustainable if they depend entirely on subsidies from national ministries for their operating funds. On the other hand, given the realities of the disparity between resources and needs in most developing countries, and the income levels of most of the Third World's population, all of the operating capital needed for rural water supply and sanitation is not likely to be available from users. Sustainable programs and systems are defined as those which meet all of their operating costs with the appropriate mix of government and community revenues.

At the program level, even the poorest country can and should be required to commit its own resources at some level as an indicator of its seriousness about meeting the water supply and sanitation needs of its population. In the absence of such a commitment, development efforts are likely to cease when the flow of donor funds and technical assistance stop and, even worse, the progress that has been made may be lost because of lack of institutional support.

Water supply and sanitation systems in developing countries probably will not be able to achieve full cost recovery from their users. This does not occur even in affluent countries like the United States, where subsidies of various sorts—construction grants, low-interest loans, municipal bonds, funds from state or local general revenues, and federal- or state-sponsored technical assistance—are widely available to and used by public systems. However, some degree of cost recovery and self-financing is required if systems are to continue functioning over the long term and if new systems are to be built at a rate commensurate with the need.

Some degree of cost recovery and self-financing is required if water and sanitation systems in developing countries are to continue functioning over the long term.

In the final analysis, funding for long-term operations and maintenance is probably a higher priority matter than locating a source of initial capital, but it is often given inadequate attention. If sustainability is the goal, the lesson is clear:

***Lesson Fourteen*: Plans for system finance that ignore the cost of long-term operation and maintenance are likely to lead to system failure.**

Depending on the country, the national government may as a policy matter provide some of the money for operation and maintenance as a public service. (Some countries provide, or attempt to provide, all the money for this; but

from a sustainability standpoint, this may be risky.) Local governments such as municipalities may also provide part of the needed operating funds from general revenues or special tariffs. User fees—connection charges, water use charges—should also form part of the revenues for ongoing operation. The mix of revenue sources will vary from situation to situation and should be specified in the long-term operational plan for the system. It is essential that this be decided and spelled out in detail before the system is put into place.

One revenue source that definitely should **not** be included in the financing plan is the donor community. Donors are typically so determined not to provide any funds for recurring costs, i.e., operation and maintenance, that they do not provide support even for aspects of operation and maintenance for which their support would be appropriate. For example, donor financing should, and may in some cases, be available for activities that would enhance the ability of national and local organizations to carry out operation and maintenance effectively. Technical assistance in establishing and revising procedures, systems, and monitoring techniques for operation and maintenance activities should be financed by donors, as should expansions of existing systems to increase capacity and expand service areas. While most donors probably could provide funds for these kinds of efforts, they prefer not to do so, in part because their contributions would not be as visible as if a new system were built.

It is important that users pay something towards the O&M of their water and sanitation system because, unless they do, they will not feel that they are part owners of the system and thus responsible for it.

At least some revenue should be generated from users, although the amount that can be expected varies from case to case depending on the ability and willingness of the users to pay. It is important that users pay something because, unless they do, they will not feel that they are part owners of the system and thus responsible for it. In addition, costs must be recovered from users because governments and donors cannot bear the financial burden alone.

Ability to pay. While most rural people in developing countries are poor and cannot pay very much cash for water and sanitation services, they are able to pay something—in some circumstances, a surprisingly large amount in relative terms, as studies of water vending have shown. People should not be asked to pay more than they can afford for basic services and, although this figure can be difficult to determine, it is usually possible. Often,

cross-subsidization can be built into rate structures so that wealthier families pay more and are, in effect, partially subsidizing services for their less fortunate neighbors. This is often a good policy from a public interest viewpoint: if people are asked to pay more than they can afford, they will either go without other things they need or will forego the water supply and sanitation service. Either of these actions could result in illnesses and malnutrition that negatively impact society as a whole.

Willingness to pay. According to a number of WASH studies on the subject, willingness to pay is most often correlated with the level of service being offered. In Haiti, for example, WASH found that users in one community were neither paying for water from the standpipe nor using much of it; water use was only five to ten liters per day. A study revealed that the villagers would have been quite willing to pay for a higher level of service—in this case, piped water into their houses—but did not value the standpipe highly enough to justify purchasing water from it.

Willingness to pay is most often correlated with the level of service being offered.

Some willingness to pay studies have also demonstrated that it is possible to set water tariffs at a level that enables recovery of both capital and operations and maintenance costs. It is important that the level of service offered be geared to what the user wants and is willing to pay for. Donors sometimes create a problem in this regard because they decide ahead of time what level of service will be provided and fail to provide for later upgrades as the community is able to afford them. A more successful approach is to establish a minimum standard of service that can be raised if either the community as a whole or individuals within it are able to provide funds to increase the level of service.

Project Concern International. Lining a well, Guatemala

4. SHARED RESPONSIBILITY

The term "shared responsibility" is not as common in development literature as the terms participation, linkage, and sustainability, but it appears to capture a notion that is favored by most development practitioners (although it may be rejected by laissez-faire advocates). The essence of this notion is that water supply and sanitation development should not be left to chance but should be approached deliberately with responsibility for various aspects carefully assigned. The key participants should not act independently or competitively in approaching this responsibility but should share it, each assuming an appropriate part of the burden. If they do, the development process is more likely to be successful; if they do not, time and money will be wasted and the need for sustainable water supply and sanitation facilities will be unmet. The principle involved here can be stated

as follows: **Sustainable development is more likely to occur if each of the key participating entities recognizes and assumes its appropriate role and shoulders its share of the responsibility.**

Those with the responsibility for water supply and sanitation development are host country governments, governmental donor agencies, nongovernmental organizations (NGOs), local communities and users, and the private sector. An appropriate division of labor for the sharing of this responsibility finds the host country government asserting firm control of the development process in the sector as a whole, while communities take charge of their own systems to the extent possible. Donors provide major financial and technical support, and NGOs assist where their expertise is relevant. The private sector makes the necessary goods and services available.

If donor and private sector resources are to contribute to meeting national goals, developing nation governments must take the lead role in their own water supply and sanitation sectors.

National Institutions

If donor and private sector resources are to contribute to meeting national goals, developing nation governments must take the lead role in their own water supply and sanitation sectors. Otherwise, the donors themselves will wind up calling all of the shots, and the results may or may not be in the best interests of the country as a whole. Or donors may decide to take their money elsewhere, to a country that shows more signs of being able to carry out sustainable programs. Similarly, the national government should ensure that private sector resources are used equitably.

In almost all cases, only the national government has sufficient authority and credibility to take on the role of sector manager. Local governments, private sector organizations, and internal support agencies can provide varying degrees of assistance, but none of them can be the focal point for sector management, which includes setting standards, overall coordination of planning, donor involvement, financing, and implementation. WASH has found that strong central government institutions are essential to effective management of water supply and sanitation development. The WASH lesson at the national level is that:

***Lesson Fifteen*: The national government role is to assume primary responsibility for sector management, including planning donor coordination, policy reform, regulation, and institutional and financial aspects of development.**

Water supply and sanitation development efforts should occur in a framework of explicitly stated support and responsibility from the highest political levels of national government.

Indicators of effective sector management include establishing clear national goals, plans, policies, and institutions with the mandate and trained personnel to carry them out; providing regulatory guidance and program approval to ensure that development efforts are environmentally sound and that all of the elements necessary for sustainability are included; and approving and monitoring donor and other involvement to ensure that programs primarily meet country needs.

Policy. It is important to the success of water supply and sanitation development efforts that they occur in a framework of explicitly stated support and responsibility from the highest political levels of national government. This statement of support and responsibility—of the government's official policy on water supply and sanitation—should be contained in a formal document officially approved at the highest levels. It need not be an elaborate document, nor need it contain detailed plans for implementation, but it should state the government's position on and general goals for the sector.

Although such policy statements do not by themselves accomplish anything, they do indicate the seriousness of purpose of the government in addressing water supply and sanitation issues and give visibility to development efforts. They also may indicate the priority the sector is being given and assign implementation responsibilities to one or more government institutions. A formal policy statement will help to create and shape the environment in which development is to occur.

Sector planning at the national level establishes priority areas for investment and ensures that water and sanitation programs address the country's most pressing needs

A policy statement alone will not be adequate to convince donors and other potential contributors to the country's water supply and sanitation program of the government's seriousness of purpose. Along with it must go a share of the available national resources. When governments really believe an issue is of importance, they will spend money on it.

Planning. Sector planning at the national level is important because it establishes priority areas for investment and ensures that water and sanitation programs address the most pressing needs in the government's

view. Planning can also identify areas where institution-strengthening is needed to increase the capability to implement programs and help to ensure that funding is provided to meet those needs. It helps governments identify activities and projects for which assistance can be sought from supplemental sources such as private voluntary organizations and the private sector. From the donor's standpoint, sector plans increase confidence that funds will be used appropriately and will go to support sustainable programs and projects.

The national government should take the lead in identifying and bringing about policy and regulatory reforms.

Regulation. The national government should also continue to take the lead in identifying and bringing about policy and regulatory reforms needed to permit greater efficiency and effectiveness in water supply and sanitation development. Although a great deal of progress has been made in dealing with this difficult issue, in some countries government tariff policies still impede efficient operation and maintenance by discouraging the involvement of the private sector, which is forced to pay higher tariffs than the public sector on imported supplies and equipment. Some governments, to cite another example, have policies militating against cost recovery from system users, which undermines the long-term sustainability of systems.

Government regulations on financial institutions, in many countries, effectively block local capital markets from participating in water supply and sanitation investment by prohibiting or severely restricting their ability to make loans. If these local markets were made available, it would help to solve external debt problems which are worsened by the requirement to repay in the loan's original currency, which may require an ever-increasing percentage of the gross domestic product when domestic currencies devalue.

Strong government sector management can increase the institutional and financial resources available to the sector.

Management. Strong government sector management can also increase the institutional and financial resources available to the sector. Many of the agencies with primary responsibility for implementation are principally technology-driven and do not have the multi-disciplinary skills required for effective development. These skills are often available in other government ministries and can be brought to bear on water supply and sanitation efforts by effective interministerial coordination.

Similarly, donor-financed-and-managed programs, private voluntary organizations, and the private sector all have abilities and experiences that can be valuable

resources to the development effort if tapped by the government. The private sector can be particularly useful in project implementation—carrying out feasibility studies, drawing up engineering plans, and constructing systems under government direction—and in providing O&M services. If external resources are to be used effectively, it is imperative that the sector plan be well-formulated and enforced and that the overall effort be strongly coordinated.

Successful water supply and sanitation sectors have some mechanism for keeping tabs on everything going on in the sector through constant monitoring and evaluation.

Evaluating performance. It is up to the government, insofar as it can, to identify and correct problems in water supply and sanitation programs quickly before they cause major weaknesses. If donors perceive the national program as a weak, ineffective, or corrupt one that performs poorly, the government will quickly lose control of the process. The best way to avoid this is constantly to evaluate the program's performance and take steps to strengthen it and make any adjustments necessary.

Successful water supply and sanitation sectors have some mechanism for keeping tabs on everything going on in the sector through constant monitoring and evaluation. In Swaziland, for example, the Technical Support Group primarily responsible for sector planning under the National Action Group is continuing to carry out monitoring and evaluation of the sector, recommending areas needing further attention or adjustments in program plans.

As the national water supply and sanitation program grows, institutional arrangements should be assessed to see if changes are needed.

Reviewing and revising institutional arrangements. As the national water supply and sanitation program grows and evolves, institutional arrangements should be periodically assessed to see if changes are needed. New government ministries may have been created, for example, to respond with greater vigor to other national needs; their efforts should be coordinated with the water supply and sanitation work. Or the shape of the program may have changed to the extent that a different coordinating structure would be more effective. If the private sector has grown significantly or if new private voluntary organizations have appeared on the scene, new relationships may need to be institutionalized. The responsibility for water supply and sanitation may need to be moved to a different ministry—from infrastructure development to health or rural development—to permit it to grow further in the right direction. Initially, rural and urban affairs may have been handled by the same department

but need to be separated, or a whole new component addressing hygiene education may need to be developed.

In Ecuador, for example, after a reassessment of the water supply and sanitation sector, the national water agency decided to move toward a much more decentralized approach to better meet the needs of rural communities. In Sri Lanka, the responsibility for rural water supply was moved from the agriculture ministry to the Urban Water Authority because the decision was made that it was cheaper and better to cross-subsidize rural and urban service.

The possibilities are virtually endless. The important thing is for someone to sit back periodically and reflect on the progress the sector is making and how that impacts on and is impacted by the institutional arrangements that exist. If this is not done, there is a tendency for no changes to be made and for outmoded or inefficient ways of doing things to be perpetuated.

Donors

Donors should be especially supportive of those countries that treat the sector as sufficiently important to devote resources to manage and develop it.

A great many countries have developed documents called sectoral plans under the impetus of the International Drinking Water Supply and Sanitation Decade. They vary dramatically in their realism, level of detail, and seriousness of purpose in terms of attempting to guide the process of developing the water supply and sanitation sector within the country. Many of the plans were done by outside consultants with little or no involvement by the national government and, predictably, are not very realistic as a result. Some countries, however, have treated sector planning as a serious matter, have given it high priority, and have come up with reasonable, well-thought-out, long-term plans for the sector which deserve serious consideration by donors for long-term funding commitments.

This is not to say that donors should only provide funds and technical assistance to countries that have such plans. Countries that do not have the institutional capability to undertake sector planning obviously are very much in need of technical assistance. Their populations are likely to be as much, or more, in need of capital assistance for improved facilities as in countries with greater planning abilities. However, donors should be especially responsive to and supportive of those countries that treat the

sector as sufficiently important to devote resources to manage and develop it. On the one hand, this is positive reinforcement to the country to take charge of its own affairs and, on the other, it is a good indicator that donor investments will be in sustainable programs and systems. Thus, for donors the lesson is that:

***Lesson Sixteen*: The donor role is to provide coordinated support in the context of national plans.**

Donors should permit as much national autonomy as possible and focus first on supporting the national plan, even if it is not as the donor would wish in every respect.

Too often, donors nod approvingly or even provide active encouragement to the idea of national governments taking the lead role in water supply and sanitation development only to insist at the implementation stage that everything using the donor's money be done the donor's way. There are numerous examples of donor support provided only if all of the donor's rules are followed and the equipment and materials it specifies are used. Some donors even insist that a separate operational department be established to handle all projects which the donor is underwriting and that this department function independently from all others.

An extreme example of this occurred in Honduras, where three donors each insisted that a separate unit be established within SANAA (the rural and urban water supply agency) to handle its program. This resulted in three units of the agency, each dealing with a different geographic area, using different criteria for community eligibility, and emphasizing different technologies. Not surprisingly, this has caused significant internal problems, including institutional jealousies, conflicting policies, and inhibited career development.

Donors should permit as much national autonomy as possible and focus first on supporting the national plan, even if it is not as the donor would wish in every respect. If there is an inescapable clash with the donor's program priorities, the donor should attempt to modify those priorities or to show the national government why its priorities should be the same as the donor's, given the country's needs. National governments should also be given the latitude to make their own mistakes and learn from them. Donors should focus on helping and teaching, not on decreeing and dictating. If donors truly believe that national governments should take charge of and be responsible for their own development needs, they must be willing to be flexible, supportive, and

understanding and to make some short-term sacrifices in the interests of long-term institutional development and sustainability.

This role carries with it several specific obligations that demonstrate donor support for national government management of the development process.

Participation in planning. Donors should actively participate in developing national strategies and plans but should be careful not to dictate to the government what such plans should be. It is extremely important to program sustainability that the plans reflect the government's priorities and directions, not those of the donor. The planning process should be a collaborative one in which the role of the donor is to assist and facilitate.

One of the most damaging mistakes by donors is refusing to make long-term financial commitments to countries in support of their water supply and sanitation activities.

Donors should not, however, take a hands-off attitude about national planning on the grounds that it is somehow inappropriate or implies a commitment the donor may be unwilling or unable to meet. If the latter is a problem, the donor can simply make it clear at the outset that its participation in the planning process should not be interpreted to indicate any funding commitment, which would have to be determined according to whatever procedures the donor uses in making grants or loans. Most donors have, and recognize that they have, a responsibility to help governments to build their institutional capability through information and skills transfer even if no capital funding is ever provided. This is the role that the donor should play in the planning process since, presumably, the donor has considerable experience and expertise that can usefully be brought to bear.

Long-term financial commitments. One of the most common and most damaging mistakes by donors is refusing to make long-term financial commitments to countries in support of their water supply and sanitation activities. This does not mean that donors should sign a blank check good for ten years on the strength of clearly unrealistic ten-year plans. It does mean that donors should verbally commit funding at an estimated level over a multi-year period and permit the country to develop its plans on the understanding that money will be provided assuming the donor approves the specific activities for which its funds will be used.

At present, many donors change directions, priorities, and emphases so rapidly that no government can rationally follow. To some degree, this is the result of demo-

cratic political practices in donor nations, but not all democratic donors are equally guilty. This type of behavior makes it impossible for developing nation governments to make the best use of their own or the donor's resources. Countries which take seriously donor admonitions to manage their own development and come up with realistic plans can find all of their work mooted by the donor's suddenly deciding that it will spend money only on peri-urban systems this year or that another country suddenly has become important to the donor nation's foreign policy and will receive most of the money henceforth. If necessary, donors should make clear to their own governments that rational development policies and efficient use of resources require consistency in theme and approach and that to do otherwise is to waste taxpayers' money.

Donor competitiveness and unwillingness to share information and coordinate activities are expensive commodities that lead to wasted money and failed programs.

Coordination of programs. In the interest of advancing rapidly in development, many governments allow programs to begin which are beyond their capacity to coordinate effectively. Generally, it is not realistic to expect a national government to coordinate donor programs. It is helpful if donors participate in the planning process, but in the end the donors themselves must take positive steps to coordinate their work. In many developing nations, there are formal or informal donor committees that meet periodically and discuss their activities and planned projects and pool their assessments of the progress the sector is making in the country. This permits all donors to make better use of their resources and to ensure that projects are not overlapping or working at cross purposes. Donor competitiveness and unwillingness to share information and coordinate activities are expensive commodities that lead to wasted money and failed programs.

Collaboration and coordination among bilateral and international donor agencies is highly desirable: it can increase the impact and visibility of sector activities and offer opportunities to increase efficiency and lower costs, for example, through agreeing on the use of standard equipment. At the same time, achieving true collaboration presents numerous difficulties, and the substantial investment of time required can slow progress and raise costs—at least in the short term. Also, collaborating entails some loss of control, and many organizations may be uncomfortable with that.

Flexibility in implementation. It is not unusual for projects to start off in one direction and then encounter

It is important that the donor be flexible enough in its policies to permit needs to be addressed and opportunities to be seized in mid-stream.

unexpected or greater-than-anticipated difficulties or ramifications that would benefit from immediate intervention. A schistosomiasis control project, for example, might discover part way through that some of the funds should be diverted to developing drinking water supplies in affected communities. Or a project designed to address only drinking water might uncover considerable community support for and willingness to pay part of the cost of sanitation facilities if the two could be developed simultaneously. Or a program initially designed to use only handpumps might find that communities are willing to pay for more sophisticated and convenient technologies.

In cases such as these, it is important that the donor be flexible enough in its policies to permit needs to be addressed and opportunities to be seized in mid-stream and not insist on adhering to the original approach or technology. This will not always be possible or desirable, of course, but in many cases it will be and may lead to a more effective use of resources than was initially thought. This can most rationally be done when a sector-wide plan and program already exist so that a shifting of project focus takes place within a defined context of program priorities.

Nongovernmental Organizations

Nongovernmental organizations (NGOs) have traditionally played a major role in development at the community level in many developing nations.

Nongovernmental organizations (NGOs) have traditionally played a major role in development at the community level in many developing nations. There are many thousands of local and national NGOs and a much smaller number of major, international ones. It is the role of the latter that is of concern here. This role seems to be expanding in a number of countries as many NGOs are focusing less on their traditional disaster relief activities and more on a long-term commitment to development. CARE, for example, is carrying out water and sanitation development projects in a wide range of countries, including Haiti, Rwanda, and Sri Lanka. World Vision is carrying out a large-scale water and sanitation program for five African countries.

NGOs tend to be apolitical. This gives them greater acceptability to both local communities and national governments and permits them to work in countries regardless of official governmental relations between the

developing nation and the NGO's home government. In Ethiopia, for example, political problems prevented A.I.D. from working directly in the famine relief camps. Over a dozen U.S.-based NGOs, however, were able to develop water supply and sanitation systems in that country.

Clearly, NGOs have a positive role to play in development efforts. They frequently have substantial amounts of money and other resources available coupled with the ability to move quickly and flexibly to address development needs. They generally have excellent community-level ties and high credibility and are active in technical assistance as well as construction. These are all characteristics that are needed in and can be used to support national development programs and projects. NGOs are a potentially significant resource in water supply and sanitation development, if this resource can be harnessed.

The downside of NGOs is that many of them have been very resistant to any outside guidance, including that of the government of countries in which they are working. This is because historically most NGOs were relief organizations that prided themselves on their independence and whose financial supporters demanded quick and visible results. While neither of these characteristics is particularly a problem in disaster relief, they can be damaging in long-term programs aimed at sustainable development. Thus, the lesson:

Lesson Seventeen: **The NGO role is most effective if it is played out in the context of national development plans.**

As NGOs shift their focus more toward long-term development, they are increasingly willing to work, along with other donors, in the context of a national government in charge of its own development process. This willingness can be further enhanced by treating NGOs as important players on the country's development team and involving them in the planning and coordination process. Generally, where strong working relationships between NGOs and governments have been established, effective project implementation has been the result.

Generally, where strong working relationships between NGOs and governments have been established, effective project implementation has been the result.

In Sierra Leone, for example, CARE, with support from Canada, has been implementing a rural water supply project in the Moyambo District for a number of years. Because CARE has worked closely with the Minis-

try of Energy and Power, technical staff of the two organizations are effectively integrated in project implementation. The ministry has provided overall direction and some staff and has established policies, while CARE has provided project funds, innovative community participation approaches, staff, and logistical support. Overall, CARE has developed a strong working partnership with the Sierra Leone government which has allowed joint efforts to be directed toward urgent water and sanitation problems.

In Malawi, the work of World Vision provides another example of the new role for NGOs. Faced with insufficient staff and financial resources to plan, design, construct, operate, and maintain every water and sanitation facility, the government of Malawi recently agreed to permit World Vision to plan and construct the first major nongovernment piped water system in the country. The all-Malawian staff of World Vision agreed to work closely with the government in order not to undermine the excellent community participation approach developed by the government over the past twenty years. The ministry will maintain a supervisory and monitoring function over World Vision and other implementing agencies. This trend is likely to continue and will provide an opportunity for other NGOs to become more active in the sector.

NGOs use indigenous staff very effectively and give them proportionately greater responsibilities than do international development agencies.

Like all organizations, NGOs have their strengths and weaknesses which should be kept in mind in planning for their roles in the national development process.

Strengths. NGOs have a number of advantages over governmental organizations in implementing water supply and sanitation projects, particularly those that are relatively small in scale and are using innovative technologies and approaches. NGOs tend to have leaner administrative structures than government organizations and can mobilize and adopt new ideas more quickly. They also can usually implement water supply and sanitation projects at a lower unit cost because their overhead and administrative costs are lower.

NGOs use indigenous staff very effectively and give them proportionately greater responsibilities than do international development agencies. They are particularly effective in countries with weak or nonexistent governmental infrastructures. In Zaire and Haiti, for example, NGOs carry out the bulk of water supply and sanitation efforts in rural areas. Because they have a

long-term presence and thus good acceptability by local governments, NGOs are often an excellent vehicle for pilot projects introducing innovative ideas, technologies, and development methods.

In Cameroon, for example, CARE began working with A.I.D. in 1979 on an integrated program of water supply, health education, and latrine construction. In a country in which few organizations have successfully implemented programs involving community participation, CARE has been able to work with the government's Community Development Department to develop integrated projects in over 100 villages. A self-help philosophy promoted by CARE has helped the villages develop a strong sense of ownership and concern for the continued operation of their facilities.

In Nepal, Save the Children Federation and A.I.D. cofinanced an integrated development program that includes a village water supply component. Since 1981, Save the Children has built or helped repair sixteen water systems and another twelve are currently under construction. These systems serve 4,900 people at a cost of $20 per person. The projects benefit from extensive village initiative, labor, and the provision of materials in planning, construction, and maintenance. The key aspects of the program are a high degree of community involvement, simple technology (gravity flow to communal standpipes), and specific provisions for community take-over and maintenance of the systems.

Weaknesses. Not all NGO-implemented projects are fully successful, due largely to inherent but correctable weaknesses in some of the organizations. NGOs sometimes lack sufficient technical expertise to carry out more complex water supply and sanitation programs. Since NGO salaries are usually quite low, there frequently is a shortage of engineers and hydrogeologists on staff. This deficiency can adversely affect field performance on projects requiring high levels of technical expertise. Because of limited staff and administrative resources, NGOs rarely monitor their field operations closely and, as a result, are not able to carry out detailed evaluations of completed projects. They also may be unable to provide sufficient back-up resources if problems arise. These problems are compounded by the preference of many NGOs for carrying out their projects in isolation rather than in conjunction with other NGOs or other institutions that could provide supportive resources.

Oddly, one of the more serious weaknesses of NGOs is that some tend to be quite inattentive to the need to strengthen institutions and promote community participation.

Oddly, one of the more serious weaknesses of NGOs is that some tend to be quite inattentive to the need to strengthen institutions and promote community participation, even though one of their strong points is their excellent links with communities. This may be a result of the "doing for" mentality of disaster relief rather than the "doing with" approach that sustainable development requires.

WASH recently evaluated work in four countries involving two of the largest international NGOs working in water supply and sanitation and found major problems in the community participation area. In Ghana and Senegal, for example, WASH found that there had been inadequate preparation of the communities before drilling rigs arrived, even though good community development work by the same NGO was going on in villages not involved in the water project. Similarly, WASH found in Sierra Leone and Belize that another NGO's projects were dominated by technology and that the local communities had had little role in influencing project development. WASH has begun working directly with several NGOs to strengthen their capabilities in community participation and anticipates that these efforts will be successful.

The ultimate beneficiaries of water supply and sanitation improvements are the communities where systems are constructed.

Community Participation

The ultimate beneficiaries of water supply and sanitation improvements are the communities where systems are constructed. For many years, this fact defined the role of the community in the development process: the community was a passive beneficiary to which a new system was given, and it was then up to the community to use it, operate it, and maintain it as best it could. With hindsight, it is not at all surprising that this conception of the community role led to many abandoned systems and wasted resources. Experience over the past ten years has resulted in a very different lesson about the proper role of the community:

***Lesson Eighteen*: The community role is to own and manage the facilities constructed and to be actively involved in decision-making in all phases of project development.**

Although in many cases the community will be the legal owner of new systems, ownership in this context is more

of a psychological concept than a legal one. (Many governments consider water systems public property, like roads, which the community must manage.) If the community is to feel that it truly owns the system, it must be fully involved in planning, designing, constructing, and operating and maintaining it. It is not acceptable to define community involvement as keeping the local people informed, or seeking their ratification of decisions already made elsewhere, or letting them build parts of the system. True involvement means decision-making and hands-on management; anything less will not be satisfactory in terms of long-term sustainability.

True community involvement means decision-making and hands-on management.

Bringing about this level of community involvement requires a great deal of work. Special steps should be taken to ensure that all segments of the community, especially women, are active participants. Community participation has substantial costs associated with it, not the least of which is training. However, the benefits of community involvement are great and extend beyond the project for which it was initially sought.

Full community involvement. It is important that all elements of the community, not just the elites and the formal leaders, participate actively in the development process. WASH experience indicates that the wealthy members of a community and those accustomed to leadership roles will participate eagerly given the opportunity, while the poor, ethnic minorities, and those not accustomed to leadership roles (such as women) require special encouragement and probably special training in participation.

It is best to build on whatever community management structure already exists rather than attempt to create a new one.

In general, it is best to build on whatever community management structure already exists rather than attempt to create a new one. Modifications will almost certainly have to be made to include representatives of all the community's elements, but it is easier to do this than to try to impose a completely unfamiliar approach.

The community's informal leadership should be identified very early in the process as this may differ substantially from its formal leadership and will be very valuable in organizing the whole community. Special steps will have to be taken to involve the very poor and other non-influential members of the community who may be ignored even by extension agents because they are difficult to reach. Even these groups, however, will have their own informal leaders who can be identified and drawn into the process.

Though women are the primary users of water supply and sanitation facilities, and often provide most of the construction labor for them as well, they are frequently not sufficiently involved in project development.

Despite the fact that women are the primary users of water supply and sanitation project facilities, and often provide most of the construction labor for them as well, they are frequently not sufficiently involved in project development. A recent review of eighteen A.I.D. water and sanitation projects in Latin America, Asia, and Africa found that women were viewed as passive beneficiaries of improvements in infrastructure rather than active participants in project planning and utilization. WASH has found that the involvement of women in project planning and implementation is essential both to sustainability and to long-term health benefits. Effective participation of women in projects occurs, first, through a recognition of their roles in the community and, second, through special efforts to include them in the project development process.

A study in Kenya found that the community development components of projects were more effective when local women were used to organize and train community women.

It is generally recognized that women are more severely affected than men by inadequate water supply and sanitation facilities. What is less generally recognized is the important role women should play in influencing the nature and extent of water and sanitation projects. There is a growing body of evidence showing that, in some cases, women may be better suited than men to carry out certain project-related functions. A study in Kenya found that the community development components of projects were more effective when local women were used to organize and train community women. Another study, also in Kenya, found that construction of dams and catchments using self-help female labor was not only cheaper but more efficient than using paid male labor.

Women often tend to have greater stability in and commitment to the community than men. In Malawi, women are being trained by the government to be village pump caretakers, and consideration is being given to including them in village pipe repair teams. Women caretakers and repair technicians usually live in the community year-round, unlike men who must occasionally go to the cities in search of paid employment.

The barriers to making full use of women as valuable resources to water supply and sanitation development are largely rooted in traditional perceptions of the appropriate roles of women and men.

The barriers to making full use of women as valuable resources to water supply and sanitation development are largely rooted in traditional perceptions of the appropriate roles of women and men. A complicating factor is often economic clout, or lack thereof. Women tend to have less access to disposable income, and this may reduce their power to influence spending decisions in their own homes as well as in the community at large. WASH

has found that where perceptions of roles and other factors militating against participation by women can be modified to permit them to make the many contributions of which they are capable, more sustainable systems result.

Costs of community participation. Community participation involves costs to both the community and the implementing agency. Since most of the community's costs are in-kind (labor, materials, participation time), they do not involve cash transfers. The implementing agency, however, will incur direct, cash outlays for salaries and expenses of personnel to assist in community organization, training, supervision, and back-up technical support. These costs generally are greatest during the mobilization phase and drop off rapidly as implementation progresses.

As the project proceeds, the community will almost certainly need ongoing training in a variety of areas to permit them to make wise decisions about their system and its use. Some members may need training in participation or literacy. Management training for the water committee may be necessary along with training in how to be trainers so that they can transfer information to the rest of the community. Some technical knowledge will need to be engendered to permit the community to make informed decisions. Administrative skills such as bookkeeping may need to be developed if they are not already available in the community. The system operator will need training in how to operate and maintain the facilities. All of these training needs should be identified at the project planning stage and arrangements made to meet them.

In WASH experience, the costs of community participation are underestimated in most projects.

In WASH experience, the costs of community participation are underestimated in most projects. Data on direct and indirect costs are unfortunately difficult to obtain. The November 1987 global consultative meeting on the Water Decade held at Interlaken, Switzerland, concluded that community participation activities could add "from 3 percent to 17 percent to project costs," adding that "estimated gains from improved reliability are higher, particularly if wider benefits are taken into account."

WASH evaluations indicate that community participation should be funded at a somewhat higher level than this if all the benefits of increased sustainability are to accrue. Its work on evaluating five specific A.I.D.-funded

projects revealed a general correlation between the amount of money spent for community development and project success in terms of long-term sustainability. This evaluation found that a highly successful project in Togo, for example, had spent about 25 percent of project resources on community participation activities, including health education and training. While no firm percentage can be recommended, it is clear that expenditures for community participation should be substantially more than the frequently cited 1 to 5 percent. It is safe to say that most projects neither give high enough priority to nor spend enough money for community participation and that both activity and funding levels should be increased.

Benefits of community participation. The community participation process used in developing water supply and sanitation projects has potential benefits extending far beyond those projects. The skills that are transferred, the capability that is developed, and the confidence that results from managing community affairs combine to increase the community's ability to take on other projects and other issues that affect its well-being. In some cases, communities have gone on to organize agriculture projects, for example, using many of the same techniques.

Greater community independence, self-reliance, and responsibility are needed in all development programs in the Third World, not just in the water supply and sanitation sector. It appears, however, that because water supply facilities are often felt needs of the community to begin with, and because projects in this area provide an immediately useful benefit, they may be the most appropriate starting point for community organization.

Field experience strongly suggests that active community participation in water supply and sanitation projects has a positive impact on other activities introduced to the community.

Field experience strongly suggests that active community participation in water supply and sanitation projects has a positive impact on other activities introduced to the community, particularly in the area of primary health care. Thus, water supply improvements may not only improve health through clean water but also may serve as a stimulus or catalyst to increase participation in other primary health care and child survival activities.

Although not as much research has been done on this topic as should have been, recent studies show that there is a strong relationship between sequential development activities when a high degree of community involvement occurs. Field investigations in Malawi have shown that community response to immunization projects, when

conducted in a participatory manner, was 50 percent higher than in nonparticipatory projects.

The best evidence to date showing the effect of community involvement in water supply projects on participation in subsequent health care activities resulted from a WASH study of sixty villages in Togo and Indonesia. Using DPT (diphtheria, pertussis, tetanus) series completion rates as the indicator, the WASH study found significantly different DPT immunization rates among communities with participatory water supply projects, communities with nonparticipatory water supply projects, and communities without any type of water project.

In both Indonesia and Togo, DPT series completion rates in the communities where participatory water supply projects had been carried out were consistently higher (55 to 60 percent) than in the communities where only nonparticipatory projects (with facilities constructed by external agencies) had been carried out. Moreover, additional data for Indonesia showed that DPT series completion rates in the communities where nonparticipatory water supply projects had been carried out were similar to series completion rates in the control villages where there had been no water supply project. The indication is, then, that participation in a water supply project—not just the existence of a project—is the key to the stimulus effect on other health care activities.

The Private Sector

Although it is by no means a panacea to water supply and sanitation needs, the private sector can be an important source of expertise in carrying out development programs. There are important differences between the public and private sectors in most countries, with the latter in many cases offering higher salaries, greater opportunities, and better morale. Thus, there may be excellent talent—engineers, planners, trainers, materials development specialists, system operators, repair people—in the private sector unwilling to work full-time in the public sector. These people can be accessed, however, on a contractual basis so that their expertise can contribute to the country's overall development effort.

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government. In Haiti, the most common product name country-wide is that of the water company that delivers water to virtually all of the middle and upper classes. The public water system is so poor that it cannot be relied upon, and all who can do so buy water from the private vendor. Similarly, in Nigeria, vendors are providing service in competition with the public system, which is less reliable. In peri-urban areas in most countries, waste cartage—both human waste and solid waste—is handled by the private sector, which recovers part of its cost through recycling solid wastes. In the absence of public services in peri-urban areas, it is very common for the private sector to provide service at a level and cost the market demands.

Many of the materials needed for water supply and sanitation system construction are already available from the private sector in some countries.

Many of the goods and materials needed for water supply and sanitation system construction are already available from the private sector in some countries. In others, it is worth exploring the possibility that materials and equipment currently being imported can be locally manufactured by the private sector. In Togo, for example, India Mark II pumps and parts are made and supplied to neighboring countries.

It is important to exercise caution in providing artificial support for manufacturing enterprises. The market should be carefully analyzed to ensure that the product is in enough demand to sustain the enterprise and that the product can be produced at a price competitive with imports. This is a role that the private sector itself should play; donors and national governments can provide information, training, and other types of assistance but should not themselves set up local manufacturing companies. In Zaire, for example, A.I.D. has asked a U.S. firm to appraise the water situation and see if it is interested in setting up a parts manufacturing operation in response to a large potential growth in handpumps.

Certain roles for the private sector require that a regulatory framework for operation already be in place and enforced.

Certain roles for the private sector require that a regulatory framework for operation already be in place and enforced. Further, one of the biggest drawbacks in using the private sector for tasks involving interface with communities is that the private sector's motivation is quite different from the public sector's. While the public sector perceives a public interest in fostering community participation and developing viable community institutions and thus is willing to devote resources to such activities, the private sector is more interested in carrying out tasks in the least time at the least cost to maximize

profits. Thus, time spent in community participation is likely to be seen as wasted time. The WASH lesson is that:

***Lesson Nineteen*: Private enterprise has a definite role in water supply and sanitation; that role is determined by the overall government strategy for the sector.**

Although this lesson can be applied in theory by making it known to private sector companies (including individual entrepreneurs in the private sector) that community participation and interaction are part of the job, most of them will not know how to foster participation effectively or be particularly motivated to do so. In these cases, training should be provided to the private companies so that they understand the whys as well as the hows of community participation. In almost all cases, the private sector will need education in meeting consumer needs and desires rather than just in solving technical problems.

Total privatization of water supply and sanitation service is probably neither feasible nor desirable in most developing nations, but elements of the delivery system could appropriately be handled by the private sector. Project implementation, for example, could in some cases be more efficiently and effectively carried out if private firms were used for elements such as design and construction while national institutions continued to provide coordination, planning, and management of the development process. Operation and maintenance is another component which may lend itself to privatization where the private sector is developed enough to offer the expertise needed. System administration functions—bill generation and collection and bookkeeping—may also be suitable for handling by the private sector under contractual arrangements.

Total privatization of water supply and sanitation service is probably neither feasible nor desirable in most developing nations, but elements of the delivery system could appropriately be handled by the private sector.

As the private sector becomes more involved in water supply and sanitation development, the need increases for a good governmental regulatory and monitoring framework to safeguard the public health and the public interest. This may be more easily said than done as experience with privatization in industrialized nations—particularly the United States—indicates.

CONCLUSION: THE LESSONS ASSESSED

It is customary in the concluding chapter to introduce the caveat that the points previously made regarding effective ways of bringing about water supply and sanitation development are not intended to suggest a model for development of the sector, that those who use the material should be flexible in applying specific lessons to their situations, and that circumstances may limit the utility of any particular lessons cited. While these cautions certainly should be observed, the suggestion of a model cannot really be denied. In this report, four central principles provide the organizing focus for nineteen lessons and a host of related points. From these a "model" can be inferred, and it is reasonable to assess the document as a whole from this viewpoint.

At least three questions can be raised. First, is the model complete, i.e., are there lessons to be cited in every corner of development? Second, to what extent are the principles here identified as broad expressions of the best current thinking on development in fact being followed in developing nations? Third, individual lessons or principles aside, is the basic model the right one?

Completing the Model

There are unquestionably some parts of the model that are not complete. The lessons are drawn from WASH experience, and WASH has been primarily a reactive technical assistance system. It responds to requests from external agencies, especially USAID missions, which are normally acting on behalf of host country governments. The kinds of assistance requested have been extremely varied, but some areas of development have been of more concern than others. As a result, there are areas where the "WASH methodology" has been applied lightly or not at all.

For example, developing nations probably do not use information as well as they should. They lack good information storage and retrieval systems at home and do not make full use of those that are available abroad. Yet WASH has been asked to carry out very few projects in the area of information exchange. It has a lot of in-house expertise that it applies to its own information transfer efforts but rarely has the opportunity to transfer the expertise to developing nations. As a result, the information aspects of the technical assistance model are not well developed.

In the linkage category, WASH is well aware that water supply and sanitation efforts should be closely linked with other development sectors, especially those closely related to water supply itself (water resources and source development, irrigation) or to health (pollution prevention, solid waste management, commu-

nicable disease control). Often the best expertise for dealing with those areas is found in the water supply and sanitation sector. But few WASH projects have truly addressed this aspect of development. Achieving linkage has been successful within the water supply and sanitation sector but is still largely unexplored between sectors.

WASH is still feeling its way with regard to the involvement of the private sector. Since requests for assistance come mainly from governments, it is primarily the public sector role in development that has been explored. Innovative ways for using the private sector have barely been touched upon.

It would be beneficial to the sector if WASH had more of an opportunity to work in the above areas, not just to round out a model but to produce useful lessons in some important areas. Since WASH cannot devote great resources to initiating projects in areas it deems important, however, completion will have to wait for more developing nations to decide that information, or inter-sectoral linkage, or the private sector are important considerations for them.

Ideal and Reality

It is probably fair to say that there is no developing country in which all the lessons offered by WASH are being followed. The WASH methodology stresses broad participation coupled with coordinated and sustainable effort. Achieving a workable balance between these two essentially conflicting principles is a tall order even for societies that enjoy a high degree of development. It is rarely achieved under Third World conditions—or any conditions.

To begin with, governments in many—perhaps most—developing countries still feel uneasy with the participatory approach. Still responding to traditions where "participation" meant dissent and disruption, they are often apt to look for the expert to provide them with the "right" answer in a critical situation. Many of their development professionals are eager to do things for communities, less optimistic about doing things with them. Unfortunately, some of the technical assistance provided to developing nations reinforces these tendencies.

Linkage of development functions is widely acclaimed in principle, often ignored in practice by the development community. For example, the need for hygiene education to complement water and sanitation facilities development is widely accepted. However, there has been too quick a rush to embrace only short-term health solutions such as ORT rather than linking them to long-term approaches like water supply and sanitation. And the threat to water supplies posed by solid and toxic wastes and other byproducts of increasing development are not sufficiently appreciated.

The financial end of sustainability has not received enough attention. In particular, in many settings, methods for generating revenues through water system users have been shunted aside in favor of continuing subsidies from central governments. In societies where many people are poor, this is perhaps inevitable, but subsidies do not equal system sustainability in the long run. Institutional

development still does not occur fully to ensure that the "system" of coordination and support down to the community level is in place.

Possibly the biggest gap between precept and performance is found in the theme of shared responsibility. All parties agree that maximum impact is achieved when efforts are coordinated, but the agreement breaks down when particular issues arise. Far too often, NGOs see government attempts to control the sector as the dead hand of bureaucracy, donors provide aid for short-term political reasons and impose their own priorities on national plans, and national governments fuel the mistrust by inefficient performance. However, there is no reason for undue pessimism on this score, because coordination of effort among differing interests is hard to achieve under any circumstances—but has had some notable successes.

On balance, the disparity between ideal and reality in water supply and sanitation development is not so great as to suggest that the gap cannot be closed. An experiential model is useful in this regard.

The International Drinking Water Supply and Sanitation Decade is coming to an end. It was not the decade in which water supply and sanitation development was completed but the decade in which the international community found out how far there is still to go in this respect. Perhaps in the next ten years, the lessons learned in the Decade can be applied.

Validity of the Model

The model overlying the lessons and principles in this report constitutes a philosophy or approach built on wide experience. The WASH staff members and consultants who contributed to this report have been influenced not only by their WASH experience but also by their experiences in development work, notably the Peace Corps, the U.S. Public Health Service, and A.I.D. itself. These individuals are working in the field of water and sanitation, but first and foremost they are development specialists. They are chiefly interested in building developing country capacity on all levels—from village committees to government ministries. The goals they espouse are shared by development workers and organizations all over the world.

In this book, the approach or philosophy comes with a water and sanitation "checklist" tailored to specific situations. This checklist is not a prescription. WASH has learned that it is futile to prescribe a package solution. Every country—probably every region or village—will present the water and sanitation development worker with a different set of problems and needs embedded in a unique context. In trying to solve the problems and meet the needs, WASH relies on the basic development philosophy and the checklist of what has been learned about effective water and sanitation projects. It takes time and commitment to operate in this way, and there are no shortcuts to real development.

Normally success is possible if the basic philosophy and checklist are applied, but sometimes the context is such that nothing positive can be achieved. One item

on the water and sanitation checklist, for example, is that without hygiene education water and sanitation projects will probably not have any positive health impact. If the ministries in a developing country government are set up in a way that inhibits coordination between systems construction and hygiene education, it may be impossible to set up effective systems until the ministerial context is changed.

Current economic and political realities can also affect the success of the development model described in these pages. In many countries, lack of local institutional capacity is so great that outside assistance cannot be absorbed, and lack of economic growth has led to a severe lack of internal resources to sustain development. But more important in the long run, the sources of external assistance, both financial and technical, are insufficient to fully address the needs of developing countries. These countries must build their capacity to plan, finance, and implement their own programs. For most this means that governments and local communities must take up part of the burden, and that in turn means that individual citizens are going to have to grow and change. The WASH model is based on this reality.

We at WASH believe that the model is the right one. It is also a model-in-process, being elaborated as more experience is accumulated and more lessons are learned. However incomplete it may be, the model should lead to an ever-increasing percentage of successful, sustainable development efforts.

A Selected Bibliography of WASH Reports

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