

**BEYOND THE DECADE**

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by

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## BEYOND THE DÉCADE

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## BEYOND THE DECADE

### SUMMARY

*Significant progress has been made during the International Drinking Water Supply and Sanitation Decade (Decade). True, coverage is not even close to the optimistic projections governments made before the Decade began. However, keeping up with population growth, indeed exceeding it, is a signal accomplishment during a period of serious economic dislocation.*

*More importantly, the first half of the Decade has seen some significant changes in the approach taken by the sector in responding to the challenge of "Service to All". Non-conventional, less expensive solutions and community participation are more common today than earlier in the Decade and offer the promise of more rapid expansion of sector coverage in the future, especially when combined with the principle of cost recovery which also has found increasing acceptance.*

*The international community can take several steps to accelerate progress towards accomplishment of the original Decade targets. More important, it must act to continue these efforts beyond the Decade and lay the foundation for continued progress. The choice is between a phasing out by the end of the Decade and in so doing destroying any hope of accomplishing the goal of service to all, possibly dooming the Health for All by 2000 goal in the process, or renewing efforts to overcome the economically related slowdown and ensuring that Health for All in 2000 includes Water Supply and Sanitation Service for All.*

*At the same time, the sector can lay the groundwork for solving existing and predictable environmental problems by broadening the focus of its activities - water demand management and use efficiency rather than supply alone, reuse of waste-water and solid waste instead of disposal.*

*To accomplish these goals, multi-and bilateral agencies and NGO's active in the sector should cooperate in the preparation of documentation of lessons learned, prepare training materials and disseminate them widely. They should undertake/sponsor additional applied research and development work, particularly in institutional development, community participation, resource recovery and selected technical areas, cooperating in the work and the subsequent dissemination of results. They should assist governments in the development of sector strategies which optimize the impact of technical assistance and investments and thus encourage the flow of internal and external resources to the sector.*

*This paper reviews the sectors progress during the first half of the Decade, identifies principal issues and recommends a Decade Plus Program of cooperative actions for organizations active in the sector's development.*

## EVOLUTION OF THE SECTOR

*" Those who cannot remember the past are condemned to repeat it " - Santayana 1905*

The water and waste sector has an interesting and long history. Civilizations in antiquity were just as concerned as today's about water supply and waste disposal and developed solutions remarkably modern even by today's standards. Just as today, the well to do were best provided as the many records and diggings of palaces reveal. Nevertheless, as long as 5-6000 years ago some cities had rudimentary central water and sewer systems. More recently, water supply and sewerage was one of the major accomplishments of the Roman Empire.

With the fall of the Roman Empire, interest and knowledge about water supply and sewerage and its benefits to health was lost in Europe. The Moslem civilizations in the Middle East, Northern Africa and Spain, in contrast, continued maintaining a high interest and level of service in water supply and personal hygiene, strongly motivated by their religion, while the situation in Europe, grew steadily worse.

By the middle of the 19th century, sanitary conditions in most European cities had become intolerable and major efforts were undertaken to promote various solutions to human waste disposal. Some wealthy households had already acquired in house facilities (with discharge to open drains or water courses), the flush toilet having been patented in England as early as 1775. Nevertheless, as late as the beginning of the 20th century, the virtues and disadvantages of the earth-closet and the flush toilet were still debated. At about the same time the debate was started on the relative advantages and disadvantages of combined versus separate sewer systems. This debate was particularly extensive in the United States where in 1912 combined sewerage won a decisive advantage. At that time a committee of the National Association for Preventing the Pollution of Rivers and Waterways reported that the use of waterways for sewage disposal was an economic necessity and that public health nuisance could be kept to a

minimum. By 1920 the concept "dilution is the solution to pollution" had become fully accepted.

The debate about the virtues of one system or the other, indeed about pollution, was waged for a long time without a clear understanding of health implications and was engaged in by people from all walks of life. Decisions were often influenced by the personality of the proponent rather than on a rational evaluation of facts. Organizations were formed to participate in the debate for or against separate sewers, and later for or against treatment. It is interesting to note that the most forceful American proponent of separate sanitary sewers was not an engineer, based his advocacy on wrong concepts (which didn't stop his success) and was opposed by the leading engineers of the time.

Treatment of water began in England in the late 18th century, of sewage in the late 19th century (water treatment was also practiced in antiquity). Water treatment was implemented more widely than sewage treatment. The general approach was to discharge sewage to water courses without treatment and overcoming potential dangers to health by treating the drinking water. It was only after the discharge of ever greater amounts of untreated sewage had led to gross pollution of receiving waters that countries began extensive pollution control programs in the late forties of this century. Results of this cleanup are now evident in most industrialized countries. Developing countries, at the other hand, are going through the same cycle of sewage discharge and river pollution and, in a few cases, the beginnings of expensive cleanups. Unfortunately, the situation is worse today because waste products are more complex, more toxic, with health impacts that became apparent only after a considerable interval of time.

The lessons to be learned from the history of the sector are clear:

- \* Progress in the sector came about whenever conditions became intolerable. Improvements reflected both then current knowledge and the need to continue using previously made investments for economic reasons.

**Some historical dates in the sector's development**

- 4000 BC** First written symbols known (Sumerian) concern water laws and water use.
- 4-3000 BC** Indus valley (modern Pakistan) urban civilization had rudimentary central water and sewer systems with in-house baths and water-flushed toilets.
- 1045 BC** Water tunnel serves Samos.
- 1000 BC to Date** Qanats in Iran carry water to date communities, supplying all of Teheran's water demand until 1930.
- 368 BC** First Roman Aqueduct.
- 312 BC** Roman Cloaca Maxima (originally storm drain then sewer).
- 180 BC** Pergamon Pressure Pipe Aqueduct.
- 284 BC** 144 Public Toilets in Rome.
- 400-1800 AD** Continuous deterioration of water supply, sanitation and personal hygiene in Europe while standards remain high in Middle East and reach high levels in Moslem dominated areas in North Africa and Europe.
- 1500-1200 AD** Closing of public bathhouses for public health reasons. (Paris with 546,000 inhabitants in 1800 had two public bathhouses)
- 1531 AD** Bill of sewers regulating their construction in London (drainage).
- 1596 AD** Sir John Harrington describes water systems (standpipe service).
- 1775 AD** First Patent for water closet granted in England to Mr. Cummings.
- 1791 AD** First slow-sand filter constructed in Scotland.
- 1802 AD** First public water supply system in U.S.A.
- 1815 AD** Sewer construction in London (wastewater and drainage).
- 1842 AD** E. Chadwick report on Health, setting in motion drainage improvements.
- 1844 AD** New York City grants permission to connect water-closets to sewers.
- 1846 AD** First London Sewage Pumping Station installed.
- 1852 AD** In England: First Cistern Flush Toilet with Siphon "Modern" Sewer Design Manual Board of Health proposal for separate sewers rejected by engineers Water Act requires filtration.
- 1845 AD** 2 million people in U.K. served by combined sewers, some of them open channels.
- 1855 AD** John Snow report on relationship between water sanitation and the spread of cholera.
- 1880 AD** \* 598 USA water systems  
\* 103 of 220 cities in U.S.A. with sewer systems practice land disposal, 25% of their population have toilets.
- 1900-1925 AD** Universal acceptance of sewers after germ theory replaces filth theory.
- 1900 AD** First sewage treatment.
- 1901 AD** First trickling filter in USA.
- 1914 AD** First activated sludge treatment plant in U.K.
- 1916 AD** First activated sludge treatment plant in U.S.A.
- 1917 AD** Drinking water chlorination starts in U.K.
- 1930 AD** U.S. urban service levels: water supply 69 million (46 with treatment) sewage disposal 60 million (18 with treatment).
- 1945 ++ AD** Change to separate storm and sanitary sewer system after gross pollution of rivers, continuous increase in water and wastewater treatment effectiveness.
- 1965 AD** Increasing number of reports of drinking water contamination in U.S.A.
- 1972 AD** U.S. Federal Water Pollution Control Act Amendments prohibit discharge of pollutants by 1985.
- 1974 AD** Louisiana study relates high cancer incidence to drinking water obtained from Mississippi (despite treatment), caused by trihalomethanes.

- \* Based on present scientific knowledge and hind-sight, many of the last 100 years intermediate solutions would not have been implemented.
- \* New settlements without massive past investments in the sector should examine alternatives available to them today rather than to repeat the cycle of solutions, improvements, failures leading to new solutions, improvements, failures, etc..
- \* Those attempting to assist developing countries in improving the sector should take particular care to ensure that solutions proposed are based on scientific knowledge of today rather than traditions of the past.

Facts of the past prove that dilution is no solution to pollution. Today's evidence suggests that disposal even with treatment, is not an adequate solution to water and waste problems. The solution can only be found in a broader set of actions which combines a reduction of wastes generated through conservation and recycling, with environmentally sound disposal of the remaining residues. Developed and developing countries alike must take another look at present practices, guided by today's knowledge of scientific evidence rather than traditions, and find long term sustainable solutions to protecting the human environment at least cost to all.

## PROGRESS

### Financial Resources

Decade progress has not only been hampered by annual population growth rates of 2-3% per annum, it also began just at the time when the world was hit by the most serious recession since the 1930's. Nevertheless the UN took the lead by dramatically increasing its allocations to the sector from US\$7.7 million in 1973 to \$104 million in 1983. Since 1983 UN allocations have declined to some \$80 million over the past four years. UNICEF funding had the major influence over the dramatic rise at the start of the decade, but also the later decline.

The total amount of external resources devoted to the water supply and sanitation sector also rose dramatically during the seventies but levelled off with the world recession in the early years of the decade to about US\$2.1 billion. Loans from the World and Regional Banks constituted some 50%, bilateral donors 37%, UN Agencies 7% and NGO's 6% of the total (ECOSOC, 1985). Estimates (which exclude China) have it that since the beginning of the decade to its mid-point an additional 270 million people in developing countries have water supply and 180 million adequate sanitation (WHO, 1986). This progress varies greatly from country to country. The urban areas have drawn most heavily on available resources and thus made the greater advances. The imbalance is exemplified by the fact that 54 million more people received water supply in urban than rural areas; similarly 86 million more urban dwellers got sanitation than in the rural areas. Yet, there are nearly twice as many people in the rural than in the urban areas and a higher percentage in greater need.

There have been noticeable trends in the way projects are implemented. During the sixties and seventies, water authorities were almost universally centralized engineering establishments. The target populations were the better residential and commercial urban areas. As the target shifted to the less accessible lower income communities, the centralized agencies found it increasingly difficult to apply standard engineering approaches to delivery and especially maintenance of services. The successful agencies reoriented their implementation method to suit the clients and conditions at hand. Appropriate low-cost technology was called for and a participatory approach used in its delivery. There are now several full scale projects in which these two elements, low-cost technology and community participation, are at the heart of the design and execution and the key to their success.

### Accomplishments

Important advances have been achieved during the first half of the Decade. Although progress in terms of additional percentage covered falls below 10% of the population it has been made despite population growth (2-3% avg.) and

stagnation in economies in most and even downturn in some economies. Other accomplishments are less quantifiable but vital to progress in the years ahead.

The first and most obvious is the recognition by developing countries and donors that conventional technologies are inappropriate to the majority of their populations and have accepted low-cost technologies as being viable through which far greater numbers can be reached with the same financial resources. The second important trend is towards involving the community in the project so that overall cost savings can be achieved and at the same time ownership of the facilities and responsibility for operation and maintenance can be taken by the community itself. Thirdly, the Decade has raised awareness of and level of priority for water supply and sanitation within governments and external support agencies. Governments are placing stronger emphasis on those in greatest need; setting targets and creating national plans; strengthening sector institutions; establishing cost recovery mechanism within programs and improving operations and maintenance systems. Government funding has remained stable during the years of economic recession. Several countries such as India, the Philippines and Trinidad have significantly increased their allocations to the sector, others such as Ethiopia, Malawi, and Lesotho are already spending over 10% of their national budgets on water supply and sanitation (ECOSOC, 1985)

#### **Remaining Constraints**

Many constraints still remain, as identified by the regional consultative meetings:

1. Institutional
2. Cost Recovery
3. Imbalance between Water Supply and sanitation
4. Operation, Maintenance & Rehabilitation
5. Community Participation
6. Coordination and Information Exchange.

There is a long way to go in meeting the needs of low-income populations of the developing world. In a nutshell, there has been significant progress in our knowledge of how to implement affordable sustainable projects. We have achieved lift off but we are not yet in orbit. What is needed now is a boost: new resources and not

necessarily from traditional sources. Success in the years ahead will depend on how well we have learned our lessons in the past and how well they will be applied in the future.

#### **ISSUES**

There are numerous issues surrounding the sector which deserve analysis ranging from institutional development to technology choice. Most have been repeatedly discussed in the literature. However, there are five major interconnected issues which stand out as being crucial to the advance of the sector in the years ahead: decentralization, community participation, integration, affordability and women's involvement.

#### **Decentralization**

Over the past forty years most water supply and sanitation agencies have been shaped in response to the demands that were placed on them. The loudest cries for service came from the wealthier and commercial areas of urban centres - those closest to political power. The institutions were modelled after the water utility or municipal departments of industrialized countries. Technologies were also transferred from there. In the cities there was no need to interact with the consumer in planning, construction, operation or maintenance. Interaction with the customer was limited to providing service and collecting revenue. Now that the major portion of urban dwellers have service, water supply agencies are turning to those in even greater need - the low-income squatter settlers on the urban fringe and the rural inhabitants. But these are far less accessible and more difficult to serve. In their attempts to do so, many agencies are becoming painfully aware that the institutions which have grown in response to urban centre needs are not appropriate to the rural and urban poor. These centralized agencies have little capacity to provide the continuing outreach necessary to operate and maintain the facilities they install in these communities.

Unfortunately, centralized agencies commonly hold the view that solutions to problems in the hinterland are to be found at the centre where superior technical skills tend to concentrate. Decisions are made at the centre, typically in the capital city, with little or no input by the

people for whom they are made. It is also unfortunate that opportunities for career advancement are greater at the centre. Being posted to the hinterland is often considered a demotion.

***Korea, The Saemaul Undong Movement, an experiment in decentralization***

*In the early seventies the Ministry of Home Affairs distributed free construction materials to selected villages for construction of public infrastructures. No other instructions as to what kind of infrastructure was given. The villages chose and implemented their own projects. All other costs were borne by the villages themselves. Some chose roads, irrigation systems and community halls, but many chose to build piped water systems. There were problems of quality control but progress and the degree of participation was astonishing. Encouraged by success, the Movement was extended through most of the country. By the early eighties over 35,000 villages had built a piped water scheme. By having to pay for most of the costs, the communities kept them down to an average of US\$ 80 per household—another example of the benefits of decentralization by devolving authority to the community.*

Success in providing self-sustaining services in low-income communities implies effective outreach and utilization of the resources of the community itself. This cannot be accomplished through centralized institutions which take the contractor/construction approach to project implementation. Decentralization which transfers responsibility and authority to the field has figured predominately as a common element in successful projects. This means that, although policy and program planning takes place at the centre, project decisions are made in the field in association with the beneficiary community. Such decentralization can mean a major shift in policy and operations. For those in responsible position in highly centralized agencies, devolving authority

to the field is often difficult. However, it is the only way that responsibility for long-term care of the facility will be assumed by the community.

**Community Participation**

It was unfortunate that the planning process continued in the top down mode in the early years of the Decade, that planners did not recognize that an expansion of sector activities required a community participation approach. The intention here is not to belittle such a planning process, but to underline the need for a combination of both top down and bottom up planning. In retrospect, it is clear that projects in low-income communities, which have not involved the beneficiaries in a meaningful way, have tended to fail; those that have had strong community inputs have been the most successful at reaching more low-income people with long-lasting services.

***Baldia, Karachi, Pakistan***

*The Baldia sanitation project started in 1979. The approach taken was very low key. Community committees were formed only after several months of sensitization. Traditional practices were followed and progress proceeded "at the pace of the people". The slow beginning was more than made up by the project's rapid take off after the second year. Now 90% coverage with pour-flush latrines have been achieved, with the people paying for 90% of capital costs and all of operation and maintenance. The project has gone on to establish 65 'home schools' to upgrade literacy and hygiene education, and it now boasts several primary health clinics. The project focusses on the needs of mothers and children. It was initiated by a female social worker and is today managed entirely by women.*

Many implementing agencies are now taking steps towards involving the community in their projects in the hope that it will improve

operation and maintenance of the installations in the long term. There seems to be three stages in the learning process. The first is where community participation is looked upon as "sweat equity" whereby the community contributes its labor in return for the facility. This has universally been found to fail in having the community assume ownership and long-term responsibility for the system. The second is the "option selection" procedure whereby the community is involved in the decision-making process but its participation is peripheral. Agency personnel allow the community to select the type and location of facility through public meetings, but little else. The community participates while the agency is directly involved, but interest wanes thereafter.

The third form of community participation is where the agency involves the community over a considerably longer period of time, before the facilities are actually installed. This time is required for sensitization, education, marketing, training and for confidence building. Typically, low-income communities have had lifelong experiences in dashed expectations and curtailed efforts at self-help development. Only when a community knows how to succeed, and believes it will succeed, can it participate fully. This process of confidence building (exemplified by the SARAR technique in PROWESS projects) takes time and resources but will ensure long-term, self-sustaining operation and maintenance of the facilities.

The process of involving communities is by no means a simple one. It often requires changes in the orientation and attitudes of staff and the implementing agency itself - to ones that look upon the community as a partner in development rather than merely a recipient of technology.

#### **Integration**

It is now widely recognized that full health benefits are not achieved by water supply alone. Sanitation and hygiene education are needed as complementary inputs. Yet sanitation remains as the weak sister to water supply. Water is a product that can be (and is) used as a political tool. Water supply agencies are seldom responsible for sanitation, and sewerage is too expensive. Sanitation doesn't lend itself well to the contractor/construction approach to project

implementation. These are among the many reasons for ignoring sanitation. This is quite apparent in the Decade coverage statistics wherein sewerage coverage falls well behind successful sanitation projects which have been based on strong community/household inputs requiring little or no subsidy. Interestingly, some of these have been implemented outside government structures by NGO's.

To say the least, health education is not known for its success. Thus proposals for hygiene education which are integrated with water and sanitation projects are often regarded with justifiable skepticism. Again, there are many reasons for its exclusion. The principal ones are jurisdictional issues and long-term inputs required at the community level. Yet there are examples of success, especially in school-based programs. Primary school children are the largest, most impressionable and attentive audience in the world. Curricula invariably include health subjects but these require upgrading, improved teaching materials focusing on hygiene, and teacher training.

In sum, integration is possible but project planners will have to be flexible and innovative in the methods they devise and in the institutions they select. Almost without exception, the successfully integrated project will have to involve two or even three ministries outside the water supply agency, and the methods used will have to draw on resources outside the conventional water sector.

#### **Affordability**

With increasing emphasis on cost recovery, questions of ability and willingness to pay are becoming increasingly fundamental to the financial viability of projects and to the agencies implementing them. Data on affordability are scarce. The old rule of thumb, that the poor can afford 3% of their income for these services, is often resorted to. Clearly, the affordability depends on a host of circumstances, only one of which is income. Where the need is great, and water is sold by vendors, the percentage is often several times the 3%. Not uncommonly, people in these circumstances are already paying more (as a group) to vendors than what an alternative community-wide system would cost.

Rural sanitation is an interesting case in point. It is conventional wisdom that rural people are not interested in improved sanitation and will not invest in latrines. Yet in several projects (e.g., India, Lesotho, Zimbabwe) there is a surprisingly high demand for sanitation once community awareness of the convenience, privacy and health benefits is established. This demand goes beyond maintaining the facilities, to covering the capital costs of installation as well.

Cost recovery for rural water supply is also assumed limited to recurrent costs only. Depending on how the community is involved and what financial systems are put into place, often the community has been shown to be able to afford far more than that. The Population and Development's (PDA's) rainwater roof catchment scheme in North East Thailand is a case in point. The North East is Thailand's poorest area, yet the PDA is able to recover, not only the entire cost of construction, but a major portion of its cost of administering the program as well.

***"Don't blame the Poor: Cost Recovery for Rural Water" J.K. Romm, 1987***

*Findings from Nepal and Bolivia disprove the common assumption that poor rural communities are unable to recover the costs of projects. Engineering, economic and institutional errors and decisions contribute to problems with cost recovery. Poorly designed and constructed systems increase capital and O & M costs and limit benefits. Efficient design and equitable, multi-tiered tariff structures developed with the community's participation resulted in sustainable water supplies even in poor villages.*

Experience has demonstrated time and again that willingness and ability to afford services depends, not only on income and the cost of the facility, but also on how the money is collected and managed. Questions as to who collects the funds and how they are collected; who controls their expenditures and what they are made on; what the terms of repayment of loans are and what the incentives for repayment are; are just as important. There is ample evidence that expectations of what even the rural poor can

afford is lower than what is actually the case. Recovery of more than just the recurrent costs of basic services is possible if the perceived need for the services is strong, if the community has ownership and control over the facilities and if appropriate credit facilities and financial management are in place.

Affordability is not only a question of whether the user is capable of paying for the service received. It is also a question whether the economy of a country can afford investments in the sector or, in other terms, whether the benefits of sector investments to the national economy outweigh its costs. Quantifying benefits of sector projects is often difficult, especially when health benefits are used as the principal justification for the investments. Water supply and waste disposal do play a role in productive sectors by providing an input to them. Visualizing a city and its industries without water supply and sanitation makes that point very clear. A greater effort must be made to demonstrate and quantify this input to other sectors to convince economic decision makers of the benefits of investing in the sector.

#### **Women's Involvement**

Water supply and sanitation is a woman's sector. It is the women who are responsible for water in the home and for maintaining the health of the family through proper sanitation and hygiene. The rhetoric rings clear and loud for women's involvement in projects. But women are not perceived by project engineers and planners as important to project success. This is a consequence of governments seldom viewing women as resources in project planning and implementation.

Although the leadership and the community at large may be brought into the participatory process, there are many reasons why women are omitted from the planning process. These include: socio-cultural barriers against women's public participation in decisionary roles; low self-image; limited time away from household duties; and fear of speaking out. Women's attendance at meetings does not constitute their participation in the planning process. Yet it is the women who will ultimately use the facilities and it is they who will ultimately decide on their acceptability.

**SARAR Participatory Training Developed by Dr. Lyra Srinivasan**

<b><u>Self-esteem</u></b>	<i>The self-esteem of groups and individuals is acknowledged and enhanced by recognizing that they have creative and analytic capacity to identify and solve their own problems.</i>
<b><u>Associative strengths</u></b>	<i>The methodology recognizes that when people form groups they become stronger and develop the capacity to act together.</i>
<b><u>Resourcefulness</u></b>	<i>Each individual is a potential resource to the community. The method seeks to develop the resourcefulness and creativity of groups and individuals in long-term solutions to problems.</i>
<b><u>Action planning</u></b>	<i>Planning for action to solve problems is central to the method. Change can be achieved only if groups plan and carry out appropriate actions.</i>
<b><u>Responsibility</u></b>	<i>The responsibility for follow through is taken over by the group. Actions that are planned must be carried out. Only through such responsible participation do results become meaningful.</i>

Women are most often involved by providing labor, especially in areas where they do most of the agricultural work. Examples are found in Kenya, Malawi, Papua New Guinea and even in the Upper Region of Ghana, where Islamic traditions have not deterred women from participating in construction activities. Women have been shown to be effective in maintaining facilities.

Although women are valuable resources to projects in terms of providing labor and maintaining facilities, greater benefits can be derived through their involvement in management decisions throughout the project cycle. This has been proven in many projects in Latin America through their participation in water committees especially involving fund raising and cost recovery. It is common to find women appointed treasurer of such committees because of their abilities to manage money.

Finally, success of sanitation and hygiene education commonly rests with the women since they hold these responsibilities in the home. If integrated projects are to succeed, women must

be effectively involved in meaningful ways at every stage of the project cycle.

## PROGNOSIS

### A Glimpse at the Future - the long term view

#### Water Demand Management

Water is at one and the same time an unlimited and scarce resource: unlimited because it is recycled by solar energy every year, scarce because its distribution varies so widely. Many areas in developed and less developed countries are short of water now or expect to be shortly. Water abstraction has substantially lowered ground water levels in areas from Northern China to Texas, from Arizona to India, lowered lake levels in Russia and increased salinity in shoreline aquifers. The impact grows beyond the water sector and affects local economies through a reduction of agricultural productivity, diminished fisheries and higher cost water abstraction. The trends are unlikely to be reversed without determined actions. Pollution

of surface and ground water aggravates the problem.

One of the tools to overcome or prevent water scarcity is water conservation and reuse. The use of treated waste-water for irrigation and manufacturing releases freshwater for potable use. Using more efficient irrigation methods (sprinkler or drip irrigation) will reduce agricultural water demand. Using water saving appliances will reduce domestic water demand while more efficient manufacturing processes can limit industrial water use. Where water abstraction is reaching the sustainable yield of available water resources, conservation and reuse (substitution) are usually the most cost effective method of ensuring adequate future supplies. Importation and desalination are normally more expensive. Conservation and substitution must become a standard part of water resource and water supply planning in areas of actual or anticipated water scarcity. This planning must include appropriate pricing at marginal cost of water without which the user is naturally reluctant to make investments in water saving appliances or methods.

#### System Rehabilitation

In the developed countries major investments in infrastructure were made from 30 to 50 years ago, a substantial amount earlier. That's just about the expected life expectancy of distribution and collection systems, longer than that of treatment plants. Investments in some developing countries date to the same period. The coming decade can be expected to see a substantial effort at rehabilitation and replacement of aging systems. The correctness of this assumption is demonstrated by the many reports of malfunctioning and collapsing infrastructure around the world. Sector planning must reflect the need for system replacement, not just the development of additional sources of supply. But it must do more than that: consider whether the same systems should be rebuilt or whether new concepts of water conservation, recirculation and reuse would result in a more effective, less costly solution. After all, every cubic meter of water that does not have to be produced does not have to be disposed. In developing countries, where many communities have not yet made these investments, alternatives should be explored now

rather than after investments in conventional imported technologies have been made.

#### Environmental Impacts

Water supply and sanitation projects have both intended and unintended environmental impact. They are designed to improve the human environment. Usually, they are also designed to minimize negative impacts on the environment, indeed some are designed to advance environmental improvements in addition to the specific project objectives which were the justification in the first place. Sewage treatment projects which use the effluent to preserve/create wetlands or parks with or without recreational water use are examples. They not only dispose waste, but improve the environment.

*Water and Sewer Systems Rehabilitation Needs in England (abstracted from an article in the New Scientist, 12 May, 1983).*

*Pioneering work in water supply and sewerage took place in England during the 19th century. With life expectancy of 50 to 100 years (at most) for such facilities, the time is here, not to say overdue, for replacement or rehabilitation. In 1982, the National Water Council estimated that it would take £31,000 million, to replace the sewers, while actually only about £204 million were spent per year. In the short term, nobody will notice the results of the shortfall. In the long term, the consequences can be enormous, as the article points out by describing numerous collapses and effects of water leaks.*

Regrettably, this type of project is still too rare. The opposite, unintended environmental damage, is more common. Even state of the art projects affect the environment negatively, often in unanticipated manners. The sanitary engineers who firmly believed that sewage treatment was unnecessary because dilution and potable water treatment would protect public health no more

intended to endanger people or environment than those who established the practice of effluent chlorination anticipated that decades later trihalomethanes would cause concern among the water users their industry served. Similarly, promoters of rural water supply in arid areas did not anticipate increases in hookworm infestation among users when they failed to provide for wastewater disposal, sanitation or, at least, appropriate user education. The list of examples demonstrating negative impacts could be expanded almost at infinitum. They all have one thing in common; side effects were not considered, or not considered seriously enough.

It is easy to say today what went wrong and easier still to merely take corrective action to eliminate mistakes of the past. That has been the routine response of the sector up to now. Sadly, that knowledge has not prevented countries which now go through the industrialization phase from adopting water supply and waste disposal technologies popular in industrialized countries and thus repeating the very mistakes made earlier. Nevertheless, slowly the realization is dawning, stimulated mainly by the high cost of the existing approach, that different solutions must be found. These solutions include, as in the past, improvements in technology as one response. They also include more fundamental considerations, a move away from the linear to circular system (J. R. Sheaffer 1983). In essence, the solution proposed is a reduction, even elimination, of waste discharge which, through maximizing reuse and recycling eliminates pollution of the receiving environment. It is an approach that offers promise particularly for developing countries which have not yet invested as heavily in infrastructure as have the developed countries. Water supply and waste disposal projects would thus have a significant impact not only on the services which are their principal objectives but on the environment as well.

### **Reuse and Recycling**

The best way to prevent pollution and protect water supply is not to discharge waste. This can be accomplished by two complementary actions, reduction of waste generation, for example through more efficient water use, and by reuse or recycling, such as waste-water irrigation or solid waste recycling. Although this approach is beginning to find support it is generally used only

in situations of great water scarcity or extreme disposal cost. Reuse as a disposal solution is an idea that still appears difficult to accept. Progress is being made nevertheless, ranging from office buildings in Tokyo which recycle treated wastewater for toilet flushing to commercial and residential developments which, to overcome water scarcity and receiving water restrictions, have developed circular systems which provide water supply, wastewater and drainage on-site with zero discharge, sewage sludge being composted and used on lawn and parks. Large central sewerage may be a thing of the past for general application, with small circular systems a more appropriate solution for cities in the future.

#### *Linear and Circular Systems.*

*The linear system imports water and other goods into a community, uses them once and discharges them from the community.*

*The circular system imports water and other goods into the community, manages demand for maximum efficiency (water saving appliances, peak load charges, etc.), reuses and recycles water and other goods to reduce waste volume and optimize environmental benefits (part and greenbelt irrigation, stormwater infiltration, agricultural wastewater, sludge and compost use, resource recovery from solid waste).*

*From J.R. Sheaffer, "Future Water", 1983.*

Wastewater use has been hindered in the past by concern for public health and the stringent reuse water quality standards imposed as a result. Experts meeting in Engelberg in 1985 reviewed epidemiological evidence and recommended more realistic standards which should encourage the use of wastewater in agriculture. WHO has called a meeting of experts for later this year to review/revise existing WHO guidelines on the basis of the Engelberg recommendations. Similar reviews are ongoing in the use of human excreta as fertilizer in agriculture and its use in

aquaculture. Realistic standards and guidelines will increase the potential of wastewater and excreta use, thus reducing the need of disposing them with detrimental effect on the environment.

Solid waste reuse - recycling - has until recently been considered principally as an economic activity rather than as a disposal option. With raw material costs low, both domestic and industrial wastes were generally disposed off at least cost, dumped or landfilled. In North America, the results of this approach have been extensive environmental damage and public health disasters caused by improper toxic waste disposal. For many communities it is a crisis of major proportions because available landfill space is rapidly being exhausted. Increasing disposal costs is lending a new urgency to recycling, which does not have the potential environmental hazards of massburning, as a method of disposal. Europe has a better record in recycling, has developed the necessary technology and is thus a better model for developing countries.

### Integration

It has been common practice in the past and very often still today, to attempt solving an urgent problem in isolation. The best example for this approach, which continues, is the provision of water without arrangements for wastewater disposal. The inevitable result is a deterioration of living condition of those urban dwellers which benefit little from the water system and the pollution of surface waters - again to the detriment of those who, without access to the water systems, depend on rivers and lakes for their water supply.

Environmental degradation in the peri-urban environment and small towns is the result not only of a lack of wastewater disposal and inadequate water supply, but also of inadequate solid waste removal and rainwater drainage. Indeed, solid waste deposited in open drainage channels often is a major cause of inadequate surface water removal. Taking a broader view, the common approach of trying to remove stormwater as quickly as possible is not an environmentally sound concept. It would be better to minimize runoff and maximize infiltration as part of urban development.

Finally, local solutions invariably impact on others. Discharge of wastes, liquid or solid, occurs outside the generating community or into watercourses which leave the community. Downstream user's are affected. National and state governments promulgate standards to protect these communities, but these standards cannot prevent inadequate operation and maintenance, nor do even the most sophisticated treatment works totally eliminate pollutant discharge. Thus, as a minimum, at least the planning of water resources and waste disposal should be done on a convenient regional base, for example for a watershed, rather than for communities. Water allocation, efficiency of use, reuse and recycling, waste discharge, should be regionally planned and possibly managed. Examples for such approaches exist in the river basin authorities in Great Britain (operation), state and national utilities in a number of developing countries (operation) and river basin compacts in the USA (planning and regulatory). Technologies exist, but institutional arrangements need to be developed in most countries for successful application of these concepts.

Effective solutions for the future must be based on a broader perspective than has been customary in the past. They must consider how today's knowledge about cause and effect of past actions in the sector requires different approaches more protective of the environment and thus human health and productivity. They must change from purely technical to community orientation and participation with all this entails for appropriate institutional arrangements.

## MOBILIZATION OF RESOURCES

### Requirements

It is true that significant progress has been made in the Decade. Coverage has kept ahead of population growth and new low-cost technologies and appropriate delivery methods have been developed and field tested. But despite the euphemistic guestimates of progress, the prognosis for water and sanitation for all in the foreseeable future is not bright.

Conventional wisdom gives the costs of achieving full coverage with low-cost technologies by the year 2000 as being in the order of US\$150 to

200 billion (UNICEF, WHO). This does not include the cost of rehabilitation and renewal of existing infrastructures. Substantial increases in both national (now estimated as 25% of the total) and external funding will be necessary if coverage is to come close to the 100% coverage target by the year 2000. On the other hand, it appears that funding for the sector has levelled off-stagnated.

WHO (1987) estimates that, if the rates of progress for the first half of the Decade prevail through the second half, over 1.2 billion people will be without improved water supply by 1990 and 1.8 billion without sanitation.

This leads to one unequivocal conclusion: **new resources must be found.**

### Resource Generation

Funds for investments in the sector have been difficult to come by in the past. The sector has an undeserved reputation of being non-productive as compared to, say, industry or energy, and its services have by many governments been considered as social benefits to be funded by them. As long as these beliefs existed, it was difficult to attract capital to the sector. Fortunately, more and more governments have concluded that water supply and waste disposal services at all but the minimum standards is a convenience rather than a basic health related service and its costs should therefore be borne by the beneficiary. At the same time, more and more evidence has accumulated that user willingness to pay is far greater than previously assumed. As to the so-called unproductiveness of the sector, evidence suggests that this belief is more a result of the sector not making a good enough case for itself than actual fact. A sector strategy can and should provide for the economic justification of sector investments and define the methods for the necessary evaluation.

Historically, the principal sources of funds for the sector have been government grants, subsidies and loans supplemented by external loans, credits and grants. One of the purposes of a sector strategy is to develop the necessary guidelines for sector financing. The long term goal should be to make the sector financially viable, capable to pay operation, maintenance, loan amortization and a percentage of investments from revenues collected

through charges for its services. Financial viability would allow sector institutions to obtain funds from the capital market, from the insurance industry and other sources of capital. It would also make the sector a more attractive borrower for foreign investors, be they donors, development or commercial lenders.

The new approaches to delivery are beginning to facilitate resource generation. The beneficiaries themselves are playing an increasing role in this effort. The communities themselves are still largely untapped, but represent a resource of tremendous potential. Women, especially, remain a largely ignored resource. Decentralization in some countries is bringing local government into the sector, making it responsible for operation and maintenance, if not program implementation itself. National governments will have to become less dependent on external resources. They will have to increase their own resource bases by recognizing that this sector can indeed be self-sustaining and they must reorient their policies and practices to reflect this. The private sector and NGOs represent major resources for the sector, but have been uncoordinated. They have had disparate and limited impacts on the sector compared to what they could have. These resources and others are discussed below in the form of explicit Decade Plus proposals.

### THE DECADE PLUS PROGRAM

The Decade has been remarkably successful so far. True, the quantitative targets initially projected will not be reached. But despite the most serious economic slow down since the 1930's and the consequent scarcity of funds, governments have been able to keep up with population growth and from marginally to significantly increase the percentage of population served. Most importantly, they have done so by making some fundamental changes in their sector policies. The two most important ones have been greater reliance on cost recovery and the use of more affordable technologies. These changes, if supported by adequate institutional/development and other actions, offer the prospect of further and substantial progress during the Decade and beyond. A well designated Decade Plus Program can help to ensure not only that all will have adequate water supply and sanitation services in the target year

for Health for All in 2000, but that some additional environmental actions to protect Health for All, once accomplished, will be achieved.

The Decade Plus Program consists of five parts:

1. Decade Plus Projects designed to transfer successful implementation models and to investigate/develop additional methods, strategies and technologies to accelerate progress in the sector, undertaken by multi-/bilateral and non-government agencies.
2. Sector Strategy Development and Implementation by developing countries with the cooperation of external support. Strategies would be designed to ensure long term sustainability of the sector institutions, attract the participation of private sector in financing and operation and promote service to all sectors of society.
3. Resource Generation for investments in the water supply and waste disposal sector.
4. The Decade Plus Approach combines the results of Decade Plus Projects, existing experiences and new developments into models for effective environmentally responsive water and wastes projects.
5. Implementation of a work program through which separate and independent activities of the various development agencies and recipient countries can maximize the impact of their activities.

#### 1. Decade Plus Projects

The Decade Plus Projects are intended to

- \* draw lessons from the experience gained during the first half of the Decade
- \* disseminate these lessons for application elsewhere
- \* prepare guidelines and models and offer tools for the sector

- \* Explore and develop alternative approaches (technical, institutional and financial)

Project implementation will be the responsibility of a lead agency with interest and qualifications in the subject or a technical support group, with inputs from other institutions. Terms of reference and workplans will be drawn up by the lead agency and/or coordinating unit. This preparatory work, including consultation with and definition of inputs by other institutions is expected to require from 2 to 4 staff weeks for each Decade Plus Project. The preparatory work for the subprojects of the Technology Review and Development Project would require from 2 weeks to six months, depending on their complexity.

#### Transfer of Implementation Models

By the early eighties nearly all the low-cost appropriate technologies for water supply and sanitation had been developed and tested in the field. Some had been applied in full-scale projects. The first half of this Decade saw strategies and techniques for implementation of these technologies develop in several countries. Typically these approaches relied heavily on community resources for planning, construction and operations/maintenance. In particular, community contributions in cash and/or kind were strong. But the development from pilot to full-scale program took time - a great deal of time - for in each country it had to start from scratch, like reinventing the wheel.

In Malawi for example, it began with the concept of water transport by pipes to the village. Now, more than ten years later, the Malawi gravity water scheme has grown to national proportions servicing more than a million people. Implementation methods took time to develop by trial and error. In Malawi's case, over ten years was required before the necessary changes were made in the implementing agency's operations and organization, which were necessary to turn it into a full-scale program.

In Baldia, Karachi, the low-cost sanitation program was painfully slow in its beginning

before the methods of delivery were standardized, after being developed by trial and error. Now, five years later, over 12,000 homes have joined the program by building their own pour flush toilets and the project is expanding to three new areas the size of Baldia.

There are many other examples, for instance in Lesotho, Zimbabwe, Thailand and India, where this process has been repeated. Full-scale and, in some cases, national programs have been successfully developed. Time is short and the same trial and error process cannot be repeated in each country. Just as in the case of technology transfer between countries, implementation models must now be transferred as expeditiously as possible.

Of course the process of transferring implementing models is not as easy as that of technology transfer. Each area differs and the methods must be adapted to suit them. But the principles are the same and the expertise now developed can be shared.

First the on-going successful models need to be well documented. The transfer of implementation models (TIMs) should begin with a review of full scale projects incorporating the participatory approach. Case studies and, subsequently, guidelines and training materials need to be developed. Preparation of materials should be coordinated in such a way that a "menu" of alternative strategies and methods are available from which local methods can be structured to suit local conditions.

Participant countries should be carefully selected and the introduction of the concepts of project management incorporating community participation, cost recovery, mobilization and marketing and local operation and maintenance should begin. Such training should be given to core groups of engineers and social scientists within the implementing agencies of recipient countries. In-service training through extended on-site full-scale programs should then follow. This in-service training should proceed for several months until the concepts to the recipient country to plan and initiate demonstration projects supported by staff from the on-going project from which implementation techniques are being transferred. A continuing process of adaptation of field methods should then proceed until they are fine

tuned and the demonstration project is ready for expansion into full-scale programs. By sharing expertise and methods, the time required for introducing appropriate delivery methods could be halved.

Now that implementation models and appropriate technologies have been developed and tested at full-scale, it is time to put the Decade into "high gear". A full-blown program of TIMs would cut several years from otherwise slow development and would allow Decade countries to get a jump on their rate of delivery which is so necessary to meet national targets.

It is proposed that coordinated international efforts be devoted to transferring implementation models. The number of recipient countries will depend on financial resources, the commitment of countries to participation-based programming, and on the managerial resources available to coordinate the transfer process. Case study documentation could begin immediately. Each of the "Interlaken" participant organizations should prepare a case study from which a designated lead agency or technical support group can draw the lessons learned and prepare documentation and training materials. All going well, the first five countries could begin training for TIMs within a year. It is estimated that each case study would take about 12 to 16 staff weeks to complete and the guidelines/training materials would take another 30 to 40 staff weeks to develop.

#### **Institutional Autonomy**

Water is essential to sustain life, to grow food, to produce goods, indeed the supply of an adequate, safe supply of water has been called a basic human right. Sanitation is of equal importance, for without it, a safe supply of water and a livable environment cannot be maintained. No wonder then, that governments take an intense interest in this sector and exercise various degrees, often complete control.

Governments, to ensure that everyone, including the poor, are served control the price of water—yet is the poor that are not served because the revenues do not generate sufficient funds for investments and operation to serve them.

Governments, to control costs, restrict the level of salaries and expenses - and find that competent staff is not attracted to or is leaving the sector, that essential equipment and supplies are not available.

Government controls, in fact, result in inadequate services, quite the opposite to what they are intended to accomplish, while independent authorities by and large function effectively.

The solution to this dilemma is to establish a contract between government and sector agency which grants specific degrees of autonomy, including tariff setting, in return for specific accomplishments, such as service targets, tariff policies. In this manner, government achieves its objectives without having to resort to practically managing the sector.

A case study of three to six successful sector organizations should be undertaken. The case study should focus on institutional arrangements, relationship with government and regulatory agencies, human resources and staff compensation, financial viability, cost recovery and tariff policies, policy and project planning and implementation, marketing and public relations.

Based on the lessons learned, a prototype government - agency agreement should be prepared which protects the governments interest in the sector by setting specific performance targets and provides for strict accountability and the operational autonomy which will give the agency the tools to accomplish them. The agreement could provide for step by step increase of autonomy in response to accomplishment. The document to be prepared should include guidance on how to adapt the prototype agreement to different conditions. Estimated staff input: 40 weeks.

#### **Institutional Models**

Technologies to solve most water supply and waste disposal problems are available or can be further refined to meet most situation. Development of institutions to maintain these technologies and to provide services has not kept pace. Although the principles on how to operate conventional urban utilities are well known, even they have often failed. That issue will be addressed in the project Institutional Autonomy.

There are two other institutional areas which need attention.

#### **(1) Peri-urban Institutional Arrangements**

In most countries, urban utilities are hard pressed to serve adequately existing populations, and usually find it difficult to extend coverage to peri-urban areas. Predictions unanimously point to a rapid increase of population in urban centers of the developing world. Most of the growth will occur in semi-urban areas, fed from rural to urban immigration. This in turn will increase demand for water and sanitation services, potentially leading to a crisis of major proportions. It is essential that steps be taken now to develop institutional arrangements to serve these areas and to test alternative solutions which should include, inter alia, decentralized organizational arrangements and technologies. Institutional studies should be initiated for four to six peri-urban settings and prototype projects developed for those settings to test institutional approaches which should emphasize community participation in the institution and the operation and maintenance of facilities. One possible solution might be a cooperative as a branch/subsidiary of an urban utility. This project preferably should be part of

#### ***Institutional Arrangements***

- \* *Municipal and regional (political or topographic boundaries) construction, operation and maintenance (O & M).*
- \* *Regional planning, municipal construction and O&M.*
- \* *Regional planning, water resource development, treatment and transmission, wastewater interception, treatment and discharge; municipal or private distribution and wastewater collection.*
- \* *National/regional finance and technical assistance, municipal construction and O&M.*
- \* *Public ownership, private operation and maintenance.*

technical assistance projects and is expected to require from 45 to 60 staff weeks and produce guidelines and models for institutional arrangements in different environments.

## (2) Rural Support Institutions

Experience with government institutions responsible for rural water supply and sanitation is less than satisfactory and strongly suggest that the only real hope for water supply and sanitation service sustainability is to enable the community to operate and maintain its own facilities. Other projects address community participation, money management and user motivation. This project is to explore alternatives on how a community can be supported in its own efforts to operate and maintain facilities and its implication on government support structures. Five or six successful rural water supply and sanitation programs should be studied, including at least two developed by NGO's and, based on the results, institutional models developed. Eventually, appropriate guidelines should be published. Time required is estimated at 36 weeks.

### The Private and NGO Sector

The private and non-government organization sector is perhaps the most under-utilized resource of all. Governments (supported by external donors) have responded to the demand for services by assuming full responsibility and have attempted to take over all aspects of program delivery, from subsidy to construction, and from selecting communities to maintaining the facilities for them! They have largely ignored the considerable resources of the private and NGO concerns which could have been harnessed for their mutual benefit.

The NGOs, providing over 5% of financial resources to this sector, have been very active in working at grass roots using appropriate technologies and developing participatory methods. However, their projects tend (with a few notable exceptions) to be small compared to the demand. The private sector had been relegated to manufacturing and providing consulting services—a sizeable piece of the market is allocated to overseas firms.

Real opportunities exist for drawing on these resources for the benefit of the sector.

- \* NGOs should be directly involved in the TIMs process. Their considerable expertise and experience will be extremely valuable in supporting government activity where their methods can be utilized in expanded national programming. Alternatively, NGO programs such as the Sarvodaya Movement (Sri Lanka) and PDA (Thailand), could be expanded to assume responsibility for program delivery.
- \* Local manufacturers need encouragement, expertise and credit to expand their product range to match the needs of the local water and sanitation sector.
- \* Although operations and maintenance has, by default, become the purview of government, opportunities exist for contracting out these responsibilities to private firms. Capital requirements would be relatively small as the facilities would remain the property of government or the communities they serve.
- \* Decentralized household-owned water supply (rainwater roof catchment) and sanitation (pour-flush toilet) offer excellent opportunities for small entrepreneurs to assume traditionally held government roles of promotion, education, construction, and maintenance. Properly managed through training, licencing and monitoring, private firms would provide far higher rates of service delivery than the government could accomplish alone. Replication of the Sulabh Shauchalaya sanitation program in India would expand the countries' ability to reach low-income groups with services, without drawing significantly on scarce government resources.
- \* The privatization of public utilities is another example of how private enterprise can be used to the benefit of the sector.

### ***Sulabh Shauchalaya International.***

*Sulabh Shauchalaya International is an Indian non-profit organization engaged in providing low cost sanitation facilities on a commercial basis in large and small urban communities. It constructs, with its own resources, public toilets, shower and washing facilities and finances operation, maintenance and amortization through a small user charge. Women and children can use the facilities free. Hundreds of thousands who cannot afford their own facilities are being served and their member is expanding steadily.*

It is proposed that these and other opportunities be studied in depth, and that ways they can be marshalled as resources for this sector be identified. Programs should be established to foster greater private and NGO participation in the sector. An example is the UNDP/IFC Africa Project Development Facility (APDF) in Nairobi and Abidjan which provides direct support to private enterprise for feasibility studies and assistance in obtaining capital. A reasonably comprehensive study would probably require 40 to 60 staff weeks.

#### **Money Management at the Community Level**

One of the essential elements in effective cost recovery is the proper management of funds at the community level. There is an understandable reluctance of many low-income communities to pay out hard earned money to a government department in which they are suspicious of corruption or in which they have little confidence.

The project planner outside the community naturally has his/her own idea as to how money should be accounted for within the community. Because of audit requirements, there is a tendency to impose outside financial management systems on the community. The community invariably has its own ways of handling funds. Ignoring these traditions is tantamount to courting failure by ignoring methods of money management which are trusted by the people. The most appropriate

system is usually a combination of traditional and conventional approaches, which satisfies both the community's and outsiders' requirements.

The NGOs have been best at incorporating traditional practices into cost recovery programs. The PDA in North East Thailand, for example, has established a system of revolving funds to recover costs of rainwater roof catchment systems. The revolving fund is local and is jointly controlled by PDA and the village. Participant families are formed into committees which are purposely kept small. Each must repay 60% of costs before another group is allowed to join the program and use the fund for construction. Peer pressure has sped up repayment beyond all expectations.

A project which focuses on money management at the community level is proposed. It will draw on existing examples of money management within this and other community-based development sectors. Examples of successful traditional and conventional approaches need to be documented. There is very little information in the literature on this subject which is extremely important to cost recovery, and therefore to this sector as a whole. The case study documentation should then be transformed into training materials and disseminated through existing channels and the TIMs program. Time requirements for such a study are estimated at about 30 staff weeks.

#### **Investment Justification**

The sector is generally considered as social as opposed to an economically productive sector which makes it difficult to attract investment funds. Project justifications frequently rely on health impact and unquantifiable benefits. To increase the sector's attractiveness as an investment to governments and lenders, a greater effort at economic justification should be made as part of project preparation. This project is to develop guidelines on how to do so, what data to collect in order to quantify or approximate the benefits expected from a project. The project should also include an evaluation of marketing strategies and demand motivation and provide guidelines on how to conduct market studies, motivate and predict demand. It is estimated that this effort would require some 40-60 staff weeks.

## Resource Generation

Funding for the sector, especially for projects serving the weaker sector of society has usually been provided as grants or subsidies from governments. Services were therefore looked upon as a government obligation with little participation by beneficiaries. If the sector's progress is to accelerate, dependence on government funding has to be reduced and the sector's attractiveness for investments has to be increased.

A study should be undertaken evaluating the various methods used in different countries to generate resources for investment in the sector to serve as guidance for similar approaches wherever they appear to be feasible: Among the methods to be studied are the following:

1. Use of earmarked taxes for investment in the sector at prevailing interest rates (example: social security taxes in Brazil)
2. Tax free savings or bonds
3. Sector internal cross-subsidies
4. Tax inducements/guarantees for private sector investments.

This study would initially take some 16 staff weeks and can be expected to generate further studies.

## Technology Review and Development

Environmental sanitation in most tropical urban areas, and to a lesser extent in rural communities, is affected as much by inadequate surface water drainage and inadequate refuse collection and disposal as it is by inadequate sanitation. Frequently, inadequate refuse collection adversely affects the functioning of the drainage system. The impact of water saving and water reuse on water source development and disposal is rarely considered, even in water scarce areas; nor is the impact of waste recycling systematically considered part of solid waste-disposal projects. No fundamental research needs to be done. Technologies by and large exist, though some work remains to be done:

\* Surface water drainage is often inadequate, either because the system is lacking or under capacity, or because it is clogged with solid waste. The possibility of using the surface water system for effluent disposal from on-site sanitation systems should be explored in areas where water consumption exceeds soil absorptive capacities. Minimal on-site treatment coupled with drainage would be less expensive than separate sewers and would probably be more beneficial than either of the two. Such a solution would be suitable for upgrading and intermediate technologies.

\* Refuse collection - waste reuse. Waste disposal appears to be the perennial step-child of municipal government despite its relative simplicity and potential for using unskilled labor. The problem is less one of technology than lack of motivation and management skills. Limited success has been achieved where waste reuse is valued and where communities have a strong commitment to a clean environment. An effort is required to develop the institutional framework for waste collection/disposal and substitute the concept of conservation and reuse for that of disposal, in order to move this sub-sector from the present neglect to greater respectability.

\* Efficiency of water use and reuse. Much technical work has been done in this area, but with few exceptions implementation of these concepts for domestic water supply/disposal has lagged. One reason for this is the previous investments in existing facilities and the prohibitive cost of retrofitting communities where service coverage is high.

Another reason is the fracturing of the sector into many small independent units in most countries (which incidentally requires human resources far in excess of a similar, but usually highly centralized sectors such as electric energy) which results in a rather parochial view, rather than the broader one required for water reuse schemes. There are many countries with scarce water resources, with low

service coverage, and a relative absence of vested interest in individual high-consumption systems. Cost-benefit analyses for water supply/waste disposal investments with and without use of more efficient use and reuse appliances/ systems should be undertaken to determine the economic/financial impact on investment and operations. Many cities in industrialized countries will soon face major rehabilitation or reconstruction cost for their aging system, and should be interested in the results of this work.

- \* **Technology upgrading.** Users and officials in urban and semi-urban areas, in particular, do not appreciate the idea of being restricted to on-site facilities for the long term. Water-flush toilets being considered as one of the significant blessings of civilization, this is particularly true where the initial sanitation step is a latrine. A demonstration of the feasibility of upgrading sanitation and water supply facilities over time would be of benefit not only to the user and official faced with having to make a choice now but also for the urban planner designing future communities or extensions of existing ones. Upgrading sequences can be timed to respond to increased economic capacity and increased water consumption. Two or three case studies comparing the cost of upgrading sequences with the cost of conventional sewerage should be prepared to demonstrate not only the technical feasibility but also the financial advantages of a plan based on step-by-step improvements. These case studies should form the basis of communications materials for decision-makers and detailed how-to-do instructions for project planners to be prepared. The use of low volume water use appliances (and their impact on costs) should be considered in these case studies. Once prepared, the materials should be used in a major information campaign to promote the use of these concepts. Countries or areas of water scarcity should be the initial target for this information.

- \* **Environmental Pollution.** Considerable work on ground water pollution from on-site sanitation has been done. Additional

investigations to cover a variety of soil and water conditions are still required to answer valid remaining questions and provide guidance for future design. Necessary additional research should be undertaken and findings disseminated. Some conditions make on-site sanitation difficult (the same conditions can make sewerage equally difficult and even more expensive). Applied research in the field should be undertaken to identify on-site technology modifications for high ground water tables, flood zones, or rocky conditions. Included in this research should be pit emptying and sludge removal equipment.

- \* **Toxic Wastes.** Some wastes, principally generated by industry, are toxic and present a hazard to those who come in contact with it or the products of waste reuse. Impacts, protective measures and treatment are generally well known in industrialized, less in developing countries. An effort should be made to examine the usefulness of industrialized country toxic waste control practices for developing countries, develop adaptations as necessary and prepare guidelines for developing country use.

Some of this work has been initiated and at least partially completed (pit emptying equipment, groundwater pollution from on-site sanitation facilities, water saving appliances), work on other topics is in progress by various organizations. This effort should be directed to fill the gap and then to work on the integration of the findings in a environmentally sound "Decade Plus Approach" which is described elsewhere. Definite proposals for these projects need to be prepared during the Decade Plus Program Preparatory Phase.

#### **Twinning in Support of Human Resource Development and Training**

Human resource development is the most important factor for sustainable progress in the sector particularly in the area of operation and maintenance. It forms part of most, if not all technical and financial assistance projects. Some institutions, such as WHO, have developed tools and methodologies for human resource

development, as has the UNDP/World Bank International Training Network, with the help of bilaterals. The latter also have undertaken massive HRD efforts individually.

Given this existing effort, the only suggestion offered here is that a study be undertaken on how to more effectively tap into the rich vein of sector experience available from successful institutions in industrialized and developing countries. In some industrialized countries, a significant proportion of sector staff are first and second generation immigrants with language skills and understanding necessary for training and technical assistance. Twinning of institutions would be one method of organizing this transfer of expertise. The study should define ways and means of using this expertise and develop the methods of doing so. The study should estimate the costs, identify sources of finance and propose necessary institutional arrangements. The study would require about 15 staff weeks.

## 2. Sector Strategy Development

Water supply and waste disposal services in most countries are the responsibility of local government. This reflects the reality that unlike electric energy, water cannot be transported efficiently through a national grid and services must therefore be locally based. The unfortunate result has been the large number of independent and ineffectively managed systems, a lack of central policy advice and insufficient human and financial resources. Too few countries have sector strategies which provide adequate guidance and support for the sector, leading to planning, financing and operational difficulties.

One way to overcome these difficulties is the preparation of sector strategies by developing countries with the assistance of donors.

Such sector strategy development efforts are underway in some countries and demonstrate the validity of this approach. The Decade Plus Projects are designed to provide necessary information required to develop comprehensive strategies. They will present examples of successful and less successful effort from which lessons can be drawn and explore different approaches and methods where experience is still lacking. Activities during the first half of the Decade have explored many such different

approaches, such as appropriate technologies, community participation, institutional models, etc. This experience needs to be analyzed and disseminated through a donor assisted TCDC efforts and selectively incorporated in sector strategies to accelerate sector development. Equipped with those tools, development assistance organizations and developing countries can work together in the development and implementation of strategies which will make the whole of technical assistance greater than the sum of its parts.

## 3. Resource Generation

A good sector strategy can help attract funds to the sector by providing for better project development and coordination. Much technical assistance efforts go to specific areas, specific projects, specific subsectors, more or less in isolation. Some lenders, such as the World Bank, for various reasons, look for large projects and are often unable to participate in long term development of small "appropriate technology" projects. Lately, structural adjustment and sector program lending have taken an increasing share of total lending. Technical assistance agencies, at the other hand, provide long term assistance for institutional development and

*From an address to the UNDP Governing Council in Geneva on June 10, 1987, by the Chairman of the OECD Development Assistance Committee, Mr. Joseph C. Wheeler on the difficulty of obtaining optimum benefits from technical assistance in the absence of efficient sector planning:*

*"In the Kenya water supply and sanitation sector over a 13-year period some \$550 million was identified for both technical assistance and capital costs by 17 donors under 51 projects. The programme has been characterized by conflicting donor policies on cost recovery, poor project design, and sub-optimal technologies all within an environment of policy ambiguity. Recognizing the problems, the Government of Kenya has been working with the World Bank and other donors on a water sector development plan"*

project generation. GTZ and KfW are a good example of the complimentary role a technical assistance and lending agency can play in sector development. Through a well developed strategy or through appropriate coordination, governments should be able to increase the sectors attractiveness for structural adjustment and sector program lending on the basis of technical assistance and project development of bilaterals and NGO's. This approach could increase not only the amount of externally generated funds but, even more importantly, the effectiveness of investments made. The UNDP sponsored roundtable talks would be a good venue for discussions on such coordinated support to the sector after exploratory talks among the various interested organizations. Such an approach based on a well defined sector strategy, would permit governments to derive maximum benefits from the project development capacity of bilateral agencies and NGO's for the generation of resources from large lenders.

Another approach to increase investment funds is to consider World Bank and Regional Development Bank loans and credits as catalysts for financial packages including private lenders as cofinanciers or parallel financiers. Such opportunities might be very attractive to private lenders and thus substantially increase the flow of external funds into the sector. This approach could also be designed to encourage the private water works industry in developed countries to enter the sector in developing countries.

Developed country professional and sector organizations should follow the example successfully set by the British waterworks industry, through the establishment of Water Aid. This non-profit organization is funded by voluntary contributions from water users stimulated by industry sponsored publicity. The effort presents a true people to people assistance program and should be emulated by other countries, as Canada has decided to do. Bilateral agencies and NGO's should jointly encourage such efforts.

#### **4. The Decade Plus Approach - or Putting it All Together**

The water and wastes sector has a significant impact on human health, environment and productivity. In the past, however, the sector

has usually been more narrowly focussed to providing specific services rather than to consider their overall impact on the community. This approach was the result both of the historical development of the sector and its technologies, ignorance of cause and effect relationships, and the resultant division of responsibilities for different aspects of water supply and waste disposal.

Today we have a much better understanding of the wider impact of the sector's action - or lack of action - on the environment. Interest in new, more comprehensive approaches and soft technologies is growing. Evidence is increasing that they are not only environmentally sounder but can also be more economical than conventional approaches. Existing information and the results of the Decade Plus Projects will permit the design of models, guidelines and pilot projects using a comprehensive approach based on a better understanding of the impact and benefits of efficiency of water use, recycling of treated effluent and of stormwater runoff, reuse of solid waste, and the institutional and financial implication on the implementation of such comprehensive projects. Such models will also address the issues of sequencing the implementation of various components of a project and of improvements over time to ensure that the maximum number of potential users receive basic benefits before a more restricted number enjoys luxury service.

Organizations which assist developing countries in the sector's development have a responsibility and unique opportunity to provide the leadership for formulating a different and better approach. The responsibility because they advise developing country officials and guide the investment of funds, the unique opportunity because so many communities have not yet constructed the more conventional facilities and officials are increasingly questioning whether the traditional approaches are the correct ones to use even if they had the funds to do so.

There is little doubt that the present conventional approaches will remain valid for many applications. It is also clear that they are not the only solution. The Decade Plus Approach will provide the information necessary to set the sector on a different course with a greater impact on the human environment and

more efficient investments. With initial guidelines/models completed by the end of the Decade, it could be the Decade's legacy to the future of the sector and its contribution to Health for All by the Year 2000. The implementation of the Decade Plus Approach would ensure that at least by the year 2000 the target of service for all would be achieved. The efforts to develop the Decade Plus Approach, including the Technology Review Projects estimating on the basis of the World Bank's appropriate Technology Research Project, would be a significant one, probably on the order of US\$3-5 million over the next three to five years. Its potential impact on the effectiveness of future investments is literally beyond measure. The effort should be one of international cooperation among donors and developing countries so proposed solutions can be tested and become acceptable in the socio-cultural environment for which they are intended. This Decade Plus Approach is, however, not only important to the sector in developing countries but also to those communities around the World who in the foreseeable future are faced with massive rehabilitation/renewal of existing systems. More effective patterns of water and waste use and reuse and associated investment cost reductions will benefit them as well.

## 5. Implementation

### Decade Plus Projects - Decade Plus Approach

Decade Plus Projects address issues treated to some extent by the various organizations active in the Decade. All of these organizations have varying degrees of experience and expertise in the topics, frequently unknown to each other (or at least insufficiently known) and to most developing countries. It should therefore be possible to identify one or more lead agencies for all of these topics. It would be the lead agencies' responsibility to produce a state of the art report on the topic with recommendations and guidelines for implementation. These reports would represent the experiences and lessons learned of the various agencies active in sector development and, after consultation among them and with recipient governments, can be expected to provide reasonably authoritative inputs for future sector strategy development.

Some projects, such as the technology review and development, could be divided by subprojects so agencies who have had efforts in specific areas (ODA in development of pit emptying equipment, SIDA in water use efficient appliances, SDC/IRCWD in groundwater pollution impact of on site technology, etc.) could continue their work.

The choice of lead institutions should be based on past experience/expertise, interest, and the need for or opportunity of application in forthcoming assistance projects. Terms of reference should be drafted by the lead agency and/or a technical support group and reviewed by all participants (assumed to be those present in Interlaken indicating an interest in participation). Draft documents should be reviewed initially by a task group and then by all participants prior to publication.

The Decade Plus Approach would examine the various opportunities of integrating the results of the Decade Plus Projects. It would investigate and develop suitable technologies not covered in the Decade Plus Technology Review Project (in-building recirculation, zero-discharge, dual systems etc.) Finally, it would develop models designed to find the most cost-effective, environmentally sound water supply and waste disposal solution for a given community. Although this project will use the results of the Decade Plus Projects, its initiation need not await those results. Enough is known already for a start, and some aspects of a comprehensive approach need to be investigated by the project itself. The agency undertaking this project should have demonstrated its ability to successfully undertake the interdisciplinary research and development work required.

### Sector Strategy Development and Resource Generation

Sector Strategy Development and Resource Generation will use and implement information generated by the Decade Plus Projects and Approach. The Sector Strategy is to be developed by the country, with the help of technical assistance, the latter and projects financed with external assistance to be coordinated by the country. This coordination at times has not been appreciated by external agencies because, in the short term, it may be

contrary to an agencies perceived interests. In the long term, however, coordination will make technical assistance more effective because all donors will follow the same government policies and priorities. Sector Strategy Development should therefore be high on the list of priorities of technical assistance, but strictly in support of country sector officials.

A Sector Strategy which defines responsibilities within the sector and provides firm guidelines on financial viability and operating authority of sector agencies, forms the basis of any successful effort to raise investment funds. This is, of course, a country responsibility. Nevertheless, UNDP should take the lead as part of the round table discussions it organizes, to explore the opportunities offered by a sound sector development strategy. Using World Bank or Regional Development Bank funding as a catalysts to attract bilateral and private sector funds (a la IFC) could be one method to increase the flow of funds to the sector.

Sector strategy development and resource generation will be recipient country driven. Technical assistance and finance institutions will respond and participate in specific activities largely on the basis of requests made during ongoing dialogues between countries and organizations. However, to increase the effectiveness of these efforts, the exchange of experience and information must be strengthened and the implementation of the Decade Plus Program requires the coordination of activities of participating institutions if they are to be successfully completed in a timely manner.

#### Coordination

The Decade already has a coordinating mechanism, the Steering Committee. To function effectively as a coordinator for the Decade Plus Program, however, its membership is at once too restricted (no bilaterals and NGO's) and too large for effective action. Missing also, even though the Steering Committee has a sizeable membership, is a representative consultative body for the exchange of information. A Decade Plus Program coordinating committee should include multi- and bi-lateral organizations and some NGO's: for example, the four principal UN organizations supporting the sector - UNDP, WHO, UNICEF, the World Bank; four Bilaterals; two NGO's, one of

the Regional Banks (though all three would be desirable) and, in view of the environmental and human settlement aspects, UNEP and UNCHS. This is already a large committee, but should be manageable. It would, in any event, be representative. The Decade Steering Committee, if appropriately reorganized, could play this role.

The coordinating committee would meet twice a year to review progress, agree/advise on future activities proposed by its members and other organizations, promote Decade and Decade Plus activities. It would inform governments and sector organizations of progress and needs and use its good offices to generate resources for promotional activities and projects.

#### Consultation

A consultative body, meeting not more than once a year, could consist of OECD bilateral technical assistance agency representatives, NGO's and member of the coordinating committee. The purpose of this consultative body would be to exchange information on recent experiences and progress, to consult on ongoing and future activities and to advise the coordinating committee on present and future activities and promote projects in their country.

#### Secretariat

In the past, WHO - EHE staff have functioned as the secretariat of the Decade Steering Committee. If this body assumes the role of the coordinating committee described above it is hoped that WHO would continue the secretariat function. This would be particularly appropriate because the Decade Plus Program is intended to complement Health for All by 2000.

The secretariat could also take on the role of a cleaning house/organism for twinning institutions, identifying and matching training programs and trainees, the latter in cooperation with the International Training Network.

The role of the secretariat should be expanded, however, in the area of information exchange, building on the excellent work already undertaken in the preparation of the donor catalog. Every institution active in the sector has valuable experiences from ongoing projects. An effort should be made by them to prepare

short presentations or abstracts which the secretariat could compile/distribute on a regular basis. Additionally, again based on information supplied by the institutions, the secretariat could advise every one of activities in specific countries and of plans and programs under development. Such information would increase the opportunities for complementary activities and greater impact and, as a minimum, would at least provide knowledge about ongoing and planned activities in the sector. Hopefully, it would increase the effectiveness of planned interventions from knowing other activities, ongoing or future, in the sector. The UNDP/WHO Decade coordinator plays an important role now in the promotion and coordination of Decade activities. His role would become even more important in the future as the principal promoter of resource generation. Given his association with UNDP and WHO, he should be the principal communicator with and participant in the round table discussions as the sector advocate.

#### Technical Support Group

The coordinating committee will need to be supported by a multidisciplinary group of professionals with the experience to coordinate the work described and to undertake parts of it themselves. UNDP has supported such a group through the various World Bank executed Decade Projects (INT/81/026; INT/81/047; INT/86/027; GLO/84/007). These projects have also received the financial support of various bilateral agencies and have stimulated a substantial number of IPF and bilateral projects using appropriate technologies to increase water supply and waste disposal services to lower income populations in developing countries. These Decade Projects have had a significant impact in several countries, individually or jointly with bilateral projects, in modifying sector policies and strategies, and are generally looked upon by countries in which they have been active as the source of technical advice for the sector. The group of professionals working on these projects is uniquely qualified to coordinate the Decade Plus Projects and to provide the leadership for the Decade Plus Program.

To perform this task effectively the group needs both the support of the participating

organizations, through the secondment of staff and financial contributions, and the recognition as the executing unit of the Decade Plus Program with somewhat more permanence than the present arrangements have provided. The World Bank should continue to manage the group because it can provide the multidisciplinary support not available elsewhere. However, contributors should oversee operations similar to a board of directors so the group is responsive to the participating organizations in the development and implementation of the Decade Plus Program. These organizations could also form the nucleus of the coordinating committee.

#### Priorities

Participating institutions have their special interests, capabilities, experience and priorities, which govern the selection of projects and countries. Overall priority for project selection should be first: institutional, community participation, affordability/cost recovery and human resource development aspects; second: completion of ongoing/incomplete technical projects and development of intermediate technologies and third: development of comprehensive, integrated expanded sector approaches.

#### Budget

The Decade Plus Program described requires resources for its implementation. Some Decade Plus Projects can be undertaken as part of participating institutions workprograms, others may be contracted. Each of the projects described provides a preliminary estimate of time required, permitting a tentative assessment of resource requirements. More definite estimates can be prepared during the preparatory phase which is estimated as requiring from 2 to 4 staff weeks per project for the majority of projects, up to six months for some of the technology subprojects. A definite preparatory phase budget can be estimated once a decision about the implementation of the Decade Plus Program has been made.

The budget for the implementation phase will depend also on the decision on how the various Decade Plus Projects will be implemented, which of the technical subprojects will be included in the program, the priority assigned to them, and

who will contribute and assume lead agency role and coordinating responsibility. For discussion purposes it can be assumed that the technical support group role exclusive of direct project work would require 2-3, and the information transfer/promotion, (secretariat) 1-2 staff years per year.

#### Work Program

The work program for the Decade Plus Program preparatory phase would consist of the preparation of the terms of reference and detailed cost estimates for the Decade Plus Projects, the preparation of a work program for their implementation, the selection of lead agencies and the drafting of agreements (which may be unilateral statements indicating the support to be provided) on the various components and funding of the Decade Plus Program: Coordinating Committee, Consultative Group, Secretariat/Decade Coordinator, Technical Support Group. The task of drafting the agreement, including consultations, is estimated to take about six staff months, with the task to be completed by mid-year 1988. At that time, the coordinating committee should initiate the Decade Plus Program based on the agreements with participating institutions.

#### 6. Plan of Action

The International Drinking Water Supply and Sanitation Consultation provides an excellent opportunity to agree on coordinated actions in support of sector progress in developing countries. Participating agencies should consider which of the projects they could undertake, lead or support and how they could contribute to common projects. Jointly, the organizations should agree on the priorities of individual activities and decide how the preparatory phase is to be implemented. The plan of action thus would consist of:

Prior to October 12, 1987

- \* Internal review and consideration of form of participation and selection of activities

October 13-16, 1987

- \* Consultation on Decade Plus Program
- \* Agreement on priority activities
- \* Tentative Agreement on Support and Implementation
- \* Selection of agency/individuals to undertake preparatory phase activities

October 19-Nov. 27, 1987

- \* Drafting of TOR's and work program for preparatory phase, scheduling of consultation, contracting staff

January 3-April 29, 1988

- \* Implementation of work program of preparatory phase

May 1-June 30, 1988

- \* Consultation and Agreement among Agencies

July 1, 1988

- \* Start of Decade Plus Program implementation

THE WORLD BANK / INTERNATIONAL FINANCE CORPORATION  
**OFFICE MEMORANDUM**

7

**Date:** October 9, 1987  
**To:** Delegates to the Interlaken Conference  
**From:** Curt Carnemark, Division Chief, INUIS  
**Subject:** UNDP-World Bank Water and Sanitation Program

Attached is a draft paper proposing a strategy for the remainder of the Decade and beyond.

It reflects the results of our close working relationships with many institutions represented here in Interlaken. Our joint efforts have helped to solve (or substantially reduce) many of the technical problems we faced early in the Decade. We believe it is time to focus more attention on demonstration and dissemination and on questions of social organization and incentives. The draft proposes a strategy for doing this.

We look forward to your reactions, and to working with you towards a final version which will set our course for the years ahead.

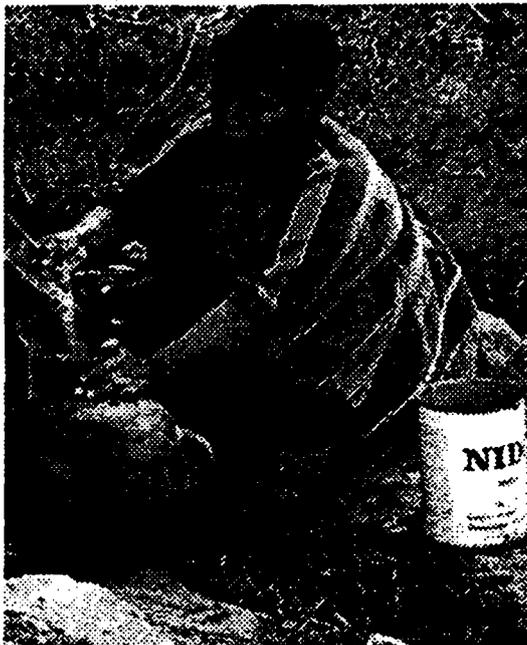
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**DRAFT**

**Water Supply and Sanitation:  
The Decade and Beyond**

**Toward Equitable and Sustainable  
Development**

**A Proposed Strategy**



**A Program of the UNDP, the World Bank, and the International  
Donor Community**

**October 1987**

**WATER SUPPLY AND SANITATION: THE DECADE AND BEYOND  
TOWARD EQUITABLE AND SUSTAINABLE DEVELOPMENT  
A Proposed Strategy**

**INTRODUCTION**

The UN General Assembly proclaimed 1981-1990 as the International Drinking Water Supply and Sanitation Decade in 1980. Governments were urged to set targets to provide all their people with clean water and adequate sanitation by 1990. The international donor community was charged with supporting governments' efforts with financial resources, with technical know-how, and with better coordination of their respective aid programs.

The task was realistically seen as formidable. In 1980, some two billion people lacked adequate water and sanitation. Global coverage of water supply stood at about 40 percent. Sanitation coverage was lower, at about 25 percent. Coverage was lower in rural and urban fringe areas than in urban areas, and for low-income people, wherever they lived. The costs of serving two billion people were staggering: with conventional systems--piped water and sewerage in the cities--costs were estimated at \$600 billion, or about \$300 per capita.

In addition to the sheer magnitude of investment, several other obstacles were identified by governments and the international community. The most important of these were:

- fragmented sector policies and planning
- weak or non-existent institutions
- lack of adequately trained and motivated manpower
- use of technologies inappropriate for developing country conditions, and lack of knowledge of lower-cost technologies
- inadequate operations and maintenance
- problems with resource mobilization and utilization, including cost recovery

UNDP, WHO, UNICEF, and the World Bank took the lead in organizing the Decade effort for the international community. UNDP took on overall leadership, at both the global and country levels. The World Bank accepted the responsibility for developing and promoting the use of appropriate low-cost alternatives to conventional water supply and sewage systems, helping governments to improve their ability to prepare investment projects for financing, and serving as a source of investment finance through its lending program.

Even before the Decade was launched, UNDP and the World Bank had recognized that water and sanitation for all would be inconceivable without low-cost systems. Estimates showed that global investment to achieve full coverage could be reduced by as much as \$400 billion with lower service standards and the widespread use of low-cost approaches to water and sanitation development. Annual costs of low-cost rural water supply and sanitation are approximately \$5 per capita, affordable by most of those in need and approximately 10 percent of the annual costs of conventional mechanized systems.

To develop the technologies and systems needed, UNDP and the World Bank had started a program in 1978 with the goal of increasing the capacity of countries to deliver water supply and sanitation services to low-income groups, using primarily low-cost, community-based approaches. The Program was and will remain wholly oriented to the objective of alleviating poverty, and it was recognized at the outset that the involvement of women would be critical. Since its inception, the Program has expanded to include five related projects executed by the World Bank and financed by UNDP and the bilateral donor community.

By now the Program has made major strides toward completion of the technological and developmental work needed to introduce low-cost approaches on a larger scale. It has:

- Made handpumps a viable choice for rural water supply projects by solving the technological problems that had plagued their use, developing a guide to their selection for various conditions, and beginning the demonstration of community management of handpump systems combined with local manufacture of handpumps and spare parts.
- Made on-site sanitation acceptable by improving latrine designs and solving problems of odor and insects, and successfully demonstrating models for delivery of sanitation in Botswana, India, Lesotho, and Zimbabwe.
- Developed an extensive set of information and training materials on low-cost water supply and sanitation that are now being distributed, and put in place a network of training centers in developing countries to use these and other materials to increase awareness and build local capacity to plan and deliver low-cost services.
- Played a major coordinating role among the external support agencies and supported changes in donor policies toward investments in the sector.
- Successfully promoted government policy shifts toward adoption of low-cost water supply and sanitation systems and toward community management and financing of services.

A fuller explanation of these accomplishments is provided in Annex I.

Near the mid-point of the Decade in 1985-1986, there were three events that captured the momentum of the first years, reinforced the work of the UNDP-World Bank Program, and outlined directions for the future.

First, the 1985 meeting of OECD's Development Assistance Committee concluded that there was a need for an intensified and more effective process of country-level aid coordination in water supply and sanitation. The OECD/DAC stressed that to be effective, sectoral consultations and coordination should involve donors and recipients in a process aimed at analyzing and improving sector policies, investment programs, and institutional frameworks.

Second, the mid-Decade report of the UN Secretary General noted that the international community had moved to coordinate their efforts to support the Decade. For example, UNDP, the World Bank, UNICEF, WHO, and seven other UN agencies had formed a steering committee, chaired by UNDP, to guide the Decade and had created inter-agency task forces to work on special

Decade concerns. WHO and bilateral agencies had sponsored Decade sectoral consultations that had led to joint resolutions to address major problems. UNDP Resident Representatives had been designated as Decade focal points at the country level. These and other efforts had begun to improve country-level coordination. Nevertheless, the mid-Decade report called for stepped-up efforts. It also, like the OECD/DAC report, urged the international community to turn its attention increasingly to institutional and human resources development, the community-level elements needed for successful projects, and documentation and dissemination of successful experiences.

And third, an international seminar in Abidjan in 1986 issued "The Abidjan Statement," which set forth a five-point strategy for successful water and sanitation projects. The strategy has application well beyond Africa and is well summarized by the preamble to the statement, which declares that:

Lasting health and economic benefits for the rural and urban-fringe populations of Africa can be achieved through increased community management of water supply and sanitation systems based on proven low-cost technologies. African governments and donors are urged to identify and commit adequate resources and provide all necessary support for the direct involvement of communities in choosing, managing and paying for their water and sanitation systems.

Three years remain in the Decade. Most of the technological development needed for large-scale programs using low-cost technologies has been completed. Attitudes toward these technologies have changed, both in developing countries and in the donor community. Progress has been made on acceptance of the importance of factors other than technical, financial, and economic ones. It is increasingly recognized that in rural areas community-based rather than centrally administered water supply systems work better. It is widely accepted that successful water and sanitation projects must respect social and cultural standards. It is acknowledged that the project development process must involve not only engineers, but technicians, health professionals, and social scientists, all of whom must interact with the potential beneficiaries as projects are designed and built. There is also greater acceptance that these schemes, in order to be sustainable and replicable, have to be financed in part by the communities they serve.

The international donor community has also responded to the mid-Decade calls for greater action and is exploring, along with governments, how they can work together better. UNDP, UNICEF, WHO, and the World Bank are seeking ways to improve joint planning, to pool staff resources, and to share expertise more effectively, especially at the field level. Major bilateral agencies have joined to support these actions.

#### **NEW DIRECTIONS: 1988-1990**

We have reached the launching stage for a new phase in the Program, a phase of intensive and focused demonstration, sector support, and dissemination and training. We believe that in the next five years it should be our objective to have in place successful national programs for low-cost water supply and sanitation in at least six to eight poor countries. At the same time, we expect to assist numerous additional countries with sector policy and human resource development. On the basis of this experience in varying circumstances and countries, we shall then be able to move on to a third phase of much broader worldwide implementation before the end of the century.

To be realistic, we have to accept that the original Decade goal of providing safe water and sanitation for all will not be reached by almost any country by 1990. Yet, water and sanitation are essential elements of primary health care, and Decade goals must become part of the global strategy to achieve Health for All by the Year 2000, as endorsed by the World Health Assembly. Thus, the Decade goal remains valid for individual countries and for the international community, and our task is to bring it closer. We must be equally realistic about our goals for the new phase of the Program.

In the new phase, the problems we shall face are more those of social organization than of technology. We need to foster closer collaboration than before among the sponsors of low-cost water supply and sanitation schemes. If two groups are developing alternative latrine designs in the same area, the competition may be healthy; if two groups are promoting alternative social organization models in the same community, the outcome may be chaos. We need open lines of communication with our collaborators in governments, donor agencies, NGOs, and, of course, within the Bank itself.

For each major country (or sub-region) a strategy and detailed work plan have to be developed, with realistic objectives and concomitant resource requirements. If such programs are to succeed in redirecting institutions and policies, we must realize that they will need a sustained commitment by governments and the donor community. From these detailed work programming exercises, we expect about a dozen large-scale programs to emerge which we hope will have all the makings of affordability, replicability, and compatibility with the environment. From these dozen, we have to expect some to fail, whether because of external crises or because of flaws in design and implementation. The strong and fortunate programs that survive will be our models for the future, for the third phase.

With this objective for the medium term, we can turn to the 1988-1990 period immediately ahead. To give structure, coherence, and a new impetus to our efforts, we propose to develop our work program under three broad categories:

- o Development of Implementation Models through Demonstration and Applied Research
- o Sector Advisory Support
- o Documentation, Dissemination, and Human Resource Development.

These categories are by no means mutually exclusive--each contains elements of the others, and all three are ultimately related to the design and operation of investments (see Figure 1). But the grouping we propose is helpful for programming, implementation, management, and subsequent evaluation.

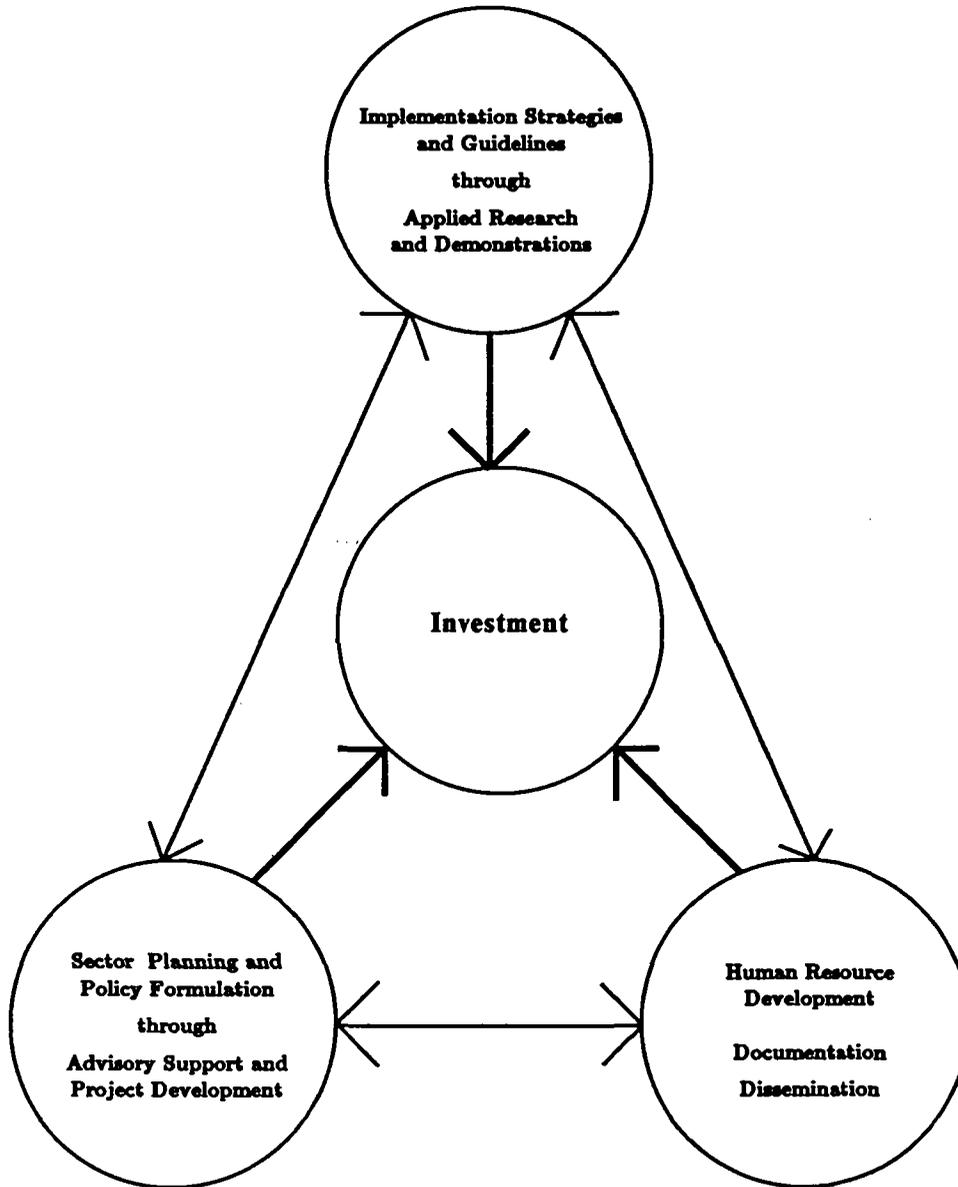
## **DEVELOPMENT OF IMPLEMENTATION MODELS**

### *Demonstration*

The aim here is to lay the foundations for what will later become effective national programs. This will require case studies, analysis of successful schemes, and the development of implementation models based on this information. Past experience has shown that to be "successful," these projects should be community-based, should be designed to be sustainable and

Figure 1

## Preinvestment Activity Cycle



replicable, and should stimulate the community's long-term commitment and support. The projects planned will demonstrate a process of community development through organization and participation, technology selection, training, operations and maintenance, hygiene education, etc., together with the best arrangements for supporting financial and administrative structures.

Integrated rural water supply and sanitation demonstration projects are planned in a dozen countries. We expect six to eight of these to develop into successful national models. These projects will address the issues described above and will focus on community management and financing of maintenance, with emphasis on the role of women, and on laying sound foundations for improved sanitation. Integrating sanitation with rural water supply requires particular attention, a long-term implementation perspective, and changes in attitudes.

In urban and peri-urban areas, sanitation projects are planned to demonstrate the technical and institutional feasibility of a strategic sanitation planning approach and the use of a combination of different technologies. Demonstration projects also have been planned for small and medium-sized cities to address how investment packages for sanitation should be prepared and what roles community and government should have in the planning and implementing of non-conventional sanitation services. In the urban context, sanitation will include excreta and sillage disposal, as well as solid waste management and urban drainage.

Through these demonstration projects we plan to develop a number of guidelines with a range of options to deal with special circumstances. The dozen national demonstration programs envisaged will emerge in part by the expansion of currently successful undertakings, in part by new beginnings. We expect the preparation of these national demonstration programs to absorb some 45 percent of program resources over the next three years.

#### *Applied Research*

In addition to demonstrations, some further efforts will be needed in applied research. There are a number of important issues in the social, institutional, economic, and financial spheres, and to a limited extent in technology.

In the social sphere, our attention will be directed to improving methods of community mobilization and participation, particularly that of women's participation. In the institutional sphere we shall examine different types of arrangements for supporting rural communities in their own efforts to operate and maintain water supply and sanitation facilities; we shall also try to identify new ways of serving the needs of rapidly growing peri-urban populations. In the financial area, we will look at the issues of affordability and willingness to pay for services: strategies for financial resource generation through successful cost-recovery policies and practices.

Our work on the remaining technological issues will focus on well construction practices, including the search for methods to reduce drilling and other costs; landfill design and operations; and learning more about alternative "intermediate" technologies offering a level of service higher than basic on-site sanitation, but that would still be affordable to large numbers of unserved people.

Finally, we shall take a broader look at water and waste management in an effort to develop more environmentally responsive strategies. Experience

shows that the poor suffer disproportionately from environmental degradation caused by inadequate sewage disposal, surface water drainage, and solid waste disposal. A strategy to alleviate these problems should start with an environmental health assessment that evaluates impact and relative priority of the sewerage, solid wastes, and drainage needs in a community. This should then lead to the design of a program that solves the community's waste disposal problems. Guidelines for environmental health assessments and the development of strategies are needed, as are demonstration projects that show how the right mix of technologies can improve the management of urban and peri-urban waste.

Applied research activities will be linked to demonstration projects in order to develop models for the implementation of large-scale replicable and sustainable water supply and sanitation projects. Some 15 percent of resources will be devoted to applied research.

### **SECTOR ADVISORY SUPPORT**

Sector advisory support will be provided to the countries and institutions that undertake national demonstration programs. It will also be available on a much wider basis, in support of sector strategies and investment plans focusing on water supply for low-income groups. Support will be available to governments and to public and private enterprises, including NGOs and the manufacturing and construction industries.

Sector advisory support tasks will be undertaken by Sector Development Teams (SDTs) in Africa and Asia. These teams will be located in regional centers and will provide various kinds of assistance. They will focus on long-term sector strategies and assist in identifying sound policies and institutional frameworks. They will help to cultivate official and public acceptance of low-cost water supply and sanitation approaches. They will contribute to identifying and preparing specific investment proposals. At the same time they will identify training needs and opportunities and endeavor to facilitate formal as well as informal training for staff of sector institutions. These teams will also promote the incorporation of research and demonstration findings into applied policies, strategies, and investment plans.

The SDTs will lend support to activities being financed by bilateral donors and the regional development banks. They will also be available to assist the World Bank's Country and Technical Departments with sector and policy work. We expect to allocate 20 percent of Program resources to sector advisory support.

### **DOCUMENTATION, DISSEMINATION, AND HUMAN RESOURCE DEVELOPMENT**

This component of the Program seeks to support the Decade's human resource development objectives. It addresses the knowledge and skill needs of professionals and technicians in planning and implementing appropriate technology projects utilizing multi-disciplinary approaches. It will also address one of the major constraints to increased investments in low-cost water and waste systems: the lack of interest and understanding among many decision makers and engineers. We aim to help countries develop more and better qualified trainers, more appropriate training materials, and more adequate training facilities through the support of centers in the International Training Network that we are helping establish.

The Program will incorporate human resource development objectives into demonstration projects, wherever feasible, in order to strengthen the skills of national professionals to design and implement large-scale low-cost schemes. At the other end of the spectrum, we are addressing the issue of training villagers in the management of maintenance of their water supplies. There is a widespread need for the development of community training materials and programs if projects are to be replicable and sustainable on a larger scale. We plan to use training workshops to disseminate the results of successful demonstration and larger-scale projects.

Quite apart from the needs of people actually implementing or managing low-cost water and sanitation schemes, there is a growing demand for technical information, results of applied research, and evaluation materials. We plan a substantial increase in what might be called "targeted documentation" of this kind, while continuing to produce periodic state-of-the-art reports, manuals, and guidelines. We shall organize international meetings and national workshops as dissemination and promotion mechanisms, participate in meetings organized by others, and collaborate closely with the International Reference Centre in The Hague. We also intend to begin publication of a quarterly newsletter to keep the international community informed of significant developments in the field of water and sanitation for low-income populations.

For planning purposes, we propose the allocation of 20 percent of program resources for support of training network centers and an expanded publication and dissemination program.

#### **COUNTRIES OF CONCENTRATION**

During the first half of the Decade, the Program carried out its activities in more than 40 countries. During the 1988-1990 period, the Program will concentrate its resources on countries selected according to the following criteria:

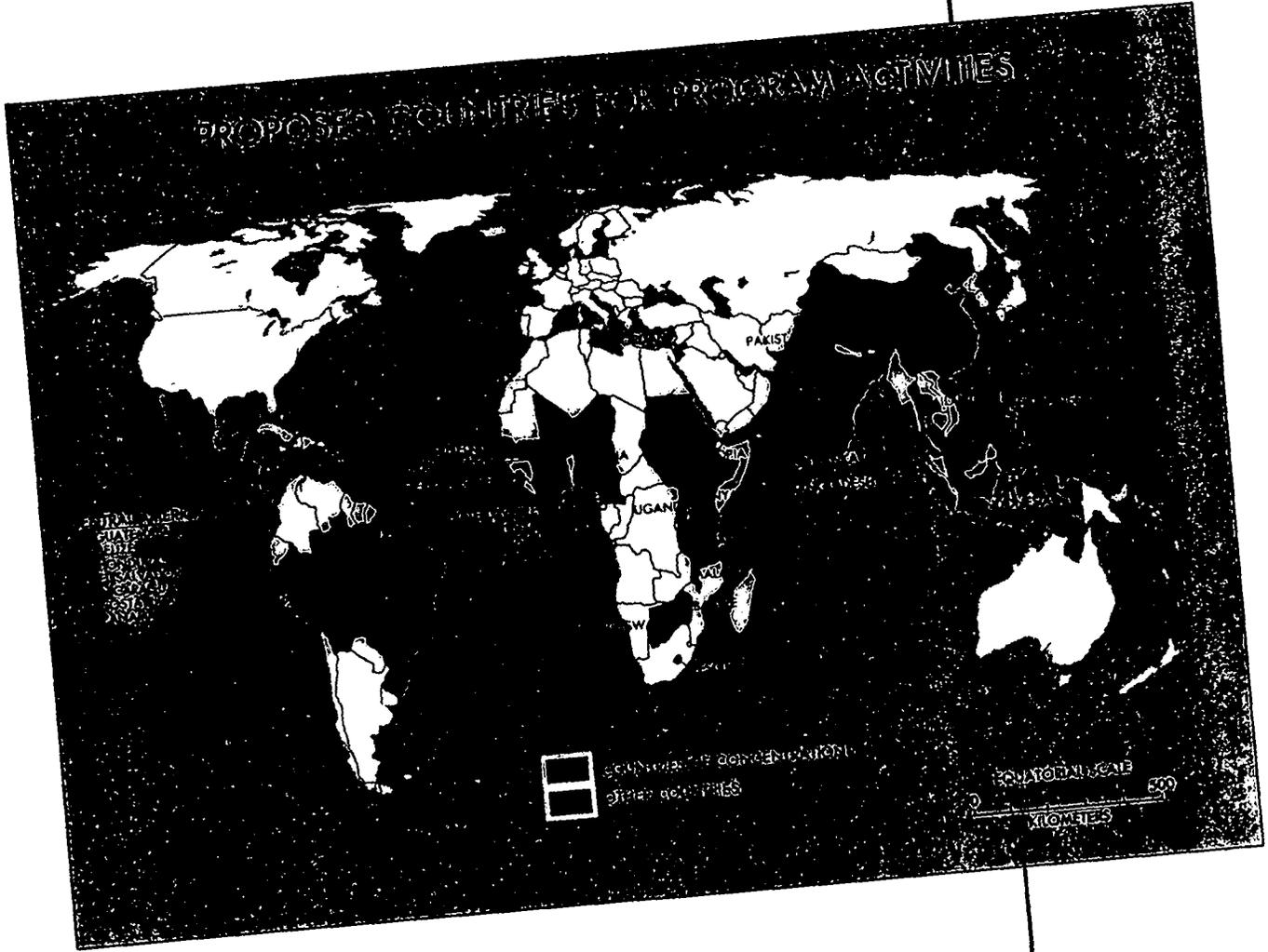
- government commitment, including allocation of adequate resources
- official status as least developed country (LDC) or IDA-eligible country, or LDC-like conditions in more developed countries
- favorable policies or follow-up investment potential by the World Bank and other agencies
- capacity for achieving significant research and demonstration results that can be disseminated outside the country
- availability of in-country financing for activities, where required

Figure 2 shows twelve "countries of concentration" in Africa and Asia proposed for extensive Program involvement. An additional number of countries will receive some assistance from the Program. Final selection depends upon negotiations with governments and the interests of the Bank and other donors.

#### **MANAGEMENT AND DONOR COORDINATION**

To ensure that the Program functions well and is properly coordinated with the rest of the World Bank's activities, management and execution of the whole

Figure 2



Program has been assigned to the Infrastructure Strategy, Management, and Assessment Division of the Bank's Policy, Planning, and Research Staff.

More authority will be delegated to regional offices in Africa and Asia to supervise day-to-day field activities more effectively and to encourage closer links between Program staff, the Bank's operational staff in the field, and staff of donor and international agencies.

At the same time, the composition of staff will be changing to correspond to the new emphasis on implementation processes. There will be more interdisciplinary teams both at headquarters and in the field, so that we can tap anthropological and social science skills, as well the more standard skills of economists and financial analysts, to complement the existing sanitary engineering expertise.

Through the Decade steering committee and other mechanisms that have been established, the Program will continue its coordination with UNDP, the World Bank, WHO, and UNICEF, and others such as DTCD, which is active in water resources management. It will also enlist the assistance of PROWESS (UNDP's program on Promotion of the Role of Women in Water and Environmental Sanitation Services) and INSTRAW (Institute for Studies, Research and Training for the Advancement of Women).

In discussing the Program under three headings in this paper, we have deliberately avoided references to the titles and numbers of the UNDP projects for which the World Bank acts as executing agency. In general we propose to treat these projects as funding streams into the three areas of activity. Thus, the lead funding streams for demonstration and applied research will be Community Water Supply, Low-Cost Sanitation, and Resource Recovery. For sector advisory support they will be the Sector Development Teams, with additional support from all the other projects. And for documentation, dissemination, and human resource development it will be mainly the International Training Network.

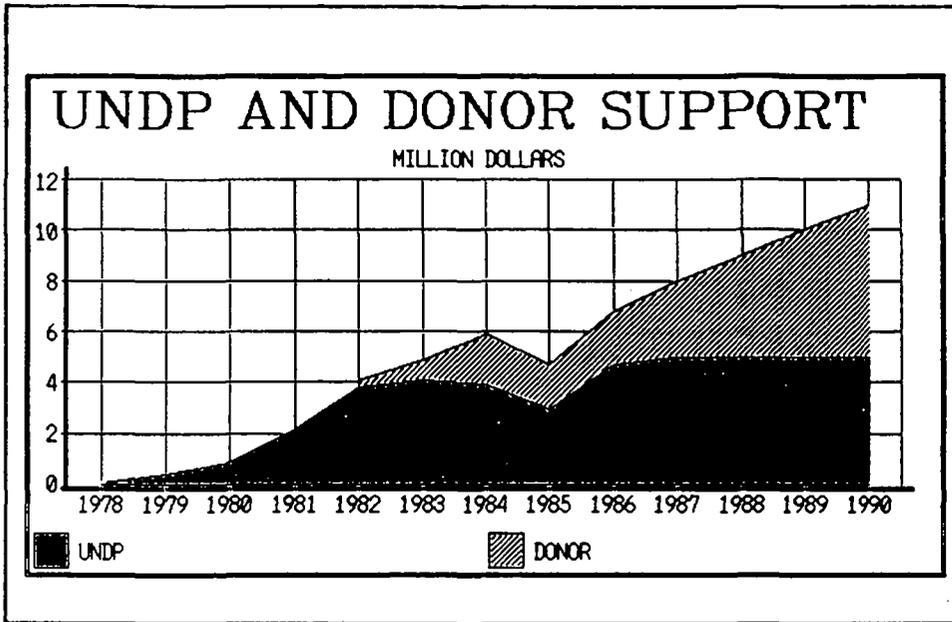
## RESOURCES

The need for the kinds of support the Program can provide is virtually limitless. Given time and resources, the Program could grow in size to meet these needs. Our planning for the next three years, however, is based on a realistic assessment of how fast we can and should grow.

The current funding level is about \$8 million a year, of which some \$5 million comes from UNDP and \$3 million from others. This total includes only cash support; if parallel contributions from bilateral donors were included, the total would be substantially greater. Over the years, contributions from non-UNDP sources have grown steadily. A conservative assumption that this trend will continue (see Figure 3) leads to a Program that totals \$30 million. More optimistically, if the rate of growth were to accelerate, the Program could grow to as large as \$50 million during the period and still remain manageable.

In the past, donor funds to support the Program have come primarily in two ways: in cash, through cost sharing with UNDP; and in parallel, through donors' direct provision of goods and services. Cost sharing with UNDP should continue to serve as the primary funding mechanism. With its new management structure and changing staff profiles, the Program can absorb additional cost sharing contributions for demonstration activities, applied

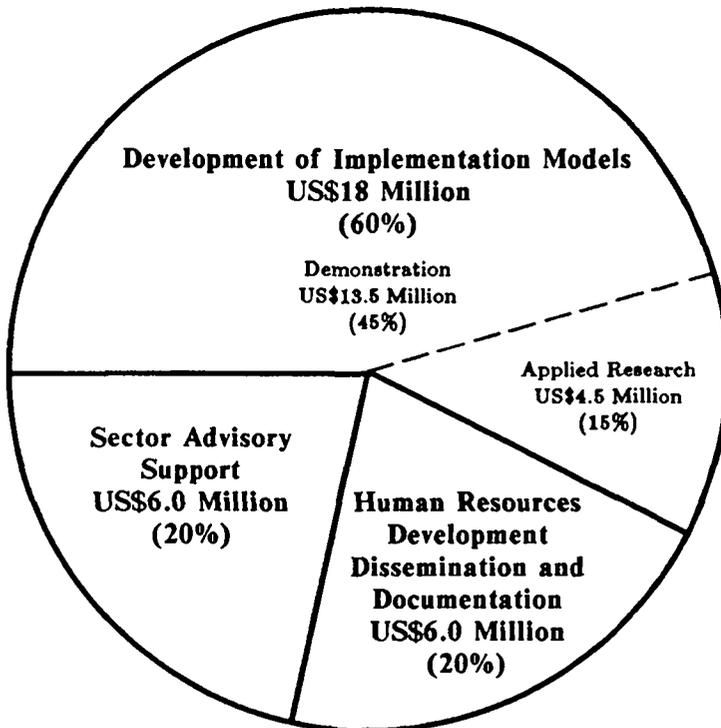
Figure 3



research, sector planning support, and human resource development. Large-scale capital investments are best financed as part of donors' ongoing country programs.

Figure 4

UNDP/World Bank Water and Sanitation Program: 1988-1990  
Resource Allocation, US\$30 Million



## CONCLUSION

We are proposing to shift to a new phase in the Decade program, one in which the main focus of attention will be the demonstration and dissemination of what has been learned to date. There will be three major components in this new phase, all oriented to the generation of sector investment for low-income communities (see Figure 4). The technical developments so far achieved have been difficult; their dissemination and implementation will be harder still. However, if the Program is successful, participating countries will be well on the way to meeting the water and sanitation needs of their poorer citizens. At the same time they will offer a helpful example to other countries less advanced in meeting their Decade targets of full coverage.

**Community Water Supply  
(Rural Water Supply Handpumps Project)**

- o Conducted extensive laboratory and field testing of 2,700 pumps of 70 types in 17 developing countries, leading up to publication in 1987 of the definitive manual on handpump technology choice and procurement: *Community Water Supply: The Handpumps Option*.
- o Made test results available as soon as possible, with the result that manufacturers significantly improved pump design and performance.
- o Introduced and promoted the concept of VL0M (Village Level Operation and Management of Maintenance) that has been accepted as the worldwide standard for handpump system design, and supported handpump manufacturers in setting up of manufacture and quality control standards based on VL0M pump designs.
- o Began demonstration and dissemination of design and management concepts for community water supply systems based on community participation and community financial responsibility, the active involvement of women, hygiene education, and integration of rural water and sanitation with agriculture and other sectors of rural economic life.

**Low-Cost Sanitation**

- o Undertaken pilot and demonstration work in 17 developing countries in Asia, Africa, and Latin America.
- o Promoted the adoption of sector policies and strategies favoring the appropriate use of lower-cost alternatives to conventional sewerage, when appropriate.
- o Supported development of major new investments extending sanitation services to low-income communities in countries such as India, Brazil, and Tanzania.
- o Contributed to research and development on sanitation technologies for low-income groups such as the VIP and pour-flush latrines and low-volume flush toilets.
- o Published and disseminated research on a range of priority sanitation subjects.

**Integrated Resource Recovery  
(Waste Management and Recycling)**

- o Completed state-of-the-art reviews and generic research on a wide range of technologies and processes for waste recycling and reuse such as composting and co-composting, anaerobic digestion, landfill gas recovery, effluent irrigation, and sewage-fed aquaculture, among others.
- o Prepared case studies and analyses of waste management and resource recovery practices in Cairo, Shanghai, Sao Paulo, and Cyprus.
- o Launched a demonstration of waste-fed aquaculture in Lima, and identified potential resource recovery demonstration projects in seven other cities.

- o Published seven technical papers from completed work and actively disseminated the findings in international conferences and workshops.

#### **Sector Development Teams (SDTs) in Africa and Project Preparation Units (PPUs) in Asia**

- o Provided a broad range of technical support designed to strengthen sector agencies, improve sector planning and investments, and accelerate project implementation.
- o Helped to design or secure funding for the design of investment projects in Nepal and in Thailand, as well as in China, where the preinvestment covers water supply and sanitation, water resources, and pollution control schemes potentially valued at some US\$1.5 billion.
- o Concentrated on developing national capacity to use microcomputers in water and sanitation system design in Asian countries.
- o In Western Africa, drafted a water resources management project for Cote d'Ivoire that has now been funded by UNDP, identified projects in four countries, and undertook sector studies in two countries.
- o In Eastern and Southern Africa, prepared a UNDP-funded technical assistance project to strengthen the management of the Water Supply and Sanitation Authority in Ethiopia; helped to reshape donor-funded rural water supply and sanitation projects in Kenya; and prepared a sector development plan for Uganda that later led to a UNDP-financed rural sector development plan.

#### **International Training Network for Water and Waste Management**

- o Prepared an extensive set of training materials for key sector audiences, now being marketed by the World Bank in English and being prepared in French and Spanish for sale in early 1988.
- o Established Training Network Centers in India, Indonesia, and Kenya (for Eastern Africa).
- o Completed preparatory activities for Centers in Zimbabwe, Ghana, and Burkina Faso (for Francophone West Africa) and begun work for Centers in Brazil, Central America, Thailand, and the Philippines.
- o Held instructors' workshops on the use of the training materials and conducted orientation meetings for consulting engineers and multilateral agency staff on low-cost techniques and strategies in the United Kingdom and Switzerland.