

**International Water Supply Association**

**Foundation for the  
Transfer of Knowledge**

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## IWSA Foundation for the Transfer of Knowledge

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**THE IWSA-FOUNDATION  
FOR THE TRANSFER OF KNOWLEDGE  
IWSA - FTK**

At the meeting of the IWSA Executive Board in Rio de Janeiro during the 17th IWSA World Congress in September 1988, it was decided to establish the IWSA Foundation for the Transfer of Knowledge.

The IWSA Foundation for the Transfer of Knowledge, is an integrated part of the International Water Supply Association (IWSA) which is entered as a charity in the Central Register of Charities of England and Wales. Within the IWSA, the Foundation is however functioning as an independent non-profit body, and has the task to realize the objects of the IWSA, particularly the following object with respect to newly-industrialised and developing countries : "to secure a maximum exchange of information on experience of education, research, water management, water treatment, methods of supply, statistics and other matters of common interest".

Within the framework of its activities and upon request, the IWSA FTK also assists national and regional associations in developing countries in the field of water supply and sanitation (WS&S).

Building a proper structure within the IWSA was a first priority in order to take all initiatives which could contribute to improve the Transfer of Knowledge and experience within the water sector for the benefit of the corporate members of newly industrialized and developing countries.

The management of the IWSA Foundation was entrusted to a Board of Trustees.

An action was initiated among the members to set up a data bank of experts in the different disciplines of the water sector. Almost 200 experts from 30 countries reacted to this call and have themselves registered in the data bank.

The financial aspects of covering the working cost were tackled by an action to recruit Patrons and donors for the Foundation. Undertakings from the sector were thereto called upon and up till now 12 Patrons are registered from the UK, France, Switzerland, the Netherlands, Belgium, Spain, and South-Africa.

It was decided to continue the action and increase the number of Patrons and donors to cover the working cost of the IWSA FTK.

It was further decided to install an Advisory Committee in which representatives of all Corporate Members of IWSA can have a seat. The Advisory Committee is now composed of representatives of 32 countries and from the World Bank, WHO, The Asian Development Bank, UNDP, UNDTCD and INSTRAW. Suggestions for discussion and project proposals can be submitted to the Advisory Committee of the IWSA FTK for consideration.

On 21 December 1990 the General Assembly of the United Nations adopted a resolution which, based on the "Delhi Statement", indicates the WSS-options for the coming decades, applicable on developing countries.

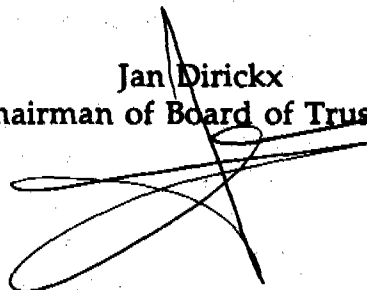
During the period 1988-1990, the IWSA Foundation took an active part in activities of the Collaborative Council of ESA's. In this council international agencies (World Bank, UNDP, UNDTCD, WHO, INSTRAW, etc.), together with bilateral donor agencies (GTZ, NORAD, CIDA, etc.) and NGO donors (Wateraid, etc.) exchange ideas in order to realize the task which was formulated as follows : "The Collaborative Council's mission is to enhance collaboration among developing countries and external support agencies (ESA's) so as to accelerate the achievement of sustainable water supplies, sanitation and waste management services for all people, with emphasis on the poor".

The IWSA FIK was the only professional organisation present at the discussions of the Collaborative Council of ESA's and of the 1990 Committee that acted as its executive committee.

During the period 1988-1990, the Collaborative Council, apart from stimulating the regional consultations (the ones at Abidjan, Manila, Dubrovnik and Puerto Rico), also prepared the Global Consultation in New Delhi meeting, in which representatives of 115 took part, led to the approval of the Delhi Statement. This document fixes the options and priorities which will, in the course of the coming decades, determine the management of the water sector in developing countries.

In order to be able to deal with future tasks and to ensure the participation in the International forum, as in the Collaborative Council, it was decided to install a permanent Technical Secretariat of the IWSA Foundation in B-1000 Brussels (Belgium), Wolstraat 70, by which the continuous treatment of the assignments is secured. This initiative became possible thanks to a collaboration with TECHWARE (Technology for Water Resources), an international non-profit organization and a university-enterprise training partnership which receives a financial support from the European Community.

Jan Dirickx  
Chairman of Board of Trustees

A handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke, positioned below the printed name and title.

# IWSA WORLD CONGRESS COPENHAGEN

## IWSA FOUNDATION SEMINAR

THURSDAY 30 MAY 1991 - HALL A2

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1. **IWSA FOUNDATION FOR THE TRANSFER OF KNOWLEDGE**  
*by ir. J. Dirickx, Belgium*
2. **THE DRINKING WATER SUPPLY AND SANITATION DECADE  
1981-1990 - WHAT NEXT ?**  
*by Mr. Alexander Rotival, Co-ordinator IDWSSD - WHO*
3. **BUILDING NATIONAL CAPACITIES FOR SUSTAINABLE  
WATER SUPPLY AND SANITATION COVERAGE**  
*by Mr. Carlo Rietveld, World Bank*
4. **URBAN WATER SUPPLY AND SANITATION IN DEVELOPING  
COUNTRIES**  
*by Mr. Daniel A. Okun, USA*
5. **WATER SUPPLY AND SANITATION IN URBAN AREAS OF BIG  
AFRICAN CITIES**  
*by Mr. Mohamed Fouad Djerrari, Morocco*
6. **WATER SUPPLY AND SANITATION IN FAST GROWING  
COMMUNITIES IN THE PHILIPPINES**  
*by Dr. F.F. Padernal, Philippines*
7. **CONCLUSIONS AND RECOMMENDATIONS**  
*by Mr. Bryan Thorpe, United Kingdom*
8. **EPILOGUE**  
*by IWSA President Dr Heinz Tessendorf*

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**THE IWSA-FOUNDATION  
FOR THE TRANSFER OF KNOWLEDGE  
IWSA - FTK**

by Jan Dirickx,  
Chairman IWSA - FTK

*"The 1990s saw unprecedented progress in bringing water and sanitation services to many millions of the worlds poorest people. But it was not enough. One in three of the developing world's population still lack these basic human needs...."*

These are the opening sentences of the Delhi Statement which was unanimously approved by representatives of 115 countries during the Global Consultation in New Delhi in September 1990.

Water and sanitation are necessary preconditions to make the very existence of the human race possible. Water is at least as elementary to survive as air or food. Wherever drought is prevalent, there is thirst and hunger. When floods occur, contamination is transmitted by the water and people die from water-borne diseases.

We should not forget that nowadays 25 million people every year die because they do not have adequate sustainable water supply and sanitation, and that the majority of these victims are children of less than 5 years old.

In the news media, such statements never receive the attention in accordance with the proportions of the problem. The death of almost 60 000 human beings a day, caused by shortages of reliable water, has become such a common fact that it is no longer a news item.

In a country such as India 200 million people were provided with an acceptable water supply, thanks to important efforts made during the last 40 years. But, still to-day, over 200 000 villages remain at a distance of more than 2 kilometres from the nearest drinking water source. A number of almost half the population of 800 million in India still have no drinking water at all.

This is just one example of many. We can state that, world-wide, only 40 % of the population of our globe have adequate water supply and sanitation facilities. This shows that 3 billion people of our world still have no reliable or no water supply and sanitation at all.

The present level of investments in the water sector in developing countries is almost 10 billion USD per year. This is a considerable amount as such but it is reduced to its real proportions if one considers that the cost of one day in the Gulf War costed more than 1 billion USD.



To reach full coverage by the year 2000, 50 billion USD a year would be necessary. The availability of financial means is of course important but the problems of water supply and sanitation cannot possibly be solved without caring for the aspect of the "human resources".

The November issue 1990 of Time Magazine published an article "The last precious Drops", with the subtitle : "Population Growth and Development have depleted and polluted the world's water supply, raising the risk of starvation, epidemic, even war".

The authors of this article sketch a rather sombre picture of what the world has to expect if one fails to witness of more insight and vision on the future, when dealing with the problems of water, the most vital product on our globe. The general tone of the article may be somewhat exaggerated and deliberately intended to be frightening, as this might be the only way to get full attention in the news.

Nevertheless, there are a number of unmistakable facts which show that the water resources of the world are not used at their optimum for the benefit of the population.

Let us not forget that on the world scale, less than 50 % of the total water quantities are used efficiently, while it is generally taken for granted that this efficient use can be increased to at least 80 %.

It is therefore imperative that, for the decade to come, the efforts made in the water sector of developing countries should rely on whatever the industrialized world learned (the good things and the bad things) during the 1960s, the 1970s, and the 1980s.

In the course of the last thirty years, the water supply which is so extremely vital for the population, has become a real industrial technical activity with an important impact on the environment, for which several disciplines and technologies are mobilized. Enormous water quantities are treated in installations on which a 100 % reliability is imposed, as far as the quality and the required quantities are concerned.

A better understanding of the fundamental functioning of the different processes used in drinking water production is being encouraged by the growing possibilities offered by data processing, thanks to ever more powerful and rapid computers.

New ideas and theories or mathematical models can be compared with an increasing number of observations and experimental data. Such comparison would formerly have been impracticable.

Present production units use highly sophisticated systems such as : lamella sedimentation, dissolved air flotation, multi layer and activated carbon adsorption, and even reverse osmosis or hyperfiltration.

The domain of highly sophisticated analyzing instrumentation has undergone a rapid revolution also, thus allowing measurements of concentrations which can be expressed in nanograms per litre and forecasts in this field indicate that this evolution has not yet come to an end.

Not only are more precise measurements possible but also ever more monitoring systems for continuous measurements become available while industrial applications need an ever increasing number of parameters to be examined.

As a result, the industrialized world goes more and more through a change of problems of quantity into qualitative ones.

The growing needs for potable water of good hygienic quality on the one hand and the pollution of the environment on the other hand will continue to stimulate the renewal and extension of the knowledge in matters regarding the quality, the treatment, and the distribution of water.

The water supply industry is presently subject to world-wide changes which have manifested themselves more strongly near the beginning of the last decade.

My own career in the water industry started in 1949. In the course of these forty years, I have witnessed very closely and have lived with very important changes in the available means and in the way of dealing with the several problems. But it has struck me that the most rapid and most fundamental changes occurred during the last decade and it is to be expected that the decade to come will bring about other dramatic changes in the water industry.

Water supply near the turn of the century, will be enormously different from our present conceptions and knowledge.

As far as the quality is concerned, the number of parameters to be checked will always increase and require the use of ever more sophisticated methods for analysis.

More and ever increasing complex treatment steps will be needed to meet and to guarantee to the consumer the water quality prescribed.

But expert systems and computerization of monitoring and treatment systems will allow to bring about what to-day is only wishful thinking. The application of these sophisticated means should contribute to increase considerably the efficiency of the use of the limited available water resources.

The most important evolution in the water sector will however be that one will remain more and more distant from the problems posed by Water Supply and Sanitation as such and more attention will be paid to the environmental problem as a whole, of which water is only a subdivision.

The water problems as such cannot be solved any longer but they should fall within a global environmental vision, in which the influence of the environmental problems on the water as well as the influence of water catchment, water treatment and the use of water on the environment will have to be considered.

Owing to the explosive growth of communication systems, the world is shrinking every day and it will therefore be impossible to react in an isolated way to the problems posed. The environmental problems do not reckon with the frontiers of countries or even continents but they will have to be faced by all inhabitants of the planet "Earth".

No water supply undertaking can allow itself to suppose that it can solve the problems on its own. National associations of water supply undertakings will rely more and more on the exchange of knowledge and experience across international borders.

The International Water Supply Association, in its quality of the only true international water supply organization, must play an important role in this evolution.

It must face the challenge to take the necessary steps so that this exchange of knowledge and experience on a world-wide level is going to take place under the best possible conditions.

The attention this congress pays to environmental problems is a signal that indicates the right direction.

The professionals in the water sector have to play an important role and this can be done best through a universal organization such as the International Water Supply Association, recruiting its members throughout the world. They belong to different races and political systems and represent the whole spectrum of economic systems and cultural heritages. To all of them, though they may be often very different in origin, is offered a cosmopolitan forum to discuss the problems of water supply and related subjects which cannot but interest those who bear the responsibility for the management and the good working of the water supply companies.

As early as 1947 an initiative was taken in Western Europe to promote co-operation in the water industry which led to the creation of the International Water Supply Association.

Since then, the water sector has undergone an enormous world wide evolution and a staff of over 300 000 is presently working in this sector.

Those who took the initiative for international co-operation proposed the organization of international congresses as an important means of propagating this idea. The first congress in the series, to which some 500 people attended, was held in Amsterdam in 1949.

The congresses have since then been organized with increasing success and more than 2 000 participants from over 60 countries attending, to become the international forum where the current water supply problems can be discussed.

IWSA has responded to the challenge to create the best possible conditions in order to realize in practice the conditions to promote and to stimulate the transfer of technology.

In view of the end of the Decade 1981-1990 and with the intention to continue contributing positively during the decade to come, it was decided in Rio de Janeiro to proceed with the establishment of the "Foundation for the Transfer of Knowledge" in order to realize the world solidarity in the water sector on a permanent basis.

Water is the key to all social improvement and economic growth. In recent years huge sums have been invested by various international funding agencies in developing water resources throughout the world.

However, investment in new works and infrastructure is not the whole answer, unless it is matched by a parallel investment in training managers and personnel to operate existing and new systems efficiently and economically. This has often not been the case.

The Foundation for the Transfer of Knowledge, an independent non-profit making Trust, has been established to fulfil this need. It has the support, and can call upon the human resources of the International Water Supply Association, which has members in over a hundred countries and is the world's foremost water supply organization.

The objectives of the Foundation are, as stipulated by its Constitution, essentially practical :

1. to provide management and operational staff of water undertakings with up-to-date information and knowledge;
2. to disseminate the benefit of practical and managerial experience elsewhere;
3. to improve operational performance and therefore standards of service;
4. to increase the cost effectiveness of operations.

The Foundation's role, as a non commercial organization, is to improve knowledge, operational standards, and management expertise among water supply and sanitation personnel for the interest of the water consumers.

The IWSA has an unparalleled fund of knowledge and experience within its membership which is available to the Foundation and to those who take advantage of its activities. One of the means deployed thereto is the organization of workshops, combined with technical follow up, by which the Foundation wants to have the knowledge and experience available transferred for developing national capacities and human resources for sustainable water supply and sanitation in the countries concerned.

Workshops can be organized on any water-related specialist subject or combination of subjects.

They can be tailored to the specific requirements of a country or region, giving the right balance between theory and practice but with the practical aim of providing management and operational staff of water supply undertakings with up-to-date knowledge; passing on the benefit of experience elsewhere; improving operational performance, and increasing the cost effectiveness of water management.

Economic expansion in many countries requires an increase in water supply capacity, but restrictions on capital expenditure mean that priority must be given to the rehabilitation and upgrading of existing facilities rather than to the construction of new ones. Improvements in operational efficiency and better maintenance, coupled with programmes of planned rehabilitation can postpone the need for capital investment, and in some situations be a complete alternative to new capital expenditure. It may also free financial means for other investments.

New treatment and pumping works involve a greater technical complexity. They also demand a greater commitment to higher standards of maintenance organization. Additionally, in the case of surface water use and treatment, quality monitoring to a consistent standard is essential to ensure safe drinking water.

In the course of the last decade, huge capital investments have been made and also for the decade to come, important amounts are provided to extend the infrastructure.

Experience however clearly indicates that investing capital is definitely not the only answer to the problems posed.

Investments in human resources become an ever more important means to increase the efficiency of the financial efforts.

Therefore the water supply profession as such needs to be revalued in the developing countries so that those who engage themselves in water supply are better appreciated by both the political leaders and by public opinion of the countries concerned.

Initially, the Foundation intends to contribute by the organization of workshops which, through intense and fruitful discussions between colleagues, will give local water supply staff the opportunity of enriching their insight while improving their own reputation with the local authorities.

By stimulating a small group in the right direction, we hope to launch a snowball effect to pass on the results of such workshops to the whole water sector of the country concerned.

But workshops are only one type of activity; policy papers, technical assistance, lecture tours, and publication of manuals are other possibilities for building national capacities and human resources development.

The Delhi Statement focused the attention to this problem as follows :

*"Human resources development is a central element of institutional development and must include training of professionals, technicians, and managers to build actively people's competence and confidence".*

We do hope that a close collaboration is going to grow between, on the one hand, the IWSA-Foundation, that holds available the broadest field of knowledge and experience, and the international agencies, on the other hand, who put the available means at the disposal of the water sector in order to improve the situation in developing countries.

We are indeed convinced that a "marriage de raison" between knowledge and experience and the financial means could make a considerable contribution to improve the water supply and sanitation in the Third World.

The IWSA-Foundation only has very limited financial means for which several instances from the water sector are called upon : water supply undertakings, suppliers, manufacturers, consultants, and research institutes.

The motivation for awarding financial support to the Foundation is mostly based on the conviction that it is a duty of industrialized countries to contribute consistently to the solution of the water problems in developing countries.

We hope that this IWSA World Congress, here in Copenhagen, will mean an fresh impulse to many people from the water sector who are present here to-day, that they will do their duty towards the IWSA-members in developing countries.

It would indeed be astonishing if we had to conclude that the water sector of almost 50 countries, where the water problems are attacked and solved with important financial means, would not be willing to free the appropriate financial means to keep the Foundation functioning.

The fact that, until now, the IWSA Foundation has been able to count on the financial support of only a limited number of countries such as : Switzerland, the United Kingdom, the Netherlands, Spain, France, South-Africa, and Belgium, is at the same time an encouragement and a challenge to those who have kept aloof until now.

Our objective should be that, within a short course of time the list of countries supporting the Foundation financially be extended from 7 to 21 at least.

Although the IWSA Foundation is itself limited in financial means, it should be underlined that the available potential of knowledge and experience is very important.

Without exaggeration we can state that there is no other organization in the world which possesses such potential of knowledge and experience among its members.

The fact that some 200 experts in all disciplines within the water sector from 30 countries are presently registered in the database of experts is an indication in that direction. It is obvious that, on condition that the efforts be continued, IWSA has the possibility to have at least 2000 experts registered in its database.

It would therefore be unforgivable that such potential of knowledge and experience could not be used for the benefit of the solution of the water problems in developing countries, because the financial means were lacking to keep the activities going.

In the professional world of water supply and sanitation, international solidarity is therefore a basic duty.

We do hope that all responsible persons in the water sector who participate in the IWSA World Congress here in Copenhagen are convinced that investments in the IWSA-Foundation, either through registration as expert or through financial support, is nothing more than performing their duty in the light of their commitment with what is presently going on in the world.

When trying to look into and to manage the future by learning from the past, we must join our forces to improve the water supply and sanitation and bring the problems related thereto closer to a solution, not only within our own environment, but on a world-wide scale.

The International Water Supply Association, as a world organization and through its Foundation for the Transfer of Knowledge, is ready and prepared to render this service to all inhabitants of the globe.

# THE DRINKING WATER SUPPLY AND SANITATION DECADE 1981-1990

## WHAT NEXT?

by Alexander H. Rotival  
Chairman of the WSS Collaborative Council

### Review of IDWSSD Achievements and Shortcomings

In spite of the unprecedented investments of efforts and funds (now close to 10 billion US dollars per year<sup>1</sup>), the International Drinking Water Supply and Sanitation Decade fell short of its initial optimistic although admirable goal, which was :

"To provide all people with water of safe quality and adequate quantity and basic sanitary facilities by 2000"

I will not elaborate on the Decade assessment, as many of us gathered here today were active players in the Decade and are well aware of its achievements and shortcomings. Let me briefly review some of the salient points of the Decade in order to introduce the strategies for the coming years.

Worldwide water supply and sanitation coverage has increased only marginally during the past ten years. In many countries, population growth exceeded increase in water and sanitation coverage. It is estimated<sup>2</sup> that in urban areas water coverage increased in the 80s from 77% to 82% and sanitation from 69% to 72% (SEE FIGURE 1). In rural areas, water coverage increased from 30% to 63% and sanitation from 37% to 49%. To reach these percentages, about 365 000 people gained access to a safe supply of drinking water every day and about 200 000 to sanitation facilities.

These statistics must, however, be considered in the light of five points :

- \* The good results recorded by some highly populated countries, notably China and India, hide very poor achievements in some others ;
- \* To date, more than 1,2 billion people in developing countries still remain without access to safe water and more than 1,7 billion without suitable means of sanitation;

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<sup>1</sup> "The New Delhi Statement" Global Consultation on Safe Water and Sanitation for the 1990s printed by UNDP.

<sup>2</sup> Achievements of the International Drinking Water Supply and Sanitation Decade 1981-1990. Report of the Economic and social Council, UN A/45/327, July 1990.



- \* Owing to the high population growth rates, the total number of people in urban areas not provided with suitable water supply and sanitation services actually increased in the 80s. Even more alarming, the number of unserved people in Africa increased in both rural and urban areas
- \* Statistics of overall coverage hide the disparities in services between the wealthier and poorer urban areas.
- \* Coverage figures are often over optimistic because many schemes have fallen into disrepair or operate at less than design capacity.

In judging the Decade, the somewhat disappointing quantitative yardstick of coverage should be balanced by major strides, from a qualitative point of view, achieved by developing countries, donors agencies and other sector organizations. The Decade helped to reach a consensus on major approaches and strategies that must be adopted to ensure sustainable water supply and sanitation development, e.g. coordination, formulation of country strategies, community management, institutions and human resources development, water resources protection, development of low-cost technologies, innovative funding practices. This consensus was progressively forged during the Decade through a series of international consultations.

Towards the mid-point of the Decade, external donor agencies and the recipient countries realized that the progress in the WSS sector was not as rapid as had been expected at the beginning of the Decade. One major inhibiting progress was thought to be insufficient coordination and inappropriate strategies. Therefore, a series of consultative meetings were held at the global, regional and national levels to strengthen collaboration among governments and External Support Agencies (ESAs) in policy and strategy formulation.

The efforts culminated in the "Global Consultation on Safe Water and Sanitation for the 90s", organized by UNDP and hosted by the Indian Government in New Delhi, India, on 10-14 September 1990. The Global Consultation achieved a remarkable consensus on guiding principles for future WSS sector development. The New Delhi Statement and the Secretary General's Report on the Achievements of the IDWSSD have been endorsed by the World Summit for Children last September and by the UN General Assembly last December. Before addressing these guiding principles and strategies for the 90s, I would like to outline the major trends that will influence our efforts during the 10 years leading up to the 21st century.

## **SCENARIO FOR THE 90s**

Key issues to be addressed in the 90s are likely to be linked to three major problems (SEE FIGURE 2) :

- \* High population growth and rapid urbanization

- \* Environmental degradation
- \* Regional disparities in economic growth

### **High population and rapid urbanization**

As a typical developing country phenomenon, the world urban population will continue to grow and is expected to increase from 1,3 to 1,9 billion by 2000.

In 1960, just three of the world's 10 largest urban agglomerations were in the developing world, and only one, Shanghai had more than 10 million people. By 2000<sup>3</sup>, there will be 18 cities with more than 10 million people in the developing world, and eight of those 18 will be among the 10 largest cities in the world.

Because of the continued high population growth rate, particularly concentrated in urban areas, projected levels of service coverage at the current rate of programme implementation (SEE FIGURE 3), indicate that the percentage of urban dwellers served with water supply by 2000 will be exactly the same as in 1980 before the launch of the water Decade. Even more alarming, the percentage of urban people served with sanitation structures will be two points lower than in 1980.

At the present rate of programme implementation and with the optimistic assumption that those currently served will continue to receive reliable and sustainable services during the next Decade, it is sobering to note that all the exceptional efforts of the Water Decade for urban populations will be undermined by the population growth rate.

### **Regional disparities in economic growth**

A report of the United Nations "Global outlook 2000"<sup>4</sup> foresees a strong regional diversity in economic growth during the 1990s.

For the developed market economies the report expects the growth to average 3,1 per cent per year during the 1990s. In the developing countries growth should reach 4,3 per cent. However given the diversity in expected performance by region, this would imply negligible growth or absolute decline in per capita income in some heavily indebted and least developed countries. GDP per capita in West Asia and sub-saharan Africa should be lower at the end of the century than it was in 1985 (SEE FIGURE 4). Most of the other groups of developing countries should also experience very moderate increases in sharp contrast with continued rapid growth expected in some Asian countries.

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<sup>3</sup> Human development report 1990. UNDP publication.

<sup>4</sup> "Global outlook 2000", 1990 United Nations publication".

Moderate or even negligible growth will oblige heavily indebted developing countries to drastically pursue their efforts for structural adjustment.

In spite of its undeniable economic significance and its potential to mitigate adverse effects of adjustment programmes for the poor, WSS is not generally perceived in developing countries as contributing directly to economic growth. As a consequence, countries undertaking structural adjustments may tend to invest in the so-called directly-productive sectors such as agriculture and industry, and neglect the social sector such as water supply and sanitation because of financial constraints. The competition among the different sectors for investments is likely to increase even further in the 1990s.

### **Environmental degradation**

Water is a renewable resource. This does not mean, however, that it is infinite and invulnerable. On the contrary water is both a very finite and extremely vulnerable resource.

70% of the earth is covered with water but most of these enormous supplies are saline or locked in inaccessible, deep aquifers. In fact, only a minimal fraction, about one per million, is available on a renewable basis for human use. Because of the unequal spatial and geographical distribution, some 80 countries<sup>5</sup>, currently supporting 40% of the world population, suffer from serious water shortages. Many could virtually consume all their usable fresh water supplies by the year 2000.

In addition, this very finite resource is also now threatened by pollution and environmental degradation.

Agriculture damages water quality through "non-point source" emission in the form of excessive use of fertilizers and pesticides. Water disposed after industrial use is often heavily polluted with chemicals and heavy metals. Rapid urbanization, combined with general population growth, generates increasing amounts of liquids and solid wastes, strangling the capacity of environmentally safe water and sanitation management systems. Today, in developing countries more than 95%<sup>6</sup> of urban sewage is discharged into surface water without treatment, leading to the sometimes irreversible contamination of the contiguous waterbodies and groundwater, and forcing municipalities and WSS companies to resort to more distant and expensive water sources.

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<sup>5</sup> Background paper - Global Consultation on Safe Water and Sanitation for the 1990s, New Delhi, India, September 10-14 1990

<sup>6</sup> Protection of the quality and supply of freshwater resources. Report of the Secretary of the United Nations Conference on Environment and Development A/Conf. 151/PC/32.

Because of water resources depletion and pollution the cost of environmentally safe water supply and disposal is likely to rise dramatically in the nineties. This would endanger development, slow down WSS coverage and expose the poorest segments of the population even further to health hazards.

## **STRATEGIES FOR THE 1990S**

The "Safe Water 2000" Global Consultation in New Delhi recognized that governments face formidable challenges entering the 1990s to provide all people with safe water and sanitation facilities : population growth, stretching to breaking point in many cities' infrastructures, depletion and degradation of water resources, raising water supply cost per unit. The Global consultation achieved a remarkable consensus on four guiding principles to take up those challenges (FIGURE 5) :

1. Protection of the environment and safe-guarding of health through the integrated management of water resources and liquid and solid wastes.
2. Institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behaviour, and the full participation of woman at all levels in sector institutions.
3. Community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes.
4. Sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies.

I have been asked to explore today the "beyond the decade" scenario. To ensure sustainable WSS sector development, future strategies should incorporate the Guiding Principles of the New Delhi Statement. The four principles should subsequently shape sector strategies and policies in the 90s.

I will not dwell on the very comprehensive and self-explanatory New Delhi Statement. At best it would only be an incomplete task given the time limitation for this present address. Keeping in mind the New Delhi principles and previous consensus achieved in international consultations preparatory to the Global Consultation I would like so simply highlight some major issues that should underlay WSS development in the 90s (FIGURE 6).

### **Sector funding**

It is estimated that to achieve full coverage by the year 2000 using conventional technologies and approaches would require five times the current level of investment, now close to 10 billion USD a year. Therefore, as stated in New Delhi Global Consultation, increased funding and reduction in service costs appear as two prerequisites to come closer to the full coverage goal and which therefore should be part of any development plan.

Regarding the first point of increased financing, additional funds must be mobilized from existing and new sources. In my view they may come from :

### **Users**

Many governments perceive water as a social right which carries highly political implications. As a consequence, they are obliged to provide water free of charge or at heavily subsidized rates. Actually, because of the fact that the total amount of resources remains limited, it has generally been impossible for the entire population to be reached, and those most likely to remain without access to clean water or adequate sanitation are usually the poorest and most vulnerable communities.

Therefore, current practices on allocation of financial resources and user charges in many developing countries result in a very paradoxical situation in which poorest people in the squatter settlements are forced to buy water from vendors sometimes 35 times its price in residential areas where water is delivered almost free of charge for social reasons.

There is a need for improved procedures for recovery of operating costs for service maintenance and, to the extent possible, of investment costs for service extension. Discriminatory fees must be established to both protect the poorest segments of the population and prevent water wastage.

### **The governments**

Governments need to assign greater priority to the financing of the water supply and sanitation sector and seek better integration within the overall process of development planning. The sector is till too often wrongly considered as a "social" sector with limited implications on economic productivity. In the context of growing budgetary constraints, it will be essential to sensitize governments to the economic significance of the WSS.

### **Private sector**

Efforts need to be undertaken to attract private funding to the sector by means of national capital markets, the creation of revolving funds and credit guarantees schemes, while selected parts of the sector could be studied in terms of gaining effective access to private sector funding.

### **Low-cost technologies**

One of the most significant and promising achievements of the Decade has been the development and application of a range of technologies well suited to conditions in developing countries.

Technical advances have included innovation approaches to long-standing problems of maintenance and construction, adaptation of technical design to the constraints of skills and spare parts availability, improvement in quality control, use of appropriate materials and adaptation to differing local conditions.

These advances have created considerable potential for further development within limited financing conditions. The strides made in developing low-cost technologies, solely from the financial point of view, can best be underscored by the estimate that a shift from conventional technologies to low-cost technologies could halve the total cost of the services. UNICEF estimates<sup>7</sup> that a shift of US\$ 1 million from high cost technologies, such as individual household connections for both water and sewerage, to low-cost/intermediate technologies such as public standposts, handdug wells and pit latrines would provide coverage to an additional 18 000 poor people (rural and peri-urban) at the cost of 2 000 economically able people.

Although there is now a large range of appropriate low-cost technological options for almost any need, their adoption still remains limited due to a certain reluctance on the part of sector professionals. Sector professionals who tend to rely essentially on conventional technologies must be sensitized and trained on alternative technologies, their potential and applications.

### **Operation & Maintenance versus Construction**

Unprecedented sums of money were invested during the decade in extension of physical plant to increase WSS coverage. Unfortunately, investments in increasing operation and maintenance (O&M) have not kept pace and many systems installed have fallen subsequently into disrepair or operate at less than design capacity. In rural areas for example, figures of 40%, 50% and 60% of the existing facilities sometimes have been reported<sup>8</sup> as out of order.

In urban areas, unaccounted for water sometimes accounts to 60% of abstracted water.

As pointed out by the Working Group presently supported by WHO on "O&M Activities and Water Quality", proper maintenance saves money by reducing water losses in urban systems, by increasing water revenue, by reducing operational costs and by postponing investments in new production works.

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<sup>7</sup> The cost of providing Water Supply and sanitation for the poor by the year 2000. Report of the Water Supply and Environmental Sanitation Section - UNICEF - May 1990.

<sup>8</sup> "O&M Activities and water quality" Report of the meeting of the operation and maintenance working group, WHO, October 1990.

On the contrary, poorly maintained systems require unlimited investments for rehabilitation and lead to risks of contamination in distribution systems due to intermittent services, negative pressures and inadequate operation.

Major factors inhibiting O&M such as low profile of O&M, inadequate institutional environment and policies, inappropriate system design and technology, insufficient and inefficient use of funds and inadequate data on O&M have to be urgently addressed if longterm sustainability of WSS investments is to be achieved in the 90s.

### **Water and sanitation imbalance**

Proper water and sanitation services protect people through four complementary mechanisms, namely :

- Excreta disposal
- Personal Hygiene (bathing, washing hands, face)
- Domestic Hygiene (house cleaning, food)
- Drinking water

The first is related to sanitation, the second and the third to water quantity, and the fourth to water quality.

A survey and analysis carried out by WASH<sup>9</sup> on the health incidence of water and sanitation on six of the most serious waterborne diseases in Africa (Diarrhoeal diseases, Ascariasis, Trachoma, Hookworm, Schistosomiasis and Guinea worm) found that *"as far as reducing the incidence and severity of these six diseases were concerned, the most effective intervention was safe excreta disposal"*.

Despite this, evidence shows that substantial health benefits will occur from water supply and sanitation development only if water supply, sanitation and hygiene education form part of an integrated project. A severe imbalance still exists between water development and sanitation development and future development planning should be aimed to correct that imbalance. The importance of communication and improved strategies for reaching communities with health and hygiene messages should be emphasized in programme planning and information campaigns.

### **Environmentally sound development**

As seen in our baseline scenario for the 90s, an environmentally-sound management of the WSS sector is economically-sound.

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<sup>9</sup> "Health benefits from improvements in Water Supply and Sanitation" WASH, Technical report n 66, July 1990.

The already large cost of drinking water provision and its safe disposal will increase exponentially in proportion to water resources depletion and pollution.

From the environmental point of view, urban WSS should receive the highest priority. Saving water and increasing efficiency of its use would decrease costs through reducing the need for new plants, water supply and sewer piping networks. Energy and other cost for service operation will also be cut. Efficiency can be increased by reducing leakages in the distribution system and using less wasteful designs for new household fixtures and appliances. Domestic waste water could be collected, treated, and recycled for agriculture and industrial purposes.

Such economically and environmentally sound measures would have also a direct impact on health through decreasing the overall discharge of pollutants into water course.

In addition, drinking water is a very sensitive indicator of environmental pollution and will be the first sector to cause environmental social conflicts. Not surprisingly, a public opinion survey commissioned by UNEP found that large majorities in the countries surveyed believed that environmental protection should have a high priority and that their greatest concern was pollution of drinking water. Therefore drinking water should be an appropriate entry gate for sensitizing governments to environmental concerns. The forthcoming International Conference on Water and the Environment to be held in Dublin in 1992 will be an important opportunity to highlight fresh water issues in the context of broader environmental concerns.

### **Community participation**

In the past, software components of water projects such as hygiene education, applied research, data collection for monitoring and planning or community participation have accounted<sup>10</sup> for less than 1% of the value of hardware components. This traditional approach ignored the fact that water and sanitation developments is far more than capital intensive interventions to dig wells, lay pipes or install sanitation schemes.

WSS development requires notably dramatic changes of behaviour towards water for maximum health benefits; technical training for proper operation and maintenance of the systems; designing of technical solutions that are socially acceptable to the different communities and their sizing based on available resources. If recipients do not like the facilities which are not adapted or responsive to their needs or do not understand their usefulness, they will simply stop using and maintaining them. Hence, the principal of effective demand.

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<sup>10</sup> IDWSSD Guidelines for the preparation and organization of a Decade Consultative Meeting, October 1986, WHO/GTZ.



As stated in New Delhi Statement "Community management is a key to sustaining services for the rural poor and is a viable option for poor urban settlements". Indeed, social acceptance, and therefore maintenance, of services can only be achieved by giving prominent roles to the communities in planning, resource mobilization, and all subsequent aspects of development.

Community management goes beyond community participation, which still too often simply means participating in digging works and in site selection. The goal of community participation is to empower and equip communities to own, control and properly use their systems through information and education campaigns and operation and maintenance training.

Furthermore women, who are the main water carriers as well as being responsible for family care and children's education, are the most affected of all groups by the lack of sanitation and water supply services. Therefore, they are also the most receptive audience to the introduction of new WSS technologies and hygiene education. In consequence, they should be encouraged to play a predominant role in WSS services planning and operation. Training and education campaigns must be designed to meet their needs.

### **Capacity building**

There was consensus among sector professionals that institutional development was the most important issue during the Decade and may remain the key issue of the 90s. There is no need to increase sector investments if sector institutions cannot absorb them.

Capacity building, including institutional and human resources development, is essential in ensuring an efficient and sustainable use of the sector's physical and financial resources.

Capacity building may require :

- decentralization of structures and services to make them closer and more responsive to communities' needs;
- strengthened intersectoral cooperation;
- shift in the role of the governments from that of providers to that of promoters and facilitators;
- rethinking of human resources development policies to increase attention to gender issues, and promote the role of staff involved in low-profile functions such as O&M, community participation, applied research, communication and data collection.

## **Coordination**

The creation of the External Support Agencies' Collaborative Council was a major achievement of the collaborative efforts mentioned previously which took place in the second half of the Decade. It stimulated the adoption of more harmonious sector strategies. Established in 1988 during the Hague Consultation for the IDWSSD, its membership initially restricted to the external support community was opened, immediately preceding the Global Consultation in New Delhi, to sector professionals in national sector agencies and external support agencies active in sector development. To reflect its new membership correctly, the Collaborative Council was renamed the *Water Supply and Sanitation Collaborative Council*.

The WSS Collaborative Council's mission statement, as defined at the Special Meeting in New Delhi, is to :

"enhance collaboration among developing countries and external support agencies, so as to accelerate the achievement of sustainable water supplies, sanitation and waste management services for all people, with emphasis on the poor".

To achieve this objective, the Council will seek to :

- i) Provide a forum to sector professionals to identify, review and seek consensus on key sector issues, and ensure widespread communication of the result.
- ii) Alert members to opportunities for more efficient use of resources;
- iii) Increase awareness of the need for intensified efforts to expand sustainable coverage and effective use during the 1990s;
- iv) Promote enhanced collaboration at the country level; and
- v) Stimulate the adoption of more harmonious policies, strategies and programmes.

The Council, the Global forum and advocate for the sector, will meet in Norway next September at the invitation of the Government.

I wish to express my conviction that strengthened cooperation between all the actors in the sector is a prerequisite for achieving the goal of providing all people with water and sanitation services. In this context IWSA, which is a full and contributing member of the Council, has a key role to play. Coordination at the country level by developing countries will be essential to maximise the use and generate new financial resources, to formulate and adopt as urged in New Delhi national action plans for water and sanitation incorporating the Guiding principles of the New Delhi Statement.

## **CONCLUSION**

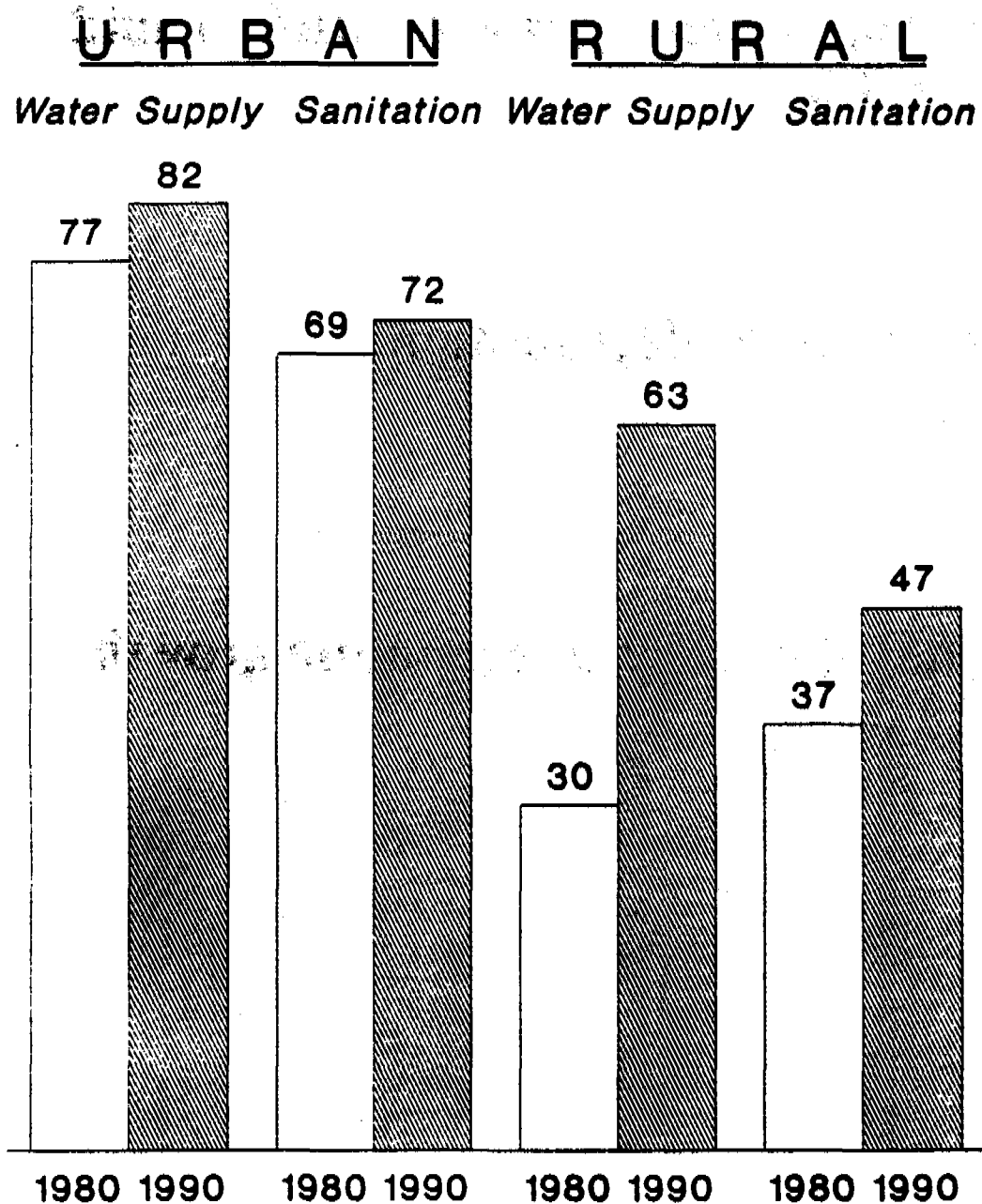
**This brief review clearly indicates that a tremendous amount of work remains to be accomplished to provide all people with water of safe quality and in adequate quantity as well as basic sanitary facilities.**

**The accomplishments achieved during the Decade, especially the changes in attitudes as well as the principles of partnership between developing countries and ESAs, give us grounds for measured optimism concerning the ability to achieve substantial increases in safe water supply and sanitation coverage by the year 2000.**

**The Water Supply and Sanitation Collaborative Council should prove, as recognized at the New Delhi Global Consultation, a convenient global forum for information exchanged and sector promotion as we move towards the 21st century.**

**Figure 1**

**Levels of Safe Water and Sanitation Service, 1980 and 1990**  
*(in percentage)*



Source: World Health Organization

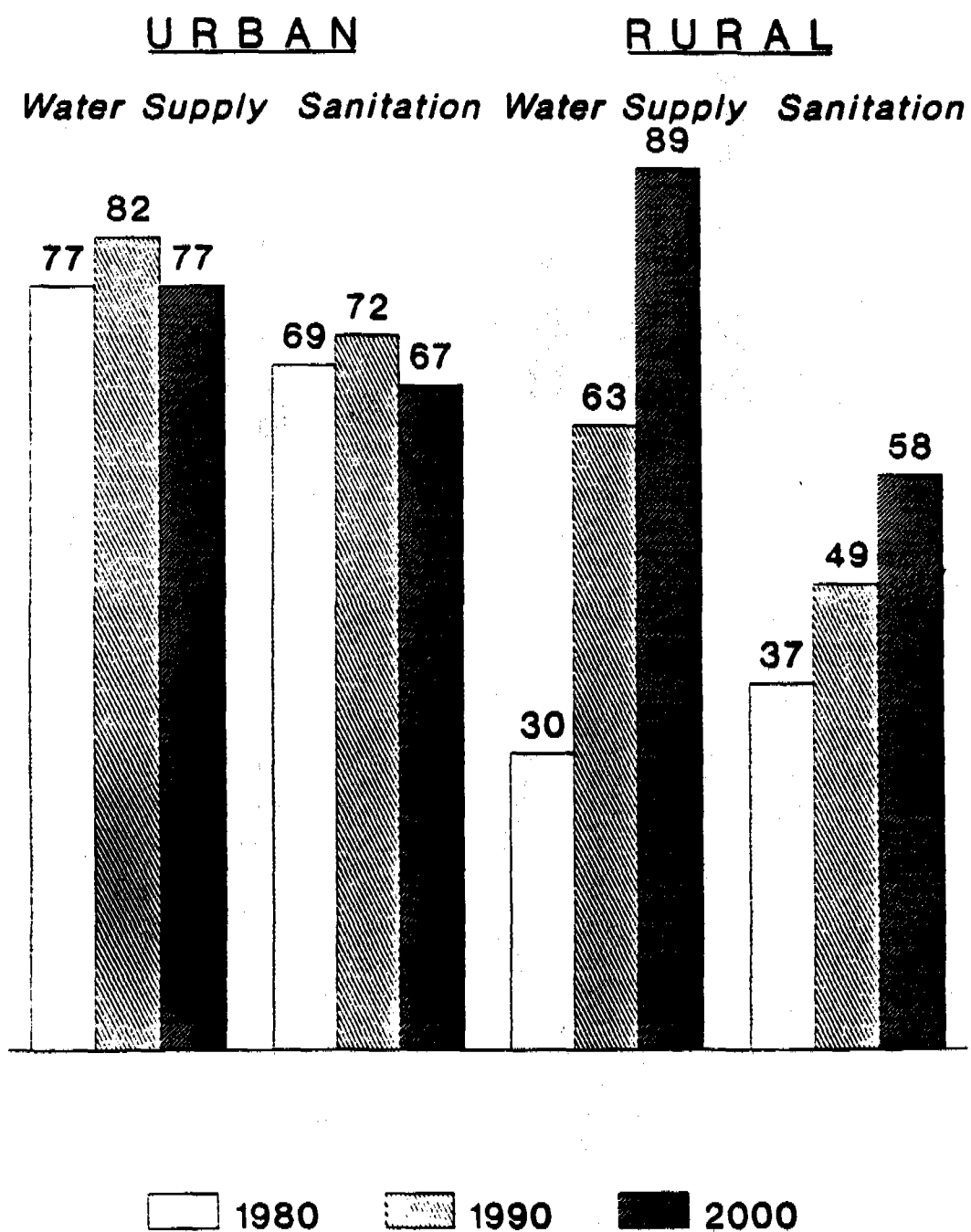
## **Figure 2**

### **BASELINE SCENARIO FOR THE 90s**

- **High population growth and rapid urbanisation**
- **Environmental degradation**
- **Regional disparity in economic growth**

**Figure 3**

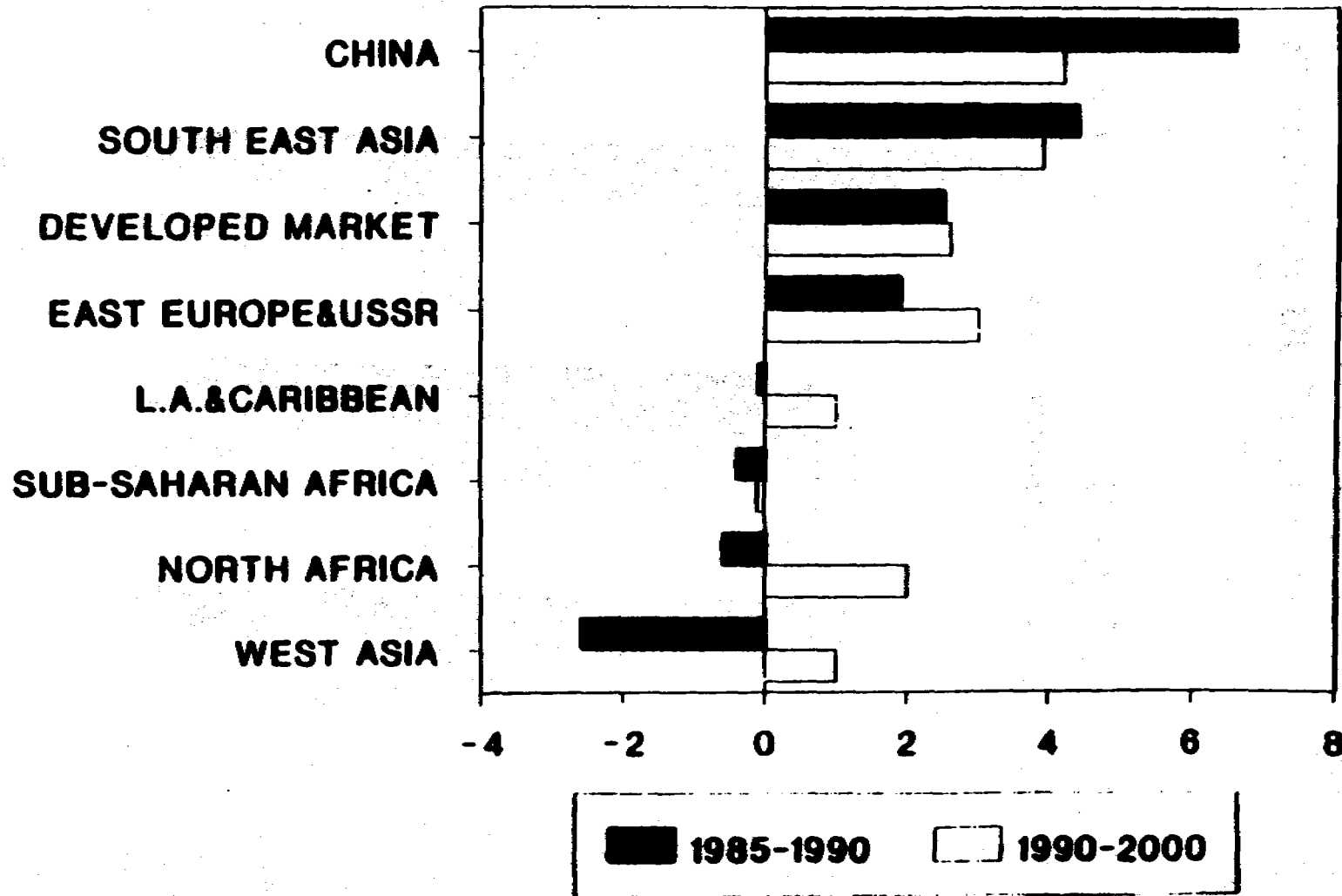
**Levels of Safe Water and Sanitation Service, 2000 Prospects**  
*(in percentage)*



**Figure 4**

2.16

**GROWTH RATES OF GDP PER CAPITA  
UNDER A BASE LINE SCENARIO**



**Figure 5**

**NEW DELHI**  
**4 GUIDING PRINCIPLES**

- **Protection of the environment and safeguarding of health**
- **Institutional reforms**
- **Community management of services**
- **Sound financial practices**



## **Figure 6**

### **SOME KEY ISSUES IN THE 90s**

- **Sector funding**
- **Low-cost technologies**
- **Operation and maintenance versus construction**
- **Water and sanitation imbalances**
- **Environmentally sound development**
- **Community participation**
- **Capacity building**
- **Coordination**

**IMPROVING WATER SUPPLY AND SANITATION SERVICES  
THROUGH NATIONAL  
PROFESSIONAL ASSOCIATIONS**

By Carlo Rietveld, John Kalbermatten and James Berna\*

**Introduction, Or Why Business As Usual Is No Longer An Option**

1. At the end of the International Drinking Water Supply and Sanitation Decade it is apparent that there are still very large numbers of people without safe drinking water and sanitation. The following figures tell the story :

Table 1 : WATER SUPPLY AND SANITATION SERVICE COVERAGE  
(DEVELOPING COUNTRY POPULATION IN MILLIONS)

	1980 Population				1990 Population			
	Total	Served	(%)	unserved	Total	Served	(%)	unserved
<b><u>Water Supply</u></b>								
Urban	933	721	(77)	212	1 332	1 088	(82)	244
Rural	2 303	890	(30)	1 613	2 659	1 670	(63)	989
<b><u>Sanitation</u></b>								
Urban	933	641	(69)	292	1 332	955	(72)	377
Rural	2 303	861	(37)	1 442	2 659	1 295	(49)	1 364

Source: United Nations : "Achievements of the International Drinking Water Supply and Sanitation Decade 1981-1990". Report A/45/327, U.N. Economic and Social Council, July 1990).

The figures are indicative only. They do not reveal for example, the quality of service, which is often suspect, and generally assume that facilities, once constructed, remain in service - a very dubious proposition.

2. Given current population trends, the situation can only grow worse during the 1990s. The United Nations Populations Fund (UNPFA) in its latest annual report predicts populations growths in Africa of 23 %, in Asia of 31 percent, with total worldwide population expected to grow from the present 4,3 to 5,3 billion in the year 2000.

\* The views presented are those of the authors and should not be attributed to the UNDP World Bank or any of its affiliates.

By 2100, total population is expected to grow to 14 billion. The Population Resource Bureau Estimates that by the year 2000, 48 % of the world's population will be living in cities, up from 29 % in 1950. The growth is disproportionately great in cities of developing countries : many have quadrupled between 1950 and 1980, some have increased sevenfold. The sheer size of some of these cities, and the consequent magnitude of the water supply and sanitation problem is overwhelming : Mexico City contains 18 million people now, Sao Paulo 14 million. By the year 2000, 22 cities are expected to have more than 10 million inhabitants each. Only four of them are located in industrialized countries.

3. The costs of providing conventional water supply and sanitation services "for all" will be staggering. In Table 2, rough estimates of the cost of providing water and sanitation services based on conventional methods are presented :

TABLE 2 : COST OF PROVIDING WATER SUPPLY AND SANITATION SERVICES

	1990 Pop. served (millions)	2000 Total Pop. (millions)	Additional Pop. served (millions)	Unit Cost USD/cap.	Total Cost Million USD
<u>Water</u>					
Urban	1 090	1 900	810	130	106 000
Rural	1 670	2 970	1 300	40	52 000
<u>Sanitation</u>					
Urban	955	1 900	945	350	332 000
Rural	1 295	2 970	1 675	30	50 000
Total Cost					540 000 =====

These investment figures understate actual financial needs. Past emphasis has been on new construction to the detriment of funding of operation and maintenance. As a result, many systems are inoperative or seriously deficient and will need to be rehabilitated. Rehabilitation needs will add substantially to financial requirements.

4. Very often the financial problem is not only one of scarcity of funds but also misallocation of financial resources, of inappropriate technology, of disregard of the environment. The use of a model design developed for different environmental conditions, different climates, different socio-economic situations leads to expensive and often ineffective solutions. The future promises more of these problems. Clearly, money alone will not solve the problems : what is required is a different approach to water supply and sanitation.

There are organizational, institutional, physical as well as financial resource constraints which must be overcome. When projections of funding requirements and per capita income growth for the next decade or two are compared, it becomes clear that continuing with business as usual is no longer feasible if developing countries are ever going to satisfy their water and sanitation service needs. Even industrialized countries have difficulties financing the maintenance and rehabilitation of their sector assets and make the investments necessary to protect the environment. A more holistic approach with appropriate motivation and education of the consumer and the sector personnel, clarification of the real price for water supply and sanitation, elimination of the blockages of central control and administration, decentralization and privatization as well as use of more effective, less expensive solutions based on developing country needs and realities need to be developed. It is time for a new look.

### A little History

5. How we got to where we are today is of interest, because existing physical and management systems are the result of a long process of development and the lessons of that process may point to new and different approaches. If those responsible for the future development of the sector in both industrialized and developing countries do not learn from that history, they will repeat the mistakes of the past. Only this time, they cannot plead ignorance about cause and effects, ignorance which led their predecessors astray in this and late in the preceding century.

### Antiquity

6. Central water and sewer systems similar to the ones we know today have been in use for thousands of years. They often were of considerable sophistication and more attuned to their environment than their modern replacements. Much is also known about the hygiene behavior of the people using them.

*Archaeologists reports that as long as 5000 to 6000 years ago the cities of the Indus Valley had central water supply and wastewater disposal systems. For example, in the ruins of the city of Mohenjo Daro, dating back 4000 to 5000 years, full bathrooms have been excavated. Similarly, it is reported that in Egypt and Mesopotamia during the same period, indoor toilets served by central water and sewer systems were in use.*

Often religions imposed and promoted this behavior, and were instrumental in the establishment of the physical facilities. The Greek and Roman civilization are well known for their well organized and often profligate use of water, and the corresponding wastewater disposal systems. From the Romans in particular we also know of environmental problems; what sanitary engineer has not heard of the cloaca maxima as an early example of sewerage, and the resultant pollution ?

## Medieval Times

7. Following the decline of the Roman Empire, water supply and sanitation, indeed public health, declined in Europe. Many of the historical accounts of environmental conditions of the cities of old tell of incredible unsanitary conditions of polluted water, human and animal wastes ankle deep in streets, of wastes thrown out of windows onto passersby, and so on.

Not surprisingly, various epidemics ravaged European populations at frequent intervals until conditions at the onset of the industrial revolution had become so intolerable that remedial action had to be taken if the laborers in crowded tenements were to remain productive. What makes this all the more incredible is that during the same period countries of Islamic cultures on the periphery of Europe had religiously-mandated higher levels of personal hygiene and, as a consequence, highly developed water supply and adequate sanitation systems.

*In Paris during the 14th century there existed a regulation requiring of householders throwing human waste out of the window in the morning (which was tolerated), to yell three times "gare l'eau !" (watch out, water !).*

*In 1844, a royal commission in England found only two cities with publicly financed and organized waste disposal service.*

## Modern era

8. Waterborne sewerage was introduced on a large scale in England in the 1840s following the recommendations of a parliamentary commission which was charged with finding alternates to cesspools, privies, buckets and earth closets used in urban areas until that time. Its development in Europe and North America has progressed towards ever more sophisticated solutions ever since, response to demands created by domestic and industrial users of water, and the needs to protect the environment. What is often overlooked is that the solutions of today are not the result of original planning, but improvements in response to previous errors and

*In 1912, one of the leading sanitary engineers of his time. Allen Hazen, declared that the city of Pittsburgh should continue to use combined sewers because dilution was sufficient to prevent nuisances. He was responding to Pennsylvania's health commissioner's request for a comprehensive sewerage plan designed to protect the health of downstream users. Hazen started as part of his justification that there was no great city that had undertaken to treat its sewage in order to protect downstream users and that no city had ever changed from a combined to a separate system to do so, due to the expense involved.*

new scientific discoveries. One example serves to demonstrate this fact. In England, Sir Edwin Chadwick in 1842 recommended the use of separate sanitary and storm sewers. In the 1870's, Colonel George E. Waring promoted the use of separate sanitary and storm sewers in the United States.

Both Chadwick and Waring, neither of whom was a sanitary engineer, ultimately failed principally due to the resistance of the "establishment". Many cities are still paying the price for that mistake. The fact that lack of knowledge at time at least partially excuses the wrong decision does not sweeten the pill today.

### History's Lesson

9. The purpose of this brief historical review is not to judge those who made decisions based on the evidence available to them at the time, but rather to determine whether today's decision-makers should continue on the main path. There are many lessons which can be learned from the past, some obvious; others less so. Some are already being implemented, among the best known probably water demand management. One thing is clear not just for water supply and sanitation, namely that simply because something was right and appropriate once, does not mean that it must necessarily be so under today's changed conditions. Some of the conclusions which can be drawn from past experience are :
  - (a) Sector policy has been to satisfy whatever demand was generated by users without developing water conservation techniques. Over the period of 150 years the demand for water has continuously risen due both to increases in population and increases in per capita consumption generated by more water consuming appliances, industrial and commercial processes. Demand in a growing number of cases now exceeds available water resources and waste disposal needs exceed the capacity of the environment in many areas;
  - (b) Many systems were acceptable when first implemented. Today they turn out to be inadequate when conditions such as water consumption, waste generation, population densities and industrial waste generation changed, and our understanding of relationships about water supply, health and human and industrial waste disposal increased.
  - (c) Facilities once constructed preclude a change in approach even if new evidence indicates that to be desirable, because the sunk investment is too important to be abandoned. Optimal solutions are thus not achievable by implementing marginal improvements which were based on inadequate knowledge.

- (d) The complexity and cost of water supply and sanitation investments and operations have risen steadily with demands for higher service standards, public health and environmental protection requirements. In many communities the financial burden of satisfying those needs or of maintaining facilities has become unacceptably costly to many users.
- (e) Water Supply has consistently received priority over sanitation, first because the impact of waste discharge and pollution on human health was not understood, later because financial constraints resulting from dependence on water borne sewerage as the only acceptable solution made simultaneous implementation of water and sewer projects almost impossible. Sewerage thus is commonly constructed only when nuisance becomes intolerable.

Summarizing, it can be said that :

The present state of the art was developed incrementally over a period of some 150 years. Of necessity, it is based as much on economics (use of already made investments and self-interest of those involved) as on scientific knowledge and level of development in organization and management of human and financial resources. Evidence suggests that in the absence of "sunk investment" present state of the art is not the optimal solution to sustainable water supply and sanitation, indeed environmental services in general. Simply because something was right and appropriate in the past does not mean that it must necessarily be so under today's changed conditions.

#### New Approaches to Infrastructure Development

- 10. Before continuing this discussion of sector problems, it will be useful to review new currents of thought that are emerging concerning the development of infrastructure in general, since water and sanitation systems are a key component of any community's essential infrastructure.
- 11. A number of positive developments began to take place in infrastructure during the 1980s. These were related to policy reform programs based on a new development strategy including a greater reliance on competitive markets and the private sector, a consistency of macroeconomic and sectoral policies and a reduction in the direct distributional role of infrastructure services. These adjustment programs are beginning to reduce or eliminate price distortions, put public enterprises on a sounder financial basis, markets are being deregulated and competition extended. These measures will result in an increased productivity of infrastructure services. However, the thesis of the paper is that those measures are necessary but not sufficient conditions for maximizing the contribution that infrastructure could make to growth and other development objectives. What is required is a more drastic reorientation, along the lines proposed below.

12. The need for better accountability and demand orientation are key issues in the new thinking about infrastructure. The evolution of most infrastructure services : in public hands, monopolies and heavily driven by their technical aspects, has resulted in a heavy supply orientation and little accountability vis-a-vis users, clients, of beneficiaries. Infrastructure has largely operated with inadequate checks and balances either from markets or political processes, to a large extent because the intrinsic characteristics of any of the services has made the functioning of markets extremely difficult. In other words, we think that there has been an excessive focus on the supply aspects of infrastructure. What is required is more of a demand oriented strategy, to enhance the way in which infrastructure services respond to clients' preferences as the best approach for improving their productivity and effectiveness and maximizing their development impact. This strategy is composed of the following main elements :
- (a) A need to focus on the reliability of infrastructure services as a demand oriented way of tackling issues of operational performance and as a way of responding to the demand for the type of high quality services expected in the future (e.g. international trade, higher value products).
  - (b) a number of institutional changes aimed at increasing accountability :
    - (i) measures to extend the realm of competitive markets beyond what is accepted at this stage in most countries, a broader participation of the private sector in the provision of services (B.O.T., attracting professional management/operation companies to joint ventures), which should go parallel with the improvement in the government's regulatory capacity;
    - (ii) development of competition surrogates in the public sector, particularly administrative decentralization in publicly owned activities; and
    - (iii) increased participation by clients, users and possibly suppliers in the operation and/or monitoring of services. That is, an extension of the concepts of "voice" and participation.
  - (c) a number of changes in the financing methods, with larger use of private sector funds in different guises and public tapping of capital markets, when appropriate.
13. To obtain this accountability and demand orientation by the above mentioned actions, mean a reorientation of much of the work now undertaken in infrastructure. Such a reorientation has been underway in a piecemeal fashion for some time, but this paper suggests that a systematic approach to it would yield important positive results.



## Implications for Water and Sanitation Services

14. To have any chance of meeting service needs in the 1990s a similar reorientation is needed in our approach to sector development. Fundamental to this reorientation must be the attempt to solve local problems locally, rather than to export them, usually at the cost to someone else or the economy at large, and to do so using solutions

*One example of a good standard with limited usefulness in developing countries unless modified is the California wastewater reuse standard. The standard does not deal with helminthic diseases : they are no longer a danger to public health in California. They are, however, a principal danger in developing countries.*

created for local conditions and based on today's knowledge rather than technologies developed elsewhere on the basis of outdated or lacking scientific knowledge, reflecting the need to use previous investments, or using inappropriate standards. A new approach is needed based on the following :

- (a) determination in every case of the appropriate solution on the basis of effective local demand, to achieve technical and financial viability;
  - (b) employment of a combination of measures, such as demand management, water conservation, on-site and off-site water reuse, and decentralized wastewater collection and disposal;
  - (c) use of a circular, rather than a linear flow model to emphasize sustainability within a given area and to avoid the export of environmental problems to other downstream communities;
  - (d) definition of achievable standards appropriate to local conditions, rather than the adoption of unrealistic and inappropriate ones simply because industrialized countries are capable of achieving them or find them necessary or desirable under their own local conditions;
  - (e) assessment of what environmental services, such as water supply, human waste disposal, storm drainage and garbage disposal, are needed, and in what priority, to solve a given problem and to optimize the use of available investment funds;
  - (f) creation of the necessary institutional framework, varying from utility arrangements with strong local involvement to community participation in project development and community management of assets, depending on size and sophistication of the population center.
15. An example of a system designed in accordance with these principles is the following.

1. Traditional centralized water supply and sewerage, serving :
  - (a) those areas already with this service today; and
  - (b) future high density commercial areas, and selected future high density residential areas, provided they can be served more economically with traditional than with other types of service.
  
2. Modified traditional centralized water supply and sewerage, serving presently unserved areas and those in need of upgrading. The system (new and modified existing facilities), would consist of :
  - (a) water-conserving fixtures in all new construction and, if economically justified, modification of fixtures in existing structures;
  - (b) simplified water treatment facilities designed to reduce operational complexity, dependence on scarce chemicals, minimize energy requirements and costs, such as roughing and slow sand filters, declining rate filtration, and others:
  - (c) greywater reuse in new construction and, if economically justified, retrofitting of existing structures, with the objective of reducing wastewater discharge by at least 75 %, with remaining treated wastewater reused for lawn irrigation, ornamental plant watering, etc., to minimize discharge to public sewers; and
  - (d) water distribution systems designed for low initial costs, flexibility and future upgradability to facilitate adaptation to changing conditions as urban areas develop;
  - (e) use of recently developed lower-cost sewer system solutions, including modified conventional sewerage, smallbore sewers and shallow sewers;
  - (f) treatment and disposal of wastewater on site or within neighbourhood based districts using treatment systems producing effluent suitable for reuse (irrigation of green areas, lawns, ornamental plantings and trees [particularly those with high evapo-transpiration rates], parks, green strips along or in the center of streets), or discharge to storm drains, surface or groundwater.
  
3. Central water supply and on-site sanitation, serving low-and medium-density communities

Many combinations of service standards suitable for different socio-economic conditions and user preferences can be implemented with available, proven technologies. Solutions are available to serve peri-urban and low-income urban as well as rural areas. All require a community-oriented, rather than the customary centralized public utility approach.

16. Now, where does IWSA come into the picture ? To be able to influence the professional sector community in a country (continued education), easily accessible organizations, managed by the profession is needed. I would like to describe a concrete initiative which the World Bank is currently in the process of developing in cooperation with the IWSA and UNDP.

### Professional Associations and Capacity-building

17. In the industrialized countries National Professional Associations play a major role in continuing national capacities for policy reform and education resulting service improvement and sustained maintenance of assets. They have contributed to this goal in the following principal ways :
- (a) by providing a mechanism for the continuous updating of sector professionals' knowledge and skills in all aspects of sector development;
  - (b) by working in close collaboration with national decision makers in defining national sector policies and realistic targets and standards;
  - (c) by acting as a link between public water and sanitation agencies and private manufacturing, consulting and other companies active in the sector; and
  - (d) by promoting national and international exchange and cooperation in the areas of research, training, technology, and overall sector development strategy.
18. The first of these functions - the enhancement of professional competence - is in many ways the most important. Institutions, whether they are water supply agencies or any other organization, are in the last analysis collections of individuals, and the quality of any institution's performance is a direct function of individual staff members' skill, knowledge and motivation. Participation in the activities of a well-functioning Professional Association offers members a continuing opportunity to upgrade their competence, remain abreast of latest advances in their fields of expertise, and - perhaps most important of all if some recent surveys are correct - to develop higher standards both as regards product output and personal performance.
19. A major problem in developing countries at present is that while large numbers of competent sector professionals can be found, they are functioning largely in isolation from one another and on their own in so far as efforts to improve their capabilities are concerned. Putting them in contact with one another in a Professional Association can have a significant multiplier effect on their personal development and eventually on the performance of the institutions for which they work.

As a member of IWSA, a National Association can also draw on the resources of other National Associations. This will enable it to provide its members with access to expertise and experience not available in-country, through study visits, in-service training and twinning arrangements.

### The World Bank - IWSA Project

20. It is against this background that a proposal has been made with the IWSA Foundation for the Transfer of Knowledge to develop an interregional project to strengthen and promote National Associations of Sector Professions in 10-12 countries of Africa, Asia and Latin America over the next three years. UNDP's Division for Global and Interregional Projects has been requested to provide the basic start-up funding, with technical support provided by member organizations of IWSA. In countries where Associations already exist the aim of the project is to expand them, broaden the range of services which they provide to members and clients, and help put the Association on a self-sustaining financial basis. In countries which do not yet have a Professional Association, the objective is to promote one and start them on the path of sound development. While the following list is not definitive, countries expected to participate in the project are : China, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Taiwan and Thailand in Asia; Nigeria, Zimbabwe, Jordan and Tunesian in Africa : Several Regional Associations will also be included, namely AIDIS (Interamerican Association of Sanitary and Environmental Engineering); The UADE/UAWS (Union Africaine des Distributeurs d'eau/Union of African Water Suppliers) in Africa; and ASCEW (Association of South Central and West Asian Countries) and ASPAC (Asia Pacific) in Asia. Preparatory work is currently underway in the form of two workshops that will be held shortly, one in India and one in China. The main project, subject to the availability of UNDP funding (which is not yet committed), is expected to commence in 1992.
21. Detailed work programs are still in the formulation stage, but I can outline for you the basic strategy we propose to pursue. In working with existing Associations, initial emphasis will be placed on analyzing their present strengths and weaknesses and on helping them to develop practical, goal-oriented Action Plans for expanding services to members and clients, both corporate and individual. High priority will be given to activities aimed at the upgrading of technical and management skills through the organization of conferences, workshops and in-service training programs for sector agency personnel as a follow-up on the workshops. The premise on which this approach is based is that the most effective way to arouse interest in the Associations and demonstrate their value is to begin providing a service that meets an important felt need and produces a tangible impact in the short-term.

22. Other planned activities as the project unfolds include assistance to participating Associations in arranging exchange visits and possible twinning arrangements with professional associations and sector agencies in more developed countries; preparation of guidelines for public education campaigns and the lobbying of sector policymakers on important issues affecting sector performance, and the development of technical publications and journals. In the implementation of these various activities, the project will rely heavily on expert staff of IWSA's member organizations who can be made available for short-term assignments in the participating countries. It is hoped that the technical support will be provided on a concessionary basis to the fullest extent possible.
23. As earlier mentioned, one of the objectives of the project is to help the participating associations, both existing ones and new ones to be promoted, to become financially self-sustaining within a reasonable period of time. This is probably the most difficult challenge that the program will face. The experience of even well-established professional associations shows that membership dues alone do not generate sufficient revenue to cover all costs, and it is therefore necessary to develop additional sources of revenue. Possible sources including the following :
- Subscriptions to Journals and Newsletters (in some organizations this is included in the dues);
  - Income from Advertisements in Journals and Newsletters;
  - Workshop and Training Course Fees paid by sponsoring organizations such as Governments, Multi- and Bilaterals, and participants;
  - Conference and Exhibition Charges to participants and exhibitors;
  - Income from Publications, possibly translations of publications;
  - Fees from Abstract and Data Base Services; and
  - Fees from other services (organizing study tours, identify/interviewing scholarship candidates, etc.).

The list could be expanded, but whatever services Associations endeavour to provide, they will need to be marketable and in sufficient volume to cover the Association's costs if it is to become a self-sufficient entity.

24. The project strategy therefore lays heavy emphasis on assisting the participating Associations to develop as rapidly as possible a program of needed services for which members and clients will be willing to pay. It is proposed to charge for these services from the inception of the project, using UNDP funding and the services provided by IWSA members as seed money and temporary support while Associations service programs are being built up. This will establish the principle of payment for services from the beginning and build up financial reserves for the time when external support terminates.

Users of Association services are expected to be : Association's own members, both individual and corporate; participants in conference and training programs; multi- and bilateral agencies for which the Association may undertake training or studies; commercial advertisers, etc.. It is recognized that not all of the participating associations may be fully viable at the end of this 3-year project, and some further assistance may be required. It is fully expected, however, that most of them will be well on the road to self-sufficiency at the end of the project. To achieve these goals the project will need the advice and support of well established Professional Associations that have succeeded in becoming self-sustaining organizations, and this is another area in which we will be relying on our friends in the IWSA through its Foundation for the Transfer of knowledge to help us.

I would like to mention in passing that we recognize that some of the countries interested in participating in this program may have to link together in a sub-regional Association.

### Conclusion

25. In conclusion I would like to say that we in the Bank consider the project that I have just outlined to be significant innovative approach to sector capacity building in developing countries. Many efforts have been and are being made to improve the management and operations of water supply agencies, and some have undoubtedly been successful in helping this or that institution. For the most part, however, these efforts have been sporadic and fragmented and not followed up to the extent needed to produce a significant broad and lasting impact. The problem has been that there does not exist in most countries any organized framework or institutional support structure for enhancing sector management and technical capacity on a sectorwide and continuing basis. Well organized National Associations, by pooling the large but presently dispersed reservoir of national professional expertise found in most developing countries, can help to remedy this situation.

## **URBAN WATER SUPPLY AND SANITATION IN DEVELOPING COUNTRIES**

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The second half of the 20th century is expected to witness a 150% increase in world population. The last decade of the century will see a growth of some one billion people (Table 1). Two characteristics of this population growth are worthy of special attention by those responsible for providing adequate water supply and sanitation (WSS) services.

- \* Of the one billion new population expected in this last decade of the 20th century, 70% will be living in urban areas; more than 100 cities will have grown to exceed one million population, making a total of more than 400 (Table 2).
- \* Most of that urban population growth will be in cities in developing countries. Whereas, the three metropolitan areas of more than ten million in the more developed countries are expected to grow to only four areas during this last decade, the number of 'great' cities in the developing world is expected to double from nine to 18 (Table 3).

The plight of people without proper WSS services is far worse in the cities than in rural areas. People in rural areas without services can somehow fend for themselves. In densely populated urban and periurban areas, on the other hand, they are virtually helpless and are far more susceptible to exposure to infectious disease. Furthermore, a rural community with local leadership can take the initiative in providing itself with water supply; an unserved community in a metropolitan area cannot itself provide the physical facilities needed.

The state of the decaying and poorly maintained physical infrastructure of the cities in the industrialized world has been well publicized. For the exploding cities in the developing world the problem is compounded by the absence of a WSS infrastructure serving much of the city in the first place and the short life and inadequate performance of such infrastructure as has been provided.

Assistance by External Support Agencies (ESAs) in providing WSS services in the developing world began following World War II. The United Nations family of agencies brought greater attention to these problems in Mar del Plata. The resultant Action Plan (UN, 1977) gave rise to the International Drinking Water Supply and Sanitation Decade of the 1980s.

However, its mandate also included sound management of water resources for all purposes including agricultural irrigation, industry, hydroelectric power, fisheries and inland navigation, explicitly a call for integrated water management.

Progress was made in WSS during the Decade, particularly in giving this subsector higher international and national priority. More than 1,3 billion people were newly supplied with adequate water supply and about 750 million with sanitation, with coverage over the decade increasing from about 45% to 70% of the population in developing countries, while sanitation coverage increased from about 45% to only 55% (Table 4). The principal impact was in rural areas, with almost one billion newly served with water in the decade, an increase of about 140%. On the negative side, because the data are submitted by the countries, they tend to show better performance than is the case. Many of the facilities provided are not fully operational; some are even abandoned. Furthermore, because the increase in urban water service was only about 50%, urban growth actually resulted in a 15% increase in the unserved urban population. The urban population unserved by adequate sanitation facilities increased about 30% over the decade. To sum up, urban services in the less developed countries, despite the emphasis of the Decade, have not kept up with growth.

**TABLE 1 Actual and Projected World Population**

<u>Year</u>	<u>Total Population</u> (millions)	<u>Urban Population</u> (millions)	<u>% Urban</u>
1950	2515	733	29
1960	2991	1030	34
1970	3592	1374	38
1980	4368	1770	40
1990	5292	2260	43
2000	6251	2917	47
2025	8466	5119	60

Source : Adapted from UN Department of International and Economic and Social Affairs, World Population Prospects, UN, New York, 1989.



**TABLE 2 Growth of Cities of More than One Million Population**

<u>Year</u>	<u>Number of Cities</u>	<u>Population (millions)</u>
1950	78	200
1960	114	299
1970	160	432
1980	222	605
1990	298	850
2000	408	1204
2025	639	2205

Source : Adapted from UN Department of International Economic and Social Affairs, Estimates and Projections of Urban, Rural and City Populations, 1950-2025 : The 1982 Assessment, UN, New York, 1985

**TABLE 3 Number of World Metropolitan Areas Over 10 Million**

<u>Year</u>	<u>More Developed Countries</u>	<u>Less Developed Countries</u>	<u>Total</u>
1950	2	1	3
1960	3	1	4
1970	3	1	4
1980	3	3	6
1990	3	9	12
2000	4	18	22

The problems facing the less developed countries in the water sector can be categorized into two closely inter-related problems :

- (1) **Water Supply and Sanitation** : Inadequate performance in the WSS subsector, attributable to exploding urban growth, use of inappropriate technology, and inadequate institutions.
- (2) **Water Resources Management** : Insufficient attention to the water resources sector as a whole. The increase in urban population, together with the rapid growth in per capita water demands in the less developed countries resulting from industrialization and improving standards of living, are creating water demands that are competitive with increasing demands for agricultural irrigation.

In response to these shortfalls in the implementation of the Mar del Plata Action Plan, the United Nations Administrative Committee on Coordination Intersecretariat Group for Water Resources (ACC/IGWR) (1989, 1990) agreed to develop a comprehensive strategy for the 1990s. What emerged was a consensus that failures in meeting WSS service objectives and in developing countries lie not in the realm of technology nor even in the availability of funds.

Ample evidence exists that even where adequate funds are made available and the appropriate technology involves only well established practices, projects and programs, these have not been sustained after ESA intervention ceases. The need is for establishing the capacity in a country to receive external support agency (ESA) development assistance such that local programs and projects can be expected to be sustained with indigenous resources.

The New Delhi Statement (UNDP, 1990), prepared at the Global Consultation on Safe Water and Sanitation for the 1990s, contained four guiding principles, two directly related to capacity : "Strong institutions are essential for sustainable development," and "capacity building is necessary to make community management effective..." The other two, environment and health and financing and technology, depend for their implementation on strong sustainable institutions.

The final report (UNDP, 1991) from which this paper is drawn, is to be the basis for a UNDP Symposium on Capacity Building for Sustainable Water Resources Management to be held in Delft in June 1991 with representation from ESAs and officials of national and local agencies from less developed countries. The purpose will be to stimulate capacity building in the ESAs themselves and in the national management agencies and local service organizations in the water supply and sanitation and irrigation subsectors in countries in Asia, Africa and Latin America. Also, recommendations from the workshop will be presented to the international Conference on Water and the Environment to be held in Dublin in January 1992 with recommendations to be forwarded to the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992.

TABLE 4  
Decade Report Card : WSS Services in the Developing World  
(in millions)

		<u>1980</u>		<u>1990</u>		<u>Change</u>	
<u>Total Population</u>		3 236		3 990		+ 754	+ 23%
Water :	Served	1 411	44%	2 758	69%	+ 1 347	+ 95%
	Unserved	1 825	56%	1 232	31%	-593	- 32%
Sanitation	Served	1 502	46%	2 250	56%	+ 748	+ 50%
	Unserved	1 734	54%	1 740	44%	+ 6	0%
<u>Urban Population</u>		933		1 332		+ 399	+ 41%
Water :	Served	720	77%	1 088	82%	+ 368	+ 51%
	Unserved	213	23%	244	18%	+ 31	+ 15%
Sanitation	Served	641	69%	955	72%	+ 314	+ 49%
	Unserved	292	31%	377	28%	+ 85	+ 29%

<u>Rural Population</u>		2 303		2 659		+ 356	+ 15%
Water	Served	690	30%	1670	63%	+980	+ 142%
	Unserved	1 613	70%	989	37%	- 624	- 39%
Sanitation	Served	861	37%	1295	49%	+ 434	+ 50%
	Unserved	1 442	63%	1 364	51%	- 78	- 5%

### Capacity Building

Water Resources Capacity Building (CB) is broadly conceived to include the establishment of a favorable policy environment and appropriate institutional development (ID), the latter to include the establishment of sound management systems, incentive structures, and the human resources development (HRD) needed for sustainable development of water-related programs. In this context, CB seeks to integrate the management of the several subsectors in the water resources sector, most particularly WSS and irrigation.

Elements of CB have, of course, been pursued over the years, but at best with indifferent success and much too often with outright failure. The less developed countries are littered with WSS projects built with funds from loans and/or grants provided by the myriad international and bilateral ESAs that fail to meet their objectives or that are abandoned. The projects may have made some provision for elements of capacity building but implementing policy change and institutional and human resources development have traditionally enjoyed little if any priority when a project includes the construction of facilities and/or the provision of instruments and equipment. Part of the problem results from the perception that the ESAs themselves are not interested in the institutional capacity of the countries to sustain the projects. The perception that the ESAs are not interested is easily understood; they are seen to be driven by the need to meet lending or granting quotas; field teams seem far more concerned with the project itself than with its sustainability. Although demonstrated failures in WSS and irrigation projects resulting from institutional inadequacies have been documented (WB, 1990), ESAs are loathe to condition, and thereby delay, a loan or grant contingent upon assurance that a national or local capacity exists or can be developed to use the funds properly.

Based on assessments of some 125 World Bank WSS projects, Buky (1990) found that adequate management and staffing are essential to success. He emphasized, furthermore, that capacity building needs to occur prior to, rather than only during, project implementation. Success was achieved "...where the Bank had the fortitude and patience to prepare the ground... by insisting on pre-project action for the build-up of institutional competence."

This paper presents a two-fold program for capacity building for water resources management :

First, introducing a variety of approaches to capacity building in less developed countries both at the national level and at the utility or service level in water supply and sanitation and in agricultural irrigation; and

Second, improving the capacity of external support agencies to provide CB assistance in the countries and as important, to be perceived by countries to be giving CB a high priority.

### Capacity Building in External Support Agencies

Applications for loans and grants in the more developed countries, whether from commercial banks, from central government or from private foundations, are accompanied by assurances that the applicant has the capacity to use the funds effectively. When these applications are appraised, the potential lender or grantor examines the applicant to ascertain whether the capacity does, in fact, exist.

Problems arise when the lender or grantor has objectives other than only assistance to the applicant. Among ESAs, the level of lending or granting may have been established to justify the existence and continued funding of the agency itself or to enhance the status of the agency among the family of similar agencies whether international, bilateral, or nongovernmental. Among some bilateral aid agencies, and to some extent the international lending agencies, the driving force for granting or lending may be political or diplomatic or commercial, with certain countries targeted irrespective of the expressed needs of the countries. Within agencies, competition among sectors or departments to achieve high levels of lending or granting may result in loans and grants made without too much concern for whether the capacity exists to use the funds effectively. In the event that a loan or grant is evaluated for its effectiveness in meeting its avowed objectives, an oft-omitted part of the process, this occurs so many years later that the staff responsible will have long departed the scene.

Other problems with implementing CB projects are that investments in processing a loan or grant for CB are not so rewarding as investments in capital projects which move larger blocks of money. Also, CB is not so visible as capital projects. They are not amenable to dedication ceremonies and plaques nor can they memorialize national leaders.

In a 1988 review of projects, the Operations Evaluation Department (OED) of the World Bank assessed operations over the last two decades (WB, 1990). Institutions and human resources issues were cited as critical indicators of project success and sustainability. In its 1989 evaluation (WB, 1990), OED reported that "Good institutional arrangements that helped to create capable and efficient organizations emerged as a key to the most successful projects."

One obvious approach, now being implemented in some projects, is to commit a certain percent, say 5 to 10%, of the total funds to be allocated to capacity building. While highly desirable this alone might fall short of providing the help needed. In many countries, new projects place heavy burdens on national and local institutions, burdens which they are often ill-equipped to handle. To require that CB and ID initiatives be undertaken in addition is much to ask. Investments in CB must be made prior to embarking upon implementation of large projects and continued during the project.

If an ESA is to promote CB, it itself must be staffed adequately with knowledgeable personnel in appropriate executive and operating positions to assist in capacity building within the ESA and its field staff and with client countries. A country is not as likely to implement the CB portion of a loan or a matching grant unless it perceives that the ESA is itself committed and that future investments of the ESA are likely to be contingent upon country capacity in the sector.

In larger ESAs, such as the World Bank (WB), the Food and Agriculture Organization (FAO) the regional development banks and the larger bilateral agencies, there may need to be CB personnel at a central policy or administrative level as well as in departments that operate in the field appraising specific loans or grants. In specialized agencies and in smaller ESA, a single focus for CB may be adequate.

If integrated water management is to be promoted in a client country by ESAs that operate in the water resources sector, CB would require that efforts be made to overcome subsector barriers within the ESAs so that differences in WSS and IRR policies not be promoted by the ESAs within the country. The ultimate objective would be to encourage countries to promote integrated water management agencies themselves.

### Rapid Assessments

Among early tasks of the external support agencies would be to inaugurate, where appropriate, rapid assessments of resources and needs in selected countries to help other specialized and bilateral ESAs as well as the countries. A collaborative and integrated approach among all the ESAs is essential in the countries if confusing messages are not be broadcast. Also, country institutions and personnel need to be committed and actively involved in the conduct of the assessment. Country readiness to participate, as demonstrated by the identification of a lead agency and key personnel, may well be a criterion for early selection for support by ESAs.

Rapid Assessments need to be tailored to the local situation. Among the subjects to be covered are the following.

- \* Water resources in the area, including the impacts of pollution;

- \* Needs for water for agriculture, industry, and water supply and sanitation as well as needs for sewerage and wastewater treatment in urban areas;
- \* Facilities available for providing WSS and agricultural irrigation as well as other water-related activities;
- \* Policy climate;
- \* Institutional resources at national and local levels;
- \* The need for human resources and facilities available for their development;
- \* Legal and regulatory tools and constraints;
- \* The financial situation with regard to capital and O&M requirements for WSS and IRR, including the potential for cost recovery; and
- \* Identification and solicitation of ESAs that are likely sources of technical and financial assistance.

The rapid assessments, expected to take months rather than years, will help establish country priorities for capacity building and for country programs and projects. Also, they will help identify those institutions in the country that most needs to be involved.

To assist with CB efforts on the part of ESAs and the countries, particularly in mounting rapid assessments, UNDP has expressed interest in initiating a CB Fund with the expectation that others will contribute to the Fund and/or provide help in CB to countries directly. Not incidentally, UNDP is in the process of establishing a CB office of its own.

### Capacity Building in Countries

The initiative for capacity building in the water sector in countries must come from within the countries. ESAs might well promote CB but investments in the sector are not likely to be sustained if the countries are not themselves fully committed to CB at all appropriate levels. Identification of the policy environment, institutional resources, water resources availability, quality and demand, and human material, educational and financial resources are key elements of capacity building in a country. For implementation, country CB activities in the water sector may be approached at two levels :

1. The national level : National issues for CB include the policy environment, legal and regulatory frameworks, integrated water resource and river basin (where appropriate) management, water demand management, information systems, sector organizational models, and the utilization and promotion of national professional associations.

National government agencies often have major roles to play in local projects and their relationships with local agencies impact on country capacity. Furthermore, international and bilateral external assistance is generally provided through national governments or, in large countries, provincial or regional agencies.

2. The local level : In WSS and irrigation subsectors, most projects are implemented at local levels generally through municipal water utilities and sewerage agencies, private water companies or irrigation districts. External assistance may be given at the local level through nongovernmental organizations (NGOs), particularly for rural, village or small community projects. Most large scale funding for local projects will be funnelled through national agencies and their success will depend upon the quality of institutions at both national and, more significantly, at local levels.

The issues to be examined at the local level include local institutional resources and alternative management models, local water availability and demand, water conservation, water quality, local financial viability including funds for O&M and cost recovery, local human resources development, and consumer organizations.

Several CB initiatives are discussed below, some of which may be appropriate at national and/or local levels.

### The Policy Environment

A tradition of free water for agricultural irrigation and a heavily subsidized water for household use, often embodied in policy and law in less developed countries, has placed heavy constraints on sound water management and the funding of water projects. However, even where such traditions hold sway, and national governments are in economic and political disarray, local initiatives have sometimes been able to create institutions that plan, finance, construct and manage high quality water enterprises. Not only need institutions development not have to wait on the establishment of sound policies and laws, strong local institutions can often be a stimulus to their establishment. Accordingly, it is incumbent on all involved in the sector to press for sound policy in every forum and venue possible.

Examples of the policy issues that need to be addressed are :

- \* Water resources, although renewable, are being depleted, limiting development. Measures need to be taken to manage water resources so as to extract the maximum yield feasible. The natural cycles of flood and drought cannot be controlled, but their impacts can be ameliorated.

- \* Water that falls as rain and then flows in rivers, lakes and underground may be free, but making it available for agriculture, residential, industrial or other use is costly; commitments to meet these costs are essential. This situation is little different from providing electricity to consumers, where metering and charging to meet the costs have been fully accepted from the outset.
- \* Realistic charges must be imposed on users to meet the costs. To encourage conservation, the charges should reflect the amount of water used. Accordingly, metering of water produced and used, a sound long-term management practice in any case, is essential. At the very least, charges should be adequate to cover the costs of management, operation, and maintenance of facilities. Because ESA funds are not likely to meet all capital costs for development, transmission, and distribution of water for agriculture, industrial or urban use in less developed countries, charges should begin to include cost recovery.
- \* National and local laws and regulations are necessary, and the institutions to implement them need to be effective.

### Institutional Development

The essential ingredient in capacity building is institutional development (ID), including the weaving of the essential fabric of all sound institutions, their human resources. Paul (WV, 1990) found a positive correlation between project sustainability and ID. Similarly, most failures, whether managerial, technical, or financial, can be traced to institutional inadequacies, which in turn can be laid to the quality and experience of their personnel.

In an evaluation of the ten years of the Water and Sanitation for Health (WASH) project established by the U.S. Agency for International Development, entitled "Lessons Learned" (WASH, 1990), Lesson One was that "Local institution-building is the key to transferring sustainable skills." WASH also cites sustainability as the most important measure of project success and that to achieve sustainability projects must address institutional development. Institutions along with high quality human resources are the best assurance of a country's capacity to achieve water sector objectives.

Many types of institutions have been successful; but a universally suitable model cannot be prescribed. Institutions are products of a country's history and social and economic structure; the choice is a local prerogative. A major problem is too many institutions with overlapping authorities impacting on a sector; the "dragons" that dominate Chinese administration. The intention is not necessarily to add new institutions, but to assess those that exist and be open to and aware of other models that have been successful and may be appropriate.



Institutions in the water sector include national and administrative agencies such as ministries, and local administrative agencies such as regional water authorities, municipal departments of public works, regulatory agencies, such as water pollution control and environmental protection agencies, and utility organizations. Community consumer groups are considered separately.

The literature is replete with models for institutions, each with its advocates. They include :

- \* National and local government administrative regulatory and operating agencies, the most common. Administrative and regulatory agencies are generally national or provincial, while operating agencies are generally local.
- \* National and local but quasi governmental agencies or authorities (called "Quangos" in Britain) which are generally financially self sustaining with their own personnel practices. While responsible to some national agency, they often enjoy greater freedom from political constraints.
- \* Local public utilities for water supply are the most common models with separate municipal sanitation agencies providing sewerage and wastewater treatment. Many advantages accrue when these are combined in a local public utility.
- \* Private agencies that often own and operate water supply service utilities, with regulation of the services, where regulation exists, by national government agencies. Privatization has extended to a lesser extent into sewerage agencies.
- \* Another model is the public ownership of facilities with operation and management turned over to private companies under contract.
- \* For optimizing the potential for effective water resources management, comprehensive river basin organizations have considerable promise. They were successful in England and Wales for some 15 years (Okun, 1977) until they were privatized with many of their functions removed in 1989. Most river basin agencies have limited operating and financing responsibilities but this may well change in time.
- \* Planning, design and management of water-related enterprises, while at one time functions of national and local governments, are increasingly the responsibility of consulting organizations. Such organizations are generally privately owned, but in many instances government agencies themselves serve as consultants to other national or local governments that do not have in-house expertise.

All these models have advantages and disadvantages which depend on local circumstances. Given that institutions are essentially people, major changes may be more difficult to implement successfully than a series of modifications. All that ESAs can do, where institutional structures are perceived as constraints to effective management, is to offer a variety of options for change and support those promising changes that country officials elect to pursue. Transitional processes may be more acceptable than the upheaval that may result from pursuit of the "ideal" situation.

### Legal Issues

A country's institutions are inextricably tied to the laws and their laws are the fruit of political systems. A common complaint in industrialized countries is that legislation and regulations have overwhelmed the water sector. Users are in conflict and resolution are often inadequate and, more importantly, where they do exist are seldom enforced. Laws and regulation are necessary but not sufficient to assure sound management of water-related activities. This is a responsibility of the institutions.

However, institutions do have a responsibility for the promulgation of appropriate laws and regulations. They need to have the professional expertise, both administrative and technical, that can advise on legislation regulation that are appropriate and implementable, recognizing existing constraints. It can also be said that institutions are necessary but also not sufficient. Sound and implementable laws and regulations and sound institutions are essential.

An FAO/WHO Working Group on legal aspects of water supply and wastewater management "...emphasizes (inter alia) the need to insure that governments have the legal power to allocate and reallocate water reuse rights..." (WHO, 1990). Many other recommendations are made, among which are :

- \* Integrated water resources planning
- \* Mechanisms for community involvement
- \* Enhancement of the capacity of water agencies and users' associations to manage water systems
- \* Control of allocation and use of wastewater
- \* Protection of downstream users from upstream withdrawals
- \* Encouragement of user charges
- \* Need for institutions to achieve sustainability.

Laws and institutions are particularly important today in the less developed countries where water for urban and industrial growth and agricultural irrigation exceeds available resources, which is nearly everywhere. Water for domestic purpose has traditionally enjoyed priority. However, because agriculture uses about 80 to 85% of water resources, agricultural interests have become the dominating power in water resources management in arid and semi-arid areas. Agriculture agencies hold dominion over water resources in most countries. Including for example, the United States, and the provision of water for growing urban and industrial needs has been seriously constrained, despite the fact that the market value of water in urban use is considerably greater than in agricultural use. A major objective of this water resources capacity building initiative is to integrate water management through policy, legislative and institutional modification to insure that water resources serve country economic and social development needs most effectively.

### Information Management

Information management systems are necessary to ensure a reference base that allows continuous updating and monitoring of water resources data and to integrate documentary information on water resources management, both of which are essential to strong institutions.

The International Reference Center (IRC) in the Netherlands has been instrumental in helping promote information management systems in countries. While initially established by WHO for the Decade, it has already expanded its coverage and might well incorporate water resources information generally and irrigation specifically in its purview. The Country External Support information System (CESI), which already enjoys increasing country level interest, needs to be expanded to include CB and the integration of water management.

### Human Resources Development

As capacity building depends on adequate institutions, institutions depend upon human resources. The organization of an institution, the boxes and lines, are less important than the people who occupy the boxes. An idealized institutional structure with poor personnel has less potential than a poor structure with high quality people. Both success and failure have issued from all types of institutions but sound institution along with high quality human resources are the best assurance of a country's capacity to achieve water sector objectives.

The growth in interest in human resources development (HRD) and its identification as more than just training, were contemporary with the Decade. However, and HRD study in the water sector sponsored by the ACC/GWR revealed a general absence of attention to assessment of human resources availability, demand and needs (UNESCO, 1987). The ACC/GWR (1989) concluded that "An estimate of the order of magnitude of the gap between available and required human and financial resources" in a country is not at hand.

Many prescriptions and models for national studies are available; conducting these studies for the purpose of developing sound HRD programs has not been done.

Further investments in "how to do" studies should be replaced by "doing" national studies which can be part of rapid assessments.

Essential elements of HRD are education and training resources at all levels which, along with methods for their utilization by personnel employed or to be employed in the sector, need to be evaluated. Included in these resources should be, in regions where they are available, members of the International Training Network (ITN), a product of the UNDP/WB Water and Sanitation Program, now numbering nine in Asia, Africa and Latin America, which provide resources that can assist countries in their own training efforts.

HRD is more than just a responsibility for improving the competence of staff. It involves employment practices, career structures, and professional and financial incentives. For example, the setting of a training program may have more impact upon improvement of a trainee's qualifications than the contents of the program.

If the training program is seen by the trainee as an investment in him or her, individual self worth is enhanced and the training is more likely to be approached with enthusiasm. If better performance as a result of commitment and/or training is seen to be rewarded by increased pay or by an invitation to a higher level of training and then greater responsibility, the individual will make much greater effort than if the training and its rewards are perfunctory.

Staffing patterns must be well understood and opportunities for promotion enlarged, commensurate with merit. Expertise in HRD exists and should be employed on the permanent staff of large institutions or as consultants to smaller organizations.

The potential for human resources development in the water sector depends to a great extent on the educational and related resources in the country. While improving literacy and vocational skills and developing a system of higher education are outside the purview of those responsible for HRD in the water sector, much can be done to enhance the quality of personnel through the educational system.

Many water-related educational, research and other tasks can be contracted to local universities and other educational institutions. This helps the educational institutions obtain and retain staff in the water sector. A common practice is to have a utility provide the university with funds for professional students to undertake tasks important to the utility. The university, the student and the utility all benefit.

Twinning arrangements may be encouraged between universities in industrialized and less developed countries, which will have the advantage of providing up-to-date technical material to one and familiarity with the specialized needs in the sector in less developed countries to the other. Joint research projects between the two institutions can be funded by a research agency or an ESA in the industrialized country. USAID has long sponsored modest research programs in universities in developing countries when coordinated with a US institution.

Universities in industrialized countries may commit themselves to developing specialized programs for engineers and scientists from developing countries. The bilateral ESAs fund such programs in specific technical fields or directed to specific countries. One of the most outstanding is the International Institute for Hydraulic and Environmental Engineering (IHE) in Delft supported in the main by the Dutch government. Finnida supports education at Tampere University of Technology in Finland for engineers from Kenya, Tanzania and Ethiopia. France supports CEFIGRE, an active training program. Such programs help the personnel in both the industrialized and the developing countries.

### Professional Associations

National and international nongovernmental professional association have long played an important role in enhancing the capacity of industrialized countries in the water sector. As Rietveld (1991) points out, they have contributed in manifold ways :

- \* They provide a mechanism for reporting and updating technical knowledge in the sector and making it available to professionals in the field through publications, conferences and short courses;
- \* They work with national decision-makers in defining policy and setting standards of all types;
- \* They can provide a link between public agencies, consultants, manufactures, industry and the public;
- \* They promote national and international exchange and cooperation in training research, technology, and sector development.

These professional associations depend upon contributions of their members through payment of dues and, much more importantly, through contributions of time. Manuals of design, operation, and methods of analysis are all products of professional contributions to the associations. Not incidentally, those who participate in the committees that prepare such manuals feel that their professional gains repay more than the value of their time.

While well established in the industrialized countries, professional associations are non-existent or very weak in most less developed countries. Important contributions to national capacity building in the water sector can come from ESA assistance as well as from initiatives by international professional associations which in general are dominated by representatives from the industrialized countries. The International Water Supply Association, through its Foundation for the Transfer of Knowledge, made a commitment to "Building and Strengthening National Capacities for Sustainable Water Supply and Sanitation Coverage" at New Delhi (IWSA, 1990). It is prepared to contribute to the strengthening of national professional associations. National associations in the industrialized countries can also reach out to assist like types of associations in the developing countries by making special arrangements for distributing their publications which, because of foreign exchange difficulties, are generally not easily available to them. ESAs can assist financially in the distribution of publications by working through national associations and they can also help by sponsoring professionals to attend conferences which are not easily accessible because of the limitations in foreign exchange.

### Twining

The growth of the "sister-city" concept, or twinning, can well be nurtured and focused on WSS services. Management and operating staff of a utility or an authority, or even a national agency in an industrialized country can exchange visits with their counterparts in a developing country, generally already selected by virtue of some commonality. Visits can be made by individuals or by teams representing a wide range of services. Such enterprise fosters international understanding as well as technical exchanges and have the advantage over project interventions in that they can be long-term. Bilateral ESAs can identify and promote such activities in their own countries. Because these efforts are generally individually financed, at least on the industrialized country's side, a little financial assistance can make a big impact.

### Multinational Corporations

Multinational manufacturing corporations have production facilities throughout the developing world. They generally require services for water supply and wastewater and solid waste management and disposal. Whether they locate in an urban area and receive services from the municipality or provide their own services in a city or in the countryside, they are closely involved with local and often national institutions. They may want to contract and pay for local WWS services but find that the water supply is unreliable and the pollution control facilities are inoperative. If they perceive the problem before siting their plant, they may opt for a location away from the city despite the advantages that accrue from an urban location. In any event, multinationals have a stake in the quality of the WSS institutions that serve them. If the utility is having trouble with the maintenance of its equipment, a common problem in the less developed countries, the corporation might offer to use its own facilities for equipment repair.

While helpful, this intervention has only short-term benefits; a better contribution would be to help train the utility management and operating personnel in the development of preventive maintenance programs. Such large corporations in the industrialized world have close working relations with the utilities that serve them in their home country. They might promote twinning between utility personnel that serve their home country plants and the utility personnel that serve their developing country plants. The engineering consultants they employ from their home country on in-plant water operations might be asked to offer technical and management assistance to the water-related utilities where appropriate.

### Consulting Engineering Organizations

Consulting engineering firms from industrialized countries are major actors in the sector. They are generally employed by clients in the developing countries but the ESAs are often involved in their selection when they are the source of funds.

Consultants are often selected for their technical competency with little attention to the role they can or should play in capacity building both with the institutions they serve and with local consulting engineering organizations. The "joint-venture" of an expatriate firm with a local firm on a project is often a marriage of convenience, the local firm helping secure the contract and being thereafter involved in "housekeeping" rather than professional obligations.

It should be the responsibility of the ESAs to incorporate in the engineering assignment a responsibility for institution building with particular emphasis on human resources development. The latter should include development of the staff and, in addition, of local engineering and other professional personnel involved in the project. An expatriate consulting firm selected on the basis of its commitment to human resources development as well as its technical responsibilities would be eager to use its professional staff to assist with training and support of local professional associations. They exercise such functions in their home countries as an inherent professional obligation. However, if the ESAs who review the performance of the consulting firm on the project appear only to be interested in the pace and quality of the technical phases of the project, both the consulting firm and the client could be little inclined to give priority to HRD. The lead time for training the staff for a project may be as long or longer than the time required for completing the capital facilities or the project, so HRD obligations should be initiated at the outset or earlier through a separate project. Furthermore, it is good practice to employ the permanent staff during design and construction phases of the project so they can be familiar with the project literally from the ground up.

The expatriate consulting firms can be the key to developing a wide range of HRD-related activities. In the process they might learn something about indigenous resources and practices and so avoid some of the more egregious examples of inappropriate technology.

## Consumer Organizations

Too often decisions on local water-related interventions are made between ESA staff and high level government officials in the capital, neither of whom are knowledgeable about the local population or its wishes. Examples abound where water supply systems have been built with external assistance but where few of the potential customers chose to connect, leading to abandonment of the project. The customers chose for various reasons to continue to purchase water from vendors at exorbitant prices rather than to connect to a system about which they had no input and whose reliability and quality of service was suspect.

Community organizations have been perceived to be important in rural communities, but they are equally or even more important in urban communities. It is not at all inappropriate for a project to include funds for the borrowing institution to support one or more consumer organizations that would institutionalize the assessment of customer needs, ability and willingness of potential customers to pay, and ascertain their preferences with regard to levels and reliability of service. An understanding of the readiness of people in the less developed country to support a project is essential, and the establishment and financial support of a consumer organization would pay for itself by avoiding costly missteps so common today. Such an organization is particularly important, though its composition might be somewhat different, for pollution control projects.

The role of women in consumer organizations has been shown to be instrumental in their success and in the sustainability of WSS projects. The reasons are easy to understand : in the absence of WSS facilities it is they who spend substantial portions of their time carrying water and whose quality of life in the home and in the field is most affected by the unavailability of water. Women have a stake in the improvement of WSS facilities and, in many societies, in irrigation facilities as well. PROWESS, a UNDP program for the Promotion and the Role of Women in Water Supply and Environmental Sanitation Services, has made significant progress in enhancing the participation of women, but most projects and programs still ignore and even resist the input of women. Capacity building at the local level cannot succeed without their full participation and leadership.

## Water Resources Management

Of all the shortcomings in implementing the Mar del Plata Action Plan, the failure to address the water resources issues facing the developing world are the most threatening. The traditional approach to water supply, whether for community or agricultural use, is to estimate demands (if an assessment is indeed made) and to assume that the resource is available for the taking. Whoever has the funds is generally free to extract water from underground or from streams virtually at will. In industrial countries, local water shortages have been met by gigantic water transfer projects.



This approach is beginning to encounter political obstacles because watersheds are no respecters of governmental boundaries. In addition, the threats to communities that are to be flooded by major impoundments, threats to flora and fauna resulting from excessive abstraction from streams, and excessive groundwater abstractions causing land subsidence that threatens urban structures and increases the potential for flood damage are, and should be, inhibiting the easy acquisition of new sources and the over-exploitation of existing sources.

Even though water is a renewable resource, fresh water resources are being depleted by withdrawals from surface and groundwater sources at a greater rate than they are being replaced by rainfall, although the amounts replaced on average with each cycle of rainfall are relatively constant. (Obtaining the average is itself a daunting management and technical problem). Except for desalination of seawater, which is beyond the financial capabilities of all but a few rich countries, there are no "new" sources. All countries will have to live with what they have, or can negotiate from others; arid and semi-arid countries and semi-arid regions of otherwise humid countries are already facing serious limitations. Even cities in rain-rich countries are now experiencing local shortages.

Up to now, few measures have been instituted to husband existing water resources to devise mechanisms for effective allocation of these resources. Even in the industrialized countries where these problems have already been widely recognized, the institutional and regulatory responses do not offer much guidance. The paucity of institutional and human resources and the almost complete of governmental frameworks for water resources management require starting from much farther back than was the case with WSS. The challenge is exacerbated by the inherent conflict for domain over the resource between agricultural and urban demands but also between country and regional needs, and even between countries. Accordingly, a priority task is the development of policies, legislation and regulations for management of this resource along with the creation of institutions capable of establishing mechanisms for allocating water, including the development of financial tools necessary for implementation of these policies.

Spearheaded by UNDP, several of the UN agencies including the World Bank, FAO, UNESCO, WMO and WHO have been active in focussing attention on these issues.

### Urban Water Management

With almost a 25% increase in the urban population over the last decade, almost all cities in developing countries are experiencing water supply and sewerage problems. The water supply problems arise because of inadequate quantity, exacerbated by leakage and poor accounting of water, and poor quality at the source. Buky (1990) has characterized unaccounted for water as probably the best single indicator of the efficiency of a water utility.

Available and economical sources have already been exploited. Population growth, increased per capita domestic consumption with higher standards of living, and growing industrialization all combine to increase demand.

Developing new sources, even where available, requires transmission of water over long distances at high cost. In the Beijing-Tianjin region of China, for example, with a population of 18 million, 60% of which is urban, water allocations in 1984 were about 200 m<sup>3</sup> /sec, of which about 65% went for agriculture and 35% for industrial and domestic use (East-West Center, 1988). Studies showed that the most economical sources of additional water for the region would be through reclamation of wastewater to be reused for agriculture, industry and nonpotable urban purposes with the recognition that the agricultural uses near the cities would be switched to industrial and urban purposes as the cities expanded.

A major problem, which is similar to that in other urban areas in developing countries, is that much of the population is not yet served by sewerage and that only about 10% and 20% of the municipal wastewaters in Beijing and Tianjin respectively receive treatment. Water reuse requires that the wastewaters be collected and be adequately treated. Only simple primary treatment is required for irrigation for crops that are not to be eaten raw, but conventional secondary (biological) treatment and filtration are required for market crops and for urban irrigation, toilet flushing and most commercial and industrial uses. The latter are attractive because they are not consumptive and the wastewaters generated can be reclaimed again. Urban irrigation and evaporative cooling are consumptive uses but they offer an opportunity for wastewater disposal that does not pollute receiving waters.

The high cost of retrofitting reclaimed water lines in cities where high-rise residential and commercial have been provided with potable water but without adequate sewerage and drainage is daunting. Hence, the use of reclaimed water is best initiated for serving individual large users in or near urban centers and in newly developing urban areas where services can be provided during construction. One advantage does accrue to cities without fully developed sewerage systems; the collection systems can be laid out and treatment plants sited with reuse markets in mind.

The potential for reuse does highlight the need for research on urban sewerage to reduce its cost. One promising approach is modification of the design standards developed in industrial countries where heavy capital investments can be justified to reduce maintenance problems. Because of the backlog in sewerage in developing countries, the objective should be to minimize capital costs. Extensive studies in this direction have already begun in Brazil.

In Sao Paulo, Brazil, the first unit of a secondary treatment plant (3.5 m<sup>3</sup> /sec) came online in 1988 in the western part of the city near rapidly growing urban and industrial developments. The effluent was of such high quality that SABESP has undertaken pilot plant studies for reclamation of the water for industry and urban irrigation (Okun, Crook, 1989).

Nonpotable reuse of municipal wastewaters has been extensive in the U.S. for urban irrigation, industry, power plant cooling, and many commercial uses in the arid areas of the southwest and in Florida, a state with more than 1300 mm annual precipitation. The use of reclaimed water for toilet-flushing has recently been introduced in commercial buildings in California, but has been widely used in residential building for many years in Singapore and Japan (Okun, 1990).

Water reclamation for urban, industrial and agricultural use is an option that will become increasingly attractive in urban areas when costs are compared with other alternatives for obtaining new sources of water.

### Conclusion

Despite major commitments by countries with the assistance of external support agencies, water resources developments including water supply and sanitation for urban areas and water for irrigation in agricultural areas are not keeping up with demand. Furthermore, many investments that have been made have not been sustained. The major constraint has not been the availability of water resources technology or funds but an absence of capacity in the less developed countries to develop and utilize the resources available.

A strategy for capacity building for water resources management is proposed as an initiative for sustainable development in the sector in the 1990s. It requires that the ESAs themselves establish their own resources for capacity building to insure that timely loans and/or grants can be made to enhance the potential for successful and sustainable interventions in the water sector. The principal thrust of the strategy is to assist the countries to initiate capacity building through rapid assessments in the sector. Based upon the findings, improvements in the policy environment and institutional and human resources development would be undertaken. Specific actions focussed on both national and local institutions, as appropriate, would include the enhancement of information, education and training programs in the sector and in utilizing, *inter alia*, professional associations, twinning, multinational corporations, expatriate consulting engineering companies and consumer organizations in innovative ways to assist in the program. Particular attention needs to be given to more effective water resources management to encourage integration between WSS and irrigation subsectors at national and local levels.

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# **WATER SUPPLY AND SANITATION IN URBAN AREAS OF BIG AFRICAN CITIES**

by Mohamed Fouad Djerrari  
President UADE

## **I. INTRODUCTION**

Urban centres in Africa are developing rapidly. The urban population in Africa, which was estimated at 130 million in 1980, will attain respectively 340 and 900 million people by 2000 and 2025.

The viability of these centres, more particularly their water supply and sanitation, pose complex and diversified problems. These problems are geared down in peri-urban centres which generally suffer of a lack of equipment.

The paper treats the following points in particular :

## **II. WATER DISTRIBUTION AND SANITATION PROBLEMS IN A PERIURBAN-ENVIRONMENT**

### **II.1 Disorderly and uncontrolled urban development, often linked to a lack of respect or no respect at all of the main urban planning project**

It is in the periurban areas of most African cities that uncontrolled constructions or spontaneous housing occur.

This construction anarchy is one of the consequences of the rural exodus linked to a development type which makes the African cities special attraction pools. One can see that, on this continent, a real inversion of the proportion of the rural an urban populations is going on for more than 20 years, in favour of the urban population. In this domain, the case of the Ivory Coast is striking.

<b>YEAR</b>	<b>1965</b>	<b>1975</b>	<b>1980</b>	<b>1985</b>	<b>1990</b>
<b>Rural population</b>	<b>75%</b>	<b>68%</b>	<b>60%</b>	<b>53%</b>	<b>45%</b>
<b>Urban population</b>	<b>25%</b>	<b>32%</b>	<b>40%</b>	<b>47%</b>	<b>55%</b>

In these areas, urban uncontrolled and disorderly development finds most often broken and insanitary grounds or without favourable configurations to contain installations. Furthermore, the absence of a main planning scheme for these areas prohibits urbanization to be mastered and controlled.

## **II.2 High population growth due to the joint effect of high birth rates and the rural exodus**

In the framework of the project "Urban Sanitation in Africa", the U.A.D.E. launched a survey among all the countries of the continent. The demographic data of the countries which answered to the questionnaire are summarized in the following table (data of 1989).

<b>COUNTRY</b>	<b>POPULATION (millions)</b>	<b>GROWTH Rate</b>	<b>URBAN POPULATION (%)</b>	<b>GROWTH Rate (%)</b>
BENIN	4,4	2,9	39	7,9
BURKINA FASO	8,5	2,9	8	5,3
IVORY COAST	11,2	3,6	44	6,9
ETHIOPIE	47,4	3,1	12	4,6
GABON	1,1	2,6	43	6,7
MAURITIUS ISLAND	1	1,1	42	0,8
LESOTHO	2	2,6	19	7,2
MALI	8	3	19	3,4
MOROCCO	24	2,4	47	4,5
NIGER	7,3	3,2	18	7,5
NIGERIA	110	3	33	6,3
RWANDA	6,7	3,8	7	8,1
SENEGAL	7	3,1	37	3,8
TANZANIA	24,7	3,4	29	11,3
TOGO	3,4	3,1	24	6,9
ZAIRE	33,4	3,1	38	4,6
ZIMBABWE	9,3	3	26	6,3

	<b>TOTAL</b>	<b>AVERAGE</b>	<b>AVERAGE</b>	<b>AVERAGE</b>
MENTIONED COUNTRIES	309,4	2,94	28,53	6,01
TOTAL OF COUNTRIES WITH LOW INCOME	958	2,6	24	5,6

If one compares the average demographic characteristics of the countries concerned by the survey with those of the countries with low revenues (at the exception of China and India), one may consider the sample to be representative indeed. One will nevertheless remark an urban population percentage exceeding the average.

The high growth rate in suburban areas in Africa is due to the joint effect of high birth rates and rural exodus. It therefore aggravates the problem of viability of the urban peripheries.

### II.3 Insufficiency, or non-existence of basic infrastructures, planning, and dimensioning of equipment

The insufficiency, even the non-existence of basic infrastructures, of planning and dimensioning of equipment in suburban areas poses a certain number of problems to the decision makers in the fields of :

- accommodation
- urban transport
- the collection of domestic waste
- potable water and sanitation

To illustrate the seriousness of the lack of equipment in urban peripheries, we mention hereafter, as an indication, the rate of water connections to water mains and the level of sanitation services in African centres and cities. This will enable to understand easily the situation in suburban areas.

#### II.3.1 Rate of water services :

##### EVOLUTION OF SERVICE THROUGH PRIVATE CONNECTIONS SYNTHESIS OF REPLIES

COUNTRY	PRESENT RATE OF SERVICE %	SERVICE OBJECTIVE		REMARKS
		RATE	TERM	
BENIN	COTONOU : 82 OTHER CENTRES : 29,6 TOTAL : 45	NP*	NP	Reference year : 1988
BURKINA FASO	OUAGADOUGOU : 31 OTHER CENTRES : 24 TOTAL : 26	NP	NP	Reference year : 1988
CONGO	BRAZAVILLE : 36 OTHER CENTRES : 26 TOTAL : 32	- - 60	NP	Reference year : 1984
IVORY COAST	ABIDJAN : 54 OTHER CENTRES : 26 TOTAL : 45	- - 90	NP	Reference year : 1987
GABON	LIBREVILLE : 40 OTHER CENTRES : 24,5 TOTAL : 32	- - 60		Reference year : 1987
GUINEE	CONAKRY : 26 OTHER CENTRES : 29 TOTAL : 27	- - NP	NP	Reference year : 1987
MALI	BAMAKO : 23 OTHER CENTRES : 19 TOTAL : 22	- - 40	2000	Reference year : 1987
MOROCCO	RABAT : 78 OTHER CENTRES : 73 TOTAL : 76	- - 90	2000	Reference year : 1987
REPUBLIQUE CENTRAFRICAINE	BANGUI : 13 OTHER CENTRES : 2,6 TOTAL : 8	- - 60	1990	Reference year : 1985
SENEGAL	DAKAR : 60 OTHER CENTRES : 56 TOTAL : 59	- - 75	2000	Reference year : 1987
TOGO	LOME : 42 OTHER CENTRES : 4,8 TOTAL : 21	75 85	1990	Reference year : 1987

\* Not precised



**RATES OF SERVICE AND OF TOTAL NETWORK USE**

COUNTRY	TOTAL POPULATION (inhabitants)	POPULATION SERVED BY CONNECTIONS (inhabitants)	%	NUMBER OF SUBSCRIBERS	LENGTH OF THE DISTRIBUTION NETWORK (km)	NUMBER OF SUBSCRIBERS PER KILOMETRE	REMARKS
BENIN	1.418.112	642.276	45	21.049	1.245.4	17	39 Centres involved Reference year - 1987
BURKINA FASO	1.932.700	498.650	26	50.800	1.303	39	33 Centres involved Reference year - 1988
CONGO	1.040.000	333.300	32	41.500	1.105	37	24 Centres involved Reference year - 1984
IVORY COAST	2.946.843	1.332.204	45	123.972	3.448	36	7 Centres involved Reference year - 1987
GABON	684.950	217.088	32	31.877	1.089	29	28 Centres involved Reference year - 1987
GUINEE	1.074.724	288.744	27	NP	NP	NP	Data related to the rate of incomplete occupation 6 Centres involved Reference year - 1986
MALI	1.241.000	268.300	22	22.276	668.8	33	12 Centres involved Reference year - 1987
MOROCCO	1.113.000	844.000	76	135.216	2.012.6	67	5 Centres involved Data related to RED-RABAT only Reference year - 1987
NIGER	NP	NP	NP	24.136	610.4	39	Data related to non-specified service rates 14 Centres involved Reference year - 1984
REPUBLIQUE CENTRAFRICAINE	831.940	71.240	8	6.052	277	22	5 Centres involved Reference year - 1985
SENEGAL	1.038.144	609.520	59	55.635	892.46	62	7 Centres involved (partial date for DAKAR) Reference year - 1987
TOGO	1.088.964	226.896	21	20.023	1.387.8	14	20 Centres involved Reference year - 1987

**II.3.2 Sanitation service level in certain African centres :**

As far as the sanitation aspect is concerned, the counting of replies to the UADE-survey showed the following results :

Cities were, as a function of their population, divided into five groups :

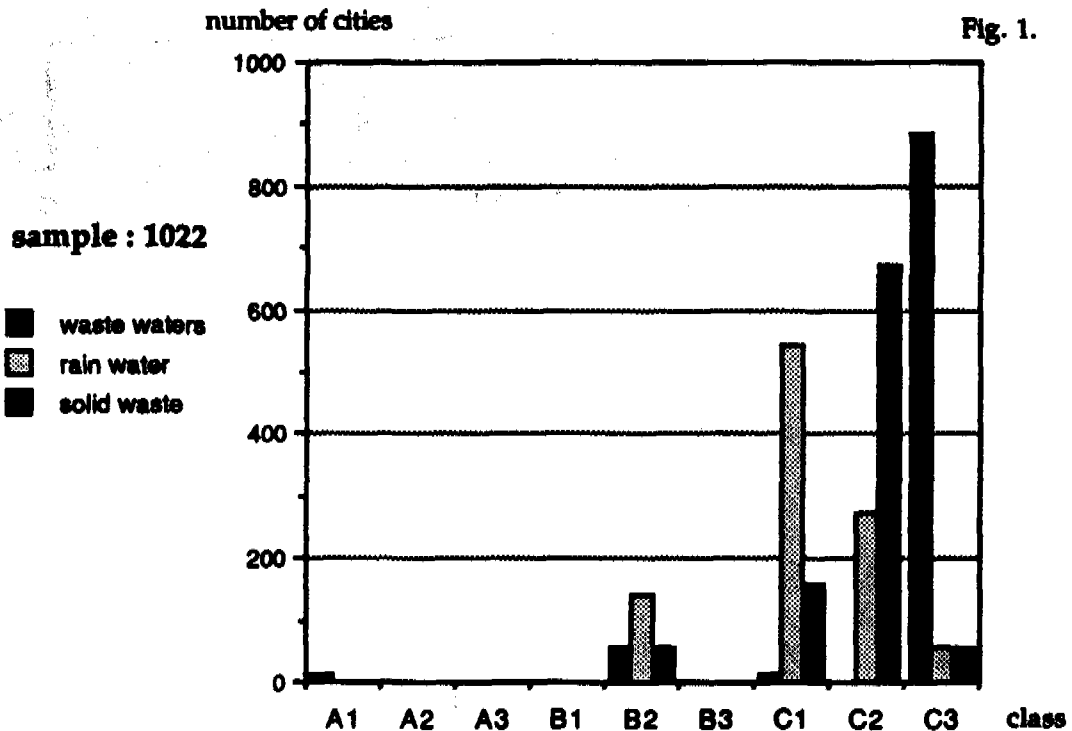
- less than 10 000 inhabitants;
- from 10 000 to 50 000 inhabitants;
- from 50 000 to 200 000 inhabitants;
- from 200 000 to 1 million inhabitants, and
- over 1 million inhabitants.

The level of services is defined in classes:

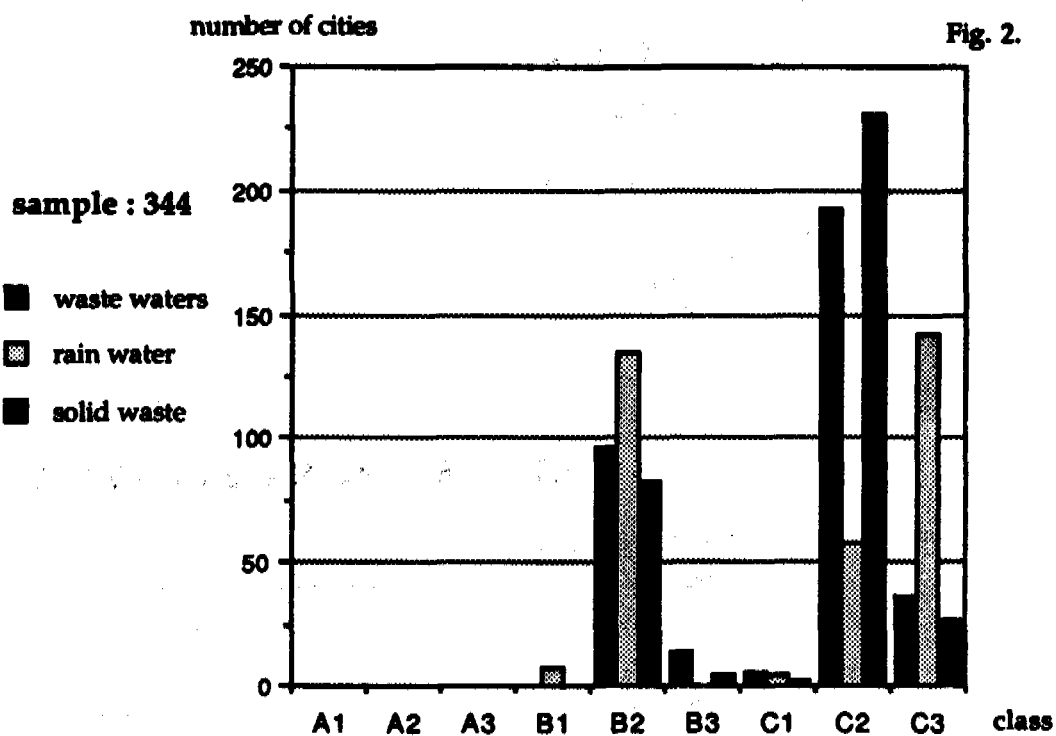
- Service type : A: effective and well managed  
 B: irregular or partial service  
 C: no formal service

- Problem type: 1: minor  
 2: average  
 3: serious

**1. CITIES OF LESS THAN 10.000 INHABITANTS**



## 2. CITIES OF 10.000 TO 50.000 INHABITANTS



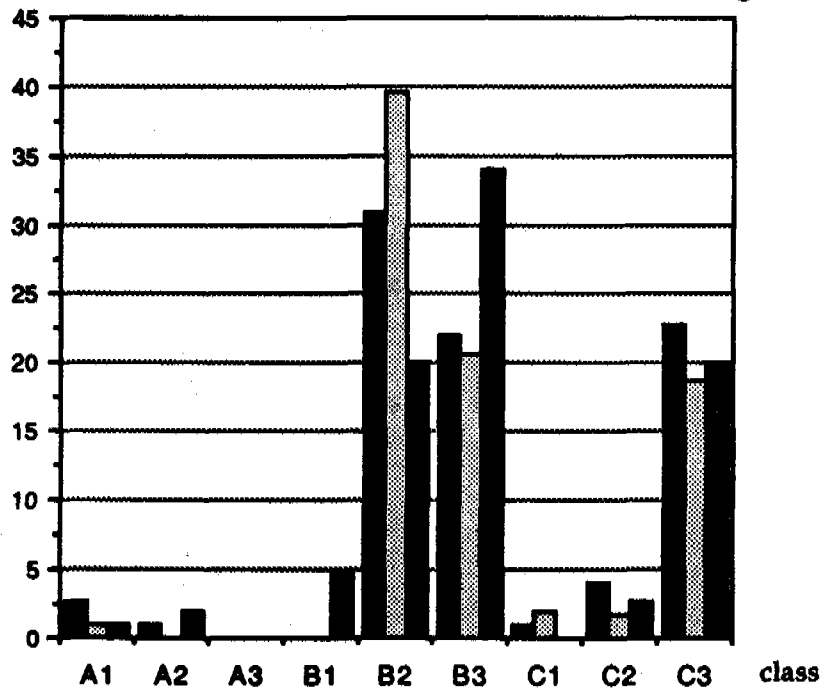
### 3. CITIES OF 50.000 TO 200.000 INHABITANTS

number of cities

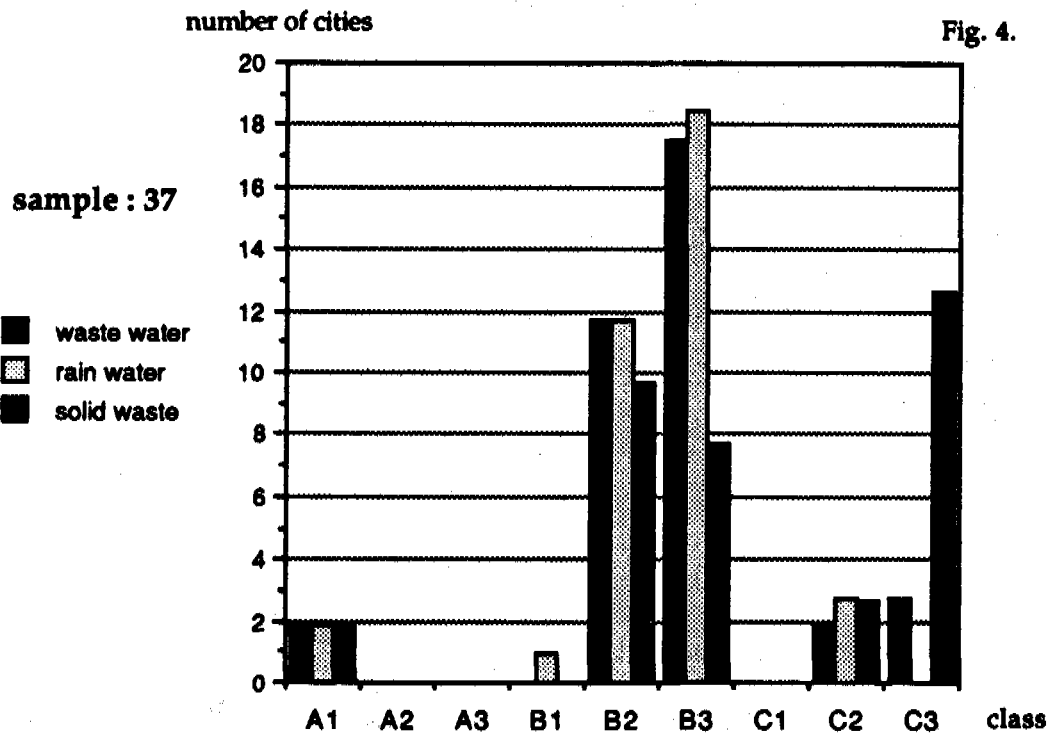
Fig. 3.

sample : 88

- waste waters
- ▨ rain water
- solid waste



#### 4. CITIES OF 200.000 TO 1 milj. INHABITANTS



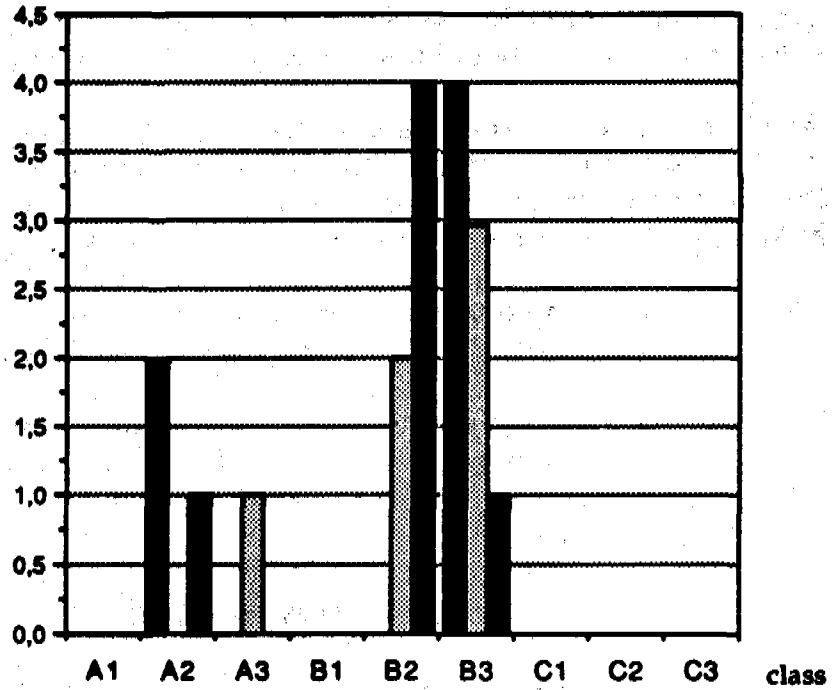
### 5. CITIES OF MORE THAN 1 milj. INHABITANTS

number of cities

Fig. 5.

sample : 6

- waste water
- ▨ rain water
- solid waste



These figures show an improvement of services as a function of the growth of the cities, according to the priority which is generally given to the equipment of important urban centres.

Although the service level of collecting and disposing of domestic waste is in general quite low, the problem posed by this sector is generally speaking considered as of average importance, whatever the population level.

At the exception of small agglomerations, drainage of rain water is a problem which varies from average importance to serious, whatever the importance of the services provided. There is no doubt that this is a problem which is rather linked to staffing of the services than it is to technicality.

As far as the draining of waste water is concerned, the majority of the problems resides in larger urban centres, even when services are organized.

This way of classifying does however not allow to make a detailed analysis of the situation. Nevertheless it shows that the problems of sanitation in small agglomerations are not felt by the governmental institutions to be as flagrant as they are in big cities.

#### **II.4 Inadequate or missing legislation in matters of water and sanitation**

Other insufficiencies contribute to the amplification of the general problems concerning equipment of water supply and sanitation in suburban areas of Africa. These insufficiencies are among other things :

- the scarcity of water resources which could be used for human consumption;
- financial means of the state and limited communities;
- inadequacy or absence of legislation in matters of water and sanitation.

The first two points being quite evident, we will confine ourselves to illustrate the third one and to the results of the UADE-survey on sanitation in Africa.

## Policy, regulations and national coordination in the field of urban sanitation

STATE	POLICY AND REGULATION	COORDINATION
BENIN	NO	YES
BURKINA FASO	YES	NO
IVORY COAST	IN PROGRESS	NO
ETHIOPIA	NO	NO
GABON	YES	NO
MAURITIUS ISLAND	IN PROGRESS	NO
LESOTHO	YES	NO
MALI	YES	YES
MOROCCO	YES	YES
NIGER	NO	NO
NIGERIA	YES	
KANO	NO	YES
KATSINA	YES	NO
ONDO	YES	YES
PLATEAU	YES	YES
RWANDA	NO	YES
SAO TOME and PRINCIPE	NO	NO
SENEGAL	YES	NO
TANZANIA	YES	YES
TOGO	IN PROGRESS	NO
ZAIRE	YES	YES
ZIMBABWE	NO	NO

- 55 % of the countries have regulations in this matter; for 14 %, the making of regulations is still in progress, and 33 % have no regulations up till now.
- 43 % of the countries have no co-ordination in the sanitation sector.

These figures indicate the institutional and legislative gaps in the sanitation sector.

### III USED TECHNOLOGIES

#### III.1 Relationship between water supply, sanitation, and the environment

In the peripheric areas of urban centres in Africa, problems linked to the living conditions, sanitation, water supply, domestic waste disposal, and the environment are posed with acuteness. As far as town-planning is concerned, the absence of an appropriated urban planning made these areas develop in an anarchic way, in defiance of elementary rules of sanitation and hygiene.



Peri-urban areas are therefore confronted with serious problems of rain water drainage, and of the removal of excrements, solid wastes, and household refuse.

### **III.2 Supply systems : Water intakes and quality standards**

The techniques used for water supply and sanitation in peripheric quarters of African cities are several.

As far as the water is concerned, the inhabitants are served by wells, river water, water retailers, delivery by tank wagon, public street-fountains, either against payment or free of charge (Ivory Coast, Morocco, Senegal) and less frequently conventional individual connections (30-60 inhabitants per connection in Niger). Rates are as high as 20-30 litres per inhabitant if one includes water supply through street-fountains.

Only then can quality standards easily be adopted and respected when the supply is done through a conventional system (street-fountains or connections to a distribution network). Otherwise the water quality often cannot be trusted.

As for sanitation, the most widely spread system is the individual sanitation by septic tanks or latrines which are emptied once a year at the average (Niger, Benin, Guinee, Ivory Coast,...). The drainage of rain water is generally not controlled in peri-urban areas.

Sanitation through a conventional network is very rare (Ivory Coast, Morocco, Tunisia).

### **III.3 Aspects of finance and tariffs**

Tarification of water from conventional systems, the willigness and ability to pay of the social classes living in the peripheric quarters of the cities have always been in the centre of concern of decision makers.

Certain operations or analyses have nevertheless proved that there is a means to succeed in providing installations in these areas. As an indication, we may quote :

- operations of "social connection" launched in the course of the last decade in Morocco, in Senegal an in Ivory Coast;
- the installation of street-fountains to be used against payment in Senegal an in the Ivory Coast allowed to reduce the tariffs of the water bought with the water retailers from 1600 FCFA/m<sup>3</sup> to 400 F when taken at the street-fountains;
- the use of a so-called "social" tariff scale (5 à 20 m<sup>3</sup>/month).

The consumptions within this scale are brought into account at an extremely low tariff (inferior to the economic cost). The differences, at the expense of the supplier, are recovered on the level of the higher consumptions.

Finally, we point out that the surveys carried out in Morocco, and in Ivory Coast within the framework of the "social connections" have shown that the problem of water tarification is not relevant. It is the use among beneficiaries to manage their resources daily which makes it not easier to have the invoices paid on a periodical basis.

#### **III.4 ORGANIZATION OF THE SECTOR AND COMMUNITY PARTICIPATION**

The organization of the water sector and of sanitation in Africa shows many gaps on the legislative and institutional level. The problem becomes still more obvious in peri-urban areas where problems, related to the insufficiency and even the non-existence of basic equipment are joined to the existence of refuse-dumps and unhealthy housing.

Nevertheless, in order to solve the problems or to have them circumscribed, one calls upon the participation of the basic communities : this is the reason why water intakes or street-fountains are generally managed by small community cells. The role of the women is often predominant within these cells.

A certain number of actions is conducted in several countries, in order to increase the efficiency of this community participation through education and sensitizing programmes on subjects of hygiene and health and in order to convince people to carry out themselves at least a minimum of maintenance. These actions are often financed by international aid organizations.

#### **IV. PERSPECTIVES AND CONCLUSIONS**

It is a pity that the balance of the efforts made during the IWSSD were not satisfactory for Africa. Much still needs to be done in the field of water and even more in the domain of sanitation. The service rate of water and the service level of sanitation reported on in the present report show the importance of the work still to be done.

The U.A.D.E. contributed to the elaboration of the objectives and strategies for water and sanitation for the 1990s. It is hoped for that the means will be freed to attain these objectives as well for the urban centres as for the peripheric quarters of the African cities. Improvement of the installations in cities will allow or facilitate :

- the extension of these installations towards the periphery;
- the destination of a part of the efforts made by the decision makers and of the community's means to suburban quarters.

But we remain convinced that the solution of the problems passes through the awareness of all (the population, the elect, those responsible on the local and governmental level) of the problems of health and hygiene and especially through the very notion of an absolute priority of matters related to water supply and sanitation.

## **V. A CASE STUDY: KARIAT OULAD MOUSSA - RABAT-SALÉ - MOROCCO**

### **Memo prepared by the Kariat Oulad Moussa Centre**

#### **1. HISTORY**

In the beginning of the 1960s, "Kariat Oulad Moussa" was an agglomeration composed of small and medium-sized agricultural properties.

A clandestine parcelling out of lands did very quickly supplant agricultural grounds and constructions did multiply very rapidly. The urban tissue extended in an important and anarchic way till 1982.

- In 1980 the population counted 11 400 inhabitants, divided over 3000 lots;
- in 1982, the number of lots had increased to 4 450 and there were 17 600 inhabitants;
- by 1987, the population of "Kariat Oulad Moussa" reached the number of 21 000. The number of lots increased to 5 250 finished constructions and to another 1 700 under construction.
- to-day 7 650 lots have been constructed, sometimes counting 2 or 3 levels; the population exceeds 30 000.

#### **2. PHYSICAL DATA CONCERNING THE "KARIAT OULAD MOUSSA"-CENTRE**

##### **2.1 Geographical situation:**

The agglomeration of "Kariat Oulad Moussa" is situated to the South-East of the city of Salé, covers a surface of 400 hectares and is accessible through the road to Meknès (RP 14).

The settling conditions being favourable (near to the centre of the city, along the road to Meknès, rapid access to Rabat and Salé), so that they can only improve in the future.

##### **2.2 Topography and constraints**

Topography of "Kariat Oulad Moussa" is marked by a shelf which lightly inclines towards the North-West with a North-South oriented crest.

The South-Eastern part of the grounds has a view on the estuary of Bouregreg. The ground is mostly composed of red alluvium, dense clayey sand.

The presence of a phreatic shallow water layer should also be mentioned, since it supplies a great number of the constructions with well-water.

The agglomeration of "Kariat Oulad Moussa" is situated within the air corridor of the Rabat-Salé Airport, i.e. almost 1000 m away from the landing-strip.

A very important part of the grounds of the site is broken, especially in the areas with very steep slopes, limiting the constructions, which presents, taking into account the nature of the soil and the quality of the constructions, a permanent danger to the inhabitants (landslides).

### **3. PROBLEMS POSED BY "KARIAT OULAD MOUSSA"**

From the proliferation of the clandestine lots followed an anarchic extension of the urban tissue and of the centre of Kariat Oulad Moussa, which was not at all ready to receive such an important population, considering the absence of the basic infrastructure.

The population growth favoured the development of primary activities such as:

- prime necessity business (food, clothing, etc.);
- building constructions, bringing about a high number of jobs;
- artisanal activities (tapestry, basketwork,...), which could draw profit of the low ground prices and abundant labour.

With 17 600 inhabitants by 1982, Kariat Oulad Moussa almost had no basic infrastructure nor essential socio-cultural provisions.

#### **3.1 Sanitation**

Waste waters originating from the constructions are directly discharged into the streets or into rudimentary septic tanks; they are either disposed of and discharge into the Ouad Bouregreg or infiltrated into the ground water layer.

In winter, most back streets in the centre of Kariat Oulad Moussa are flooded during the rainy season.

### 3.2 Potable water

Potable water supply was done out of wells. Shallow ground water layers were polluted either by infiltration of waste waters from septic tanks or by stagnating water. Water carriers sold cans of potable water filled at the street-fountain of Salé at exorbitant prices.

### 3.3 Electricity and lighting

Electricity and public lighting did practically not exist.

### 3.4 Roads

The anarchic implantation of constructions resulted in a network of roads with the following characteristics :

- irregular acquisitions;
- alignments badly respected;
- roads unsealed and very narrow.

Traffic is therefore locally almost impossible. These difficulties are worsened by stagnating rain water during a long period of the year.

## 4. MEASURES TAKEN

Faced with this precarious situation, in the light of the improvement of the living conditions of the population and of the protection of the environment and of the public health, it was decided to proceed to the restructuration of the clandestine habitat by the following activities :

- Urban planning
  - The setting up of an urban planning;
  - Structuration study of the blocks of houses.
- And basic equipment planning
  - Sanitation;
  - Drinking water;
  - Electricity;
  - Roads;
  - Socio-cultural structure.

#### 4.1 Plan :

##### 4.1.1 General options :

Clandestine constructions are at the origin of the development of the agglomeration of Kariat Oulad Moussa.

It was therefore necessary to restructure a tissue that already existed :

- by limiting demolitions as much as possible;
- by saving certain virgin grounds for equipments;
- by keeping the traffic moving within the perimeter of the urban planning;
- by letting the already urbanized house blocks benefit from green space or from a park in order to give "the agglomeration a soul" and to promote the development of good neighbourliness between the inhabitants. Thereto the available space was used.
- by creating a "non aedificandi" area and by planting trees on broken grounds with very steep slopes which present a real danger for landslide to occur.

##### 4.1.2 Characteristics of the urban planning :

OCCUPATION OF THE GROUNDS	SURFACE (Ha)
<u>Habitat</u>	
Dense on two levels	145
Residential area	50
<u>Equipment</u>	
Administration	6
Schools an lycea	15
<u>Sports and free time</u>	6
<u>public green spaces</u>	8
<u>roads</u>	47
<u>"non aedificandi" areas</u>	123
TOTAL	400

#### Restructuration of the blocks of houses

The construction plan is only concerned with the main line of planning and the grounds necessary to the different equipments.

As far as the interior of the house blocks is concerned, a restructuration study of the urban tissue was started. This study adopted the same general options set when the planning was conceived :

- to avoid any demolition by defining an interior network of roads linked to the main roads meant to make the traffic between the block as easy as possible;
- to protect the projected infrastructure;
- to allow to define the public expropriations, which includes a regularization of property of the parcels of land;

The studied land planning can presently receive a population of about 100 000.

## 4.2. The realization of the equipments

### 4.2.1 Sanitation

Sanitation studies carried out on behalf of the Kariat Oulad Moussa centre showed the following :

- Sanitation network of the unitary type for the densely occupied area;
- Sanitation network of the separative type for the rest of the area;
- Waste waters from Kariat Oulad Moussa will be discharged with the help of a collector through the city of Salé and they will be treated the same way as the waters originating from the city of Salé.
- Rain water will be discharged through the nearest talweg.

Works are therefore meant to realize the complete set of constructions and networks needed to connect the riverains.

The cost of the project is to be estimated at 122 000 000 DH\* (price of 1987).

These works are realized by the Autonomous Intermunicipal Water Supply and Electricity Administration of Wilaya in Rabat-Salé (R.E.D.), within the framework of a contract between the Administration and the Rural Municipality of Bouknadel, in order to define the role of the Administration in its quality of foreman of the works and the administrative modes of application, both technical and financial, for the construction and the exploitation of the sanitation network of Kariat Oulad Moussa.

## STUDIES

The carried out studies comprise :

- a preliminary study on sanitation;
- a study on sanitation prior to the project;
- the establishment of the plans 1/500 by photorestitution;
- soil studies;
- studies of the execution projects for the collector, the outlet, the principal collectors and the interior network.

\* 8,72 DH = 1 USD

## FINANCIAL ASPECTS

Sanitation works, estimated at 122 000 000 DH are realized by the R.E.D. (Loan - Municipal Equipment Fund (55 %) , Islamic Development Bank(45 %)).

R.E.D. proceeds to recover the cost entered into from the beneficiaries, according to a procedure comparable to the social connections for drinking water : payment by the riverains of their share, on the basis of terms up to 5 years at the same interest rate as the one charged to R.E.D.

### 4.2.2 Drinking water

Drinking water supply of Kariat Oulad Moussa originates from the hydraulic centre of Hay Salam which includes a semi-buried reservoir of 12 000 m<sup>3</sup> and a raised reservoir of 600 m<sup>3</sup>. The supply necessitates furthermore the hereafter mentioned constructions and the realization of the following works :

- Construction of a pumping station;
- Construction of a surpressure unit;
- Laying of 3600 metres mains of DN 400 mm;
- Laying of 8500 metres pipes of several diametres (60-300 mm) for the interior network;
- Laying of 7600 connections of DN 15 mm.

The cost of these operations is estimated at 60 000 000 DH.

## FINANCE

Water supply works, estimated at 60 000 000 DH are financed as follows :

- World Bank and Municipal Equipment Fund (F.E.C.) in the framework of social connections: 35 %;
- Islamic Bank and F.E.C. : for infrastructure networks : 25 %
- R.E.D.'s own resources : 40 %.

The operation "social connections" consists of making pay the owners or the tenants for their connection by monthly payments during a period of 5 years.

### 4.2.3 Electricity

For the electricity supply of the agglomeration of Kariat Oulad Moussa, the following works have to be carried out :



- reinforcement of the supply station 60/20 KV;
- construction and equipment of the transformation unit MT/BT;
- setting-up of the adjusters;
- laying of the lines Low Tension (LT);
- public lighting;
- laying the connections to the premises of the subscribers.

The cost of this operation is estimated at 37 000 000 DH, of which 27 268 640 are financed by F.E.C. and B.I.D. and 9 731 360 DH by R.E.D.

Cost recovery is done directly with the beneficiaries on the basis of payment facilities.

#### 4.2.4 Roads

Three kinds of roads can be distinguished :

- PRIMARY ROADS : connecting to the existing road network;
- SECONDARY interior ROADS : links between quarters and blocks;
- TERTIARY ROADS : Roads which enable the service within the blocks.

These roads planned outside the site are financed and constructed by the Municipality of Bouknadel through an F.E.C.-loan.

Tertiary in situ roads are constructed by the owners who have to get together in friendly groups and associations.

The designation "primary road" and "secondary road" covers all the roads mentioned on the urban plan; the cost is estimated at 45 000 000 DH.

### FINANCE

Primary roads : Cost of the works : 45 000 000 DH, financed through a loan by F.E.C. (55 %) and B.I.D. (45 %).

Tertiary roads : these are roads which resulted from the restructuring study of the blocks and they are to be constructed by the owners.

#### 4.2.5 Socio-Cultural Equipment

The planned equipment takes into account the present and future necessities of the agglomeration of Kariat Oulad Mousse, by using grounds which are still available.

## 5.20

## EDUCATION

5 primary schools	
2 lycea	42 500 000 DH

## PUBLIC HEALTH

5 dispensaries	
2 health centres	13 000 000 DH

## YOUTH AN SPORTS

2 women's homes	
2 youths' homes	
1 sports playgrounds	11 000 000 DH

## TRADITIONAL INSTALLATIONS

1 main mosque	
2 mosques in quarters	7 000 000 DH

The total cost is :	73 500 000 DH
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These installations will be realized by the different interested administrations.

### 4.2.6 Execution of the plan

The execution of the urbanization plan, which was essential after the works started, made necessary an intervention on the following axes :

- Realization of the planned roads :

The realization of the planned primary and secondary roads, as they figured on the plan, necessitated the demolition of 126 houses, which posed a serious problem of rehousing and indemnification of the owners of the habitats which occupied public grounds.

Owners of which the propriety happened to be demolished were indemnified by the community of other owners of Kariat Oulad Moussa who participated in the operation at a fee of 15 DH/m<sup>2</sup> of ground.

### Restructuration study

This study was intended to define a network of interior roads linked on to the principal roads of the plan and to make traffic and service to the interior blocks of houses much easier.

These planimetric studies must be accompanied by an architectonic arrangement of the existing constructions and an altimetric reconstruction (access, number of floors, aspect, architecture, window openings, etc...).

### CONCLUSION

The reconstruction of this agglomeration which seemed totally impossible in the very beginning, is going to succeed, thanks to the will of its inhabitants who admitted the implied financing of the complete equipment and in particular of the water and electricity supply, of the road construction, and the sanitation works. These equipments are indeed closely interlinked if one wants to obtain a viable urban community.

## WATER SUPPLY AND SANITATION IN FAST GROWING COMMUNITIES IN THE PHILIPPINES

by Dr. F.F. Padernal

### *Introduction*

Water supply and sanitation (WSS) development in fast growing communities has reached an unprecedented growth during the last three years. Concerted government and community actions were done. Sector institutions are generally adequate. The areas of responsibilities of six main government sector institutions were clearly delineated. Two institutional models are existing namely : agency management, like the Water Districts (WDs) and Community Management, like the Barangay (Community/Village) Waterworks and Sanitation Associations (BWSAs). Hundreds of WDs and thousands of BWSAs were organized and made operational. In most cases, the problems on peri-urban, poor urban and fringe areas are addressed by the WDs.

National sector policies and strategies on WSS were formulated and are aligned with national development plans. Provincial water supply and sanitation master plans were prepared by local governments and national consultants in consonance with national WSS plans.

Support legislation on hastening water supply implementation was passed by Congress and approved by the President. Correspondingly, a devolution to the local governments on Planning and implementation of rural water supply projects is currently being experienced.

The national program calls for the integration of water supply and sanitation, two sub-sectors which complement each other. Several projects were packaged and implemented. The task on rural sanitation is mainly on the construction of household latrines and school toilets, and the administration of health education programs.

Capacity building, especially training, has always been a component of projects developed. The "International Training Network" has provided additional push to the program. The cascading training approach for the rural areas has still to catch up with the accelerated pace of water supply construction.

Because of the geographic condition of the country (It has over 7,000 islands) and the varied hydrogeologic conditions, majority of the fast growing communities have combined service levels. Point Sources (mainly developed springs, wells with handpumps and rainwater cistern systems) are prevalent in the rural areas while individual taps or household connections with simple, low-cost treatment technologies are being used in the urban areas.

An aggressive health education campaign has been instituted. A published manual on health care is being used as a reference in program execution.

The updating of the provincial hydrogeologic maps has provided a vital set of information to the provincial authorities. The computerization in almost all operational levels (e.g. sector agencies and water directors) is remarkable. Data management has been institutionalized. Networking with international institutions is currently being worked out by the government.

The Non-Government Organizations (NGOs) are playing a major role in the WSS program. In remote and isolated communities, and at times in often identified poverty areas, NGOs provide institutional financial and technical assistance in coordination with the government.

Although the program is getting a big leap, it is not spared of problems. Issues encountered are : cost-effective operation of piped systems, affordability and cost-recovery, effective use of point sources, BWSA formation lagging behind construction, and inadequate maintenance arrangements. On the contrary, success stories are not being documented.

After being neglected for many years, the government has modestly mobilized its resources in order to attain the present level of WSS development. The communities have responded to the call of the government through direct involvement and participation in implementing the projects. The NGOs have found a place in the sector. The private sector (e.g. manufacturers, contractors, including the professionals (especially the consultants) have continued to increase their capacities to implement and support the government.

### The sector

The sector referred to in this paper means rural and urban water supply and rural sanitation. It was only recently that wastewater management became a component of the sector.

Rural water supply focuses on the development of non-piped schemes like the drilling and construction of shallow and deep wells, construction of rainwater cistern systems, development of springs and the construction of standposts or communal faucet systems. Integral components of the program are training, health education programs and water quality surveillance.

Urban water supply addresses mainly piped-systems or house connections. Capacity building of national and local institutions has been a continuing element of the program. Self-sustaining operations and full cost-recovery are major thrusts.

Rural sanitation is centered on the construction of household and school latrines, and the implementation of health education programs.

Wastewater management is still a grey area. The government has already conducted feasibility studies and detailed designs on possible wastewater management schemes in key cities of the country. Moreover, there are plans of formulating a national wastewater master plan.

### Institutional arrangements

During World War II, majority of the water supply systems of the Philippines were destroyed and those which were spared deteriorated for lack of maintenance.

To speed up the reconstruction of needed water supply facilities, the National Waterworks and Sewerage Authority (NAWASA) was created in 1955 for a centralized and consolidated control and supervision of all waterworks and sewerage systems in the country. This centralized waterworks program worked well for a time specifically on the improvement program in the City of Manila, the rebuilt and the operation of water systems in major urban areas, and the construction of wells in the rural areas.

The subsequent fast growth in population both at the Greater Manila area (later on renamed Metropolitan Manila) and the provinces made NAWASA unable to cope with the enormous water needs of the people. It was noted that water supply development became more directed towards the metropolis and the urban centers of the provinces. Rural water supply development was given a lesser priority.

With the prime policy objective of the National Government in the 70's which is to provide potable water to every Filipino household, a redirection of water supply goals was indeed necessary. NAWASA was then abolished and was replaced by three (3) specialized agencies that would take responsibility for specific areas; namely : Metropolitan Waterworks and Sewerage system (MWSS) for Metro Manila and its contiguous area; the Local Water Utilities Administration (IWUA) for cities and municipalities with population of 20,000 or more; and the Rural Waterworks Development Corporation (RWDC) for the rural population and the smaller provincial urban communities. Other government agencies in support to the water sector included the then Ministries of Public Works and Highways (MPWH), Local Governments (MLG), Health (MOH), and the National Water Resources Council (NWRC).

In the 1980s, the present Department of Public works and Highways (DPWH) is the central coordinating office for all water supply plans, programs and policies. With its Project Management Office for Rural Water Supply, it is principal implementing arm for engineering and construction of rural water supply projects. The now Department of Interior and Local Governments is responsible for Institutional development. The department of Health (DOH) is responsible for promoting safe water supplies, concurring the sites of water sources and exercising testing and surveillance of water quality.

NWRC was reorganized and renamed as National Water Resources Board (NWRB) with some of its technical functions absorbed by DPWH. The NWRC serves as the planning and policy formulation agency for water resources development and management.

MWSS and LWUA remain attached with DPWH. MWSS is still concerned with Metro Manilla and its fringes while LWUA is now responsible for the development of water supply systems (Levels II and III) outside Metro Manilla.

DPWH continues to implement water supply projects in the rural areas, particularly the basic level of water service (point sources or Level I water service).

In line with the International Drinking Water Supply and Sanitation Decade (1980s) and beyond the "Decade" (1990s), goals, institutional reforms and public investments for water supply and sanitation showed a remarkable concern of the government in uplifting sector development, thus, improving the water and sanitation condition in fast growing communities of the country.

Depending on the water service being rendered WDs and BWSAs are being formed. Majority of the fast growing communities have combined institutional set-up.

#### Development Guiding Principles

In developing water and sanitation programs and projects for communities, several guiding principles are being followed. These are presented hereunder.

Programs and projects, policies and strategies developed must be replicable. Area specific water supply projects must be replicated in other locations. This means that planning, project management processes, coast-recovery schemes, institutional arrangements and other similar tools and processes must be replicable.

Institutional adequacy is a critical ingredient for sustainable operations. For piped-systems, WDs must be formed, staffed adequately and staff must be properly trained. For point sources and public standposts systems, BWSAs were formed and made operational. Community participation, involvement and management were emphasized.

Water organizations must operate in a feasible manner from technical and financial viewpoints. Full cost-recovery is essential. Viable operations must be sustained. Majority of the duly registered WDs and BWSAs have sustainable operations. Major points considered for systems sustainability are responsive policies, effective institutions, cost-recovery, technical efficiency, appropriate technology, and the capacity to deliver the service.

Low-cost and appropriate technologies were introduced to the communities and field tested. For example, the wells equipped with handpumps were ensured to be effectively used by the beneficiaries.

Training and human resources development (HRD) and Capacity Building (CB) became almost an element of all projects developed. Indeed, the benefits derived from training and HRD programs were optimized and their effects multiplied over the years.

#### Present Situation

In order to realize the increasing demand for water supply facilities and in support to the national policy to promote the quality of life of every Filipino people, the government launched the Accelerated Water Supply program which commenced in 1989 up to the year 1992.

In March 17, 1989, the President signed Republic Act No. 6716, a vital legislation (law), which provides for the construction of water wells and rainwater collectors, development of springs and rehabilitation of existing water wells in all barangays (villages) of the country. With this Act, the DPWH is tasked to immediately construct and rehabilitate 100,000 Level I systems covering all barangays. This program is directly serving about 15 million Filipinos mainly in the rural communities.

The Program includes the construction of 46,613 deep wells, 33,795 shallow wells, 195 free flowing wells, and 992 rain water collectors, the development of 7,530 springs, and the rehabilitation of 10,875 existing projects. RA 6716 is a clear manifestation of the government's sincere commitment to the Filipinos, its constituents. It is also a tribute to sector planners and implementors to realize greater coverage (population served with adequate and safe water) and executing low-cost and appropriate technologies.



To ensure the effective and efficient implementation of the Program, national sector policies and strategies were formulated and aligned with national development plans. The sector objectives, policies and strategies are clearly defined in the Water Supply, Sewerage and Sanitation Master Plan of the Philippines.

The Program is scheduled for implementation on a two-stage period : 1988 - 1992 and 1993 - 2000. The first stage envisages to raise water supply coverage in Metro Manila to 87 %, in the rural areas to about 92 % and 77 % in the urban areas as of end of 1992. Likewise, the second stage shall endeavour to complete the remaining unserved population up to the year 2000.

IWUA concentrated its efforts on the construction of new water supply projects in both urban and rural areas with a target of 40 % and 90 %, respectively, during the stage of program implementation. For the second stage, IWUA is in the process of completing the construction of the remaining new projects required for both urban and rural areas. It shall also undertake rehabilitation of facilities in the urban areas and the repair/rehabilitation or replacement of Levels I and II (communal Faucet Systems/Public Standposts) facilities in rural areas. During both stages, IWUA shall implement training programs for the community beneficiaries of Levels I and II systems.

Institutional structures were established at all levels (administrative hierarchy) including the water-users group to ensure proper operations and management of the water systems. Agency and community-management was taken into account. For bigger urban cities and municipalities, Water Districts (WDs) are created primarily to acquire, install, improve, maintain and operate the water supply and distribution system within the district. The WD is a non-profit, quasi-public and a local entity which manages a Level III water supply system. The schema illustrates the agency-management.

For smaller systems like Level I and II facilities, the Barangay Waterworks and Sanitation Association (BWSA), a non-profit and non-stock organization is formed to ensure the proper operation and maintenance of their systems. The officers and members of the BWSA are the heads of families of the beneficiary communities. It is the responsibility of the BWSA to collect fees from their members to cover the operation, maintenance and repair costs of their facilities. Community-management approaches, principles and practices are applied.

After the formation and registration of the WDs and the BWSAs, these are equipped with technical and management skills through training programs conducted by either IWUA or DPWH. Both agencies have their own sets of training programs intended for their respective clientele.

The manpower development program of IWUA includes management and technical training for all levels of personnel of the water districts and its BWSAs. The DPWH Rural Water Supply Training Program caters to both project implementors and beneficiaries (BWSA officers and members).

In the rural areas, there is a backlog in the formation and training of BWSAs against the fast pace of water supply facilities construction. This is a case which should be corrected over time.

Bilateral and multilateral development agencies and the Philippine government jointly initiated the establishment of the International Training Network (ITN) for Water and Waste Management. The ITN-Philippines project which started operations in January 1990 aims to refocus investments towards the use of appropriate water supply and sanitation technologies adaptable to low-income population groups in the urban fringe, urban poor and the rural areas of the country. The ITN (Philippines) is composed of twelve (12) participating institutions with IWUA as the host agency. Undoubtedly, even with only one year of operations in the country, the ITN has provided a great help to the water supply sector particularly on the training and information dissemination aspects of the program.

In coordination with concerned government agencies, non-government agencies (NGOs) also play important roles in the water supply program. They participate in the formation and trainings of BWSAs, assist in project identification and construct small water systems (mainly spring development projects and wells equipped with handpumps). At times, they attend public biddings and finance repair works of constructed systems. Most often, the NGOs penetrate the remote and isolated communities or the identified poverty areas to provide the needed assistance.

As of the end of 1986, only 69 % of the total households in the country are provided with sanitary toilet facilities, 15 % are equipped with unsanitary types while the remaining 16 % had no toilet facilities at all.

The Department of Health (DOH) is currently implementing the IBRD-assisted First Water Supply, Sewerage and Sanitation Sector Project in association with the DPWH and DILG. The sanitation component includes the distribution of one million toilet bowls for individual household latrines, construction of toilet facilities for about 1,000 schools, construction of 100 pilot communal/public toilets, a pilot project covering the procurement and installation of 100 wastewater treatment units, procurement of 1,000 sillage removal units. Training on sanitation is a major concern.

A marked improvement in the sanitation sector has been observed these past few years and it is expected that, with the present programs and the sector plans being formulated, sanitation coverage will definitely increase drastically, particularly in the rural areas.

### *Conclusions*

Water supply development was not viewed as a completely isolated program but part of a bigger sector. Rural and urban sanitation programs were likewise developed in the early 80s, but in a smaller scale as compared to water supply. Likewise present sector development thrusts include the provision of facilities for the treatment of the attendant wastes from water use. This is technically known as wastewater. Fast growing communities must also address properly wastewater management problems.

The author has been consistent during the past decade that rural and urban water supply, sanitation and wastewater management should be rightfully integrated into a single sector. The needs of fast growing communities necessitates such action. However, resources must be mobilized. The political will to deliver these complementing services must be demonstrated.

The 1990s should address appropriately the backlog in the provision of water supply facilities in urban poor and blighted areas vis-a-vis wastewater management in highly developed and developing urban areas of the country.

Lastly, there should be an effective campaign to encourage proposed beneficiaries to contribute more (more than 10 %) to the capital cost.

## **NEW DELHI STATEMENT**

**Safe water supplies and disposal of solid and liquid wastes are priorities for improved health, poverty alleviation and environmental protection. Their provision through community management must be a primary goal for the 1990s.**

**Maximizing sustainable water supply and sanitation coverage will require political commitment to apply the many lessons of the International Drinking Water Supply and Sanitation Decade. Use of the appropriate technologies, combined with community management, and human resources development will reduce investment cost and improve sustainability. Countries can thus extend coverage with socially acceptable and affordable service standards at achievable investment levels.**

The 1980s saw unprecedented progress in bringing water and sanitation services to many millions of the world's poorest people. But it was not enough. One in three of the developing world's population still lack these basic human needs.

Entering the 1990s, population growth in some countries remains unchecked. Infrastructure in many cities is stretched to breaking point. Uncontrolled pollution puts further stress on the living environment and aggravates competition for increasingly expensive water resources. Without fundamentally new approaches, the hardship will turn into an unmanageable crisis.

During the International Drinking Water Supply and Sanitation Decade (1981-1990) every developing country has learned its own lessons. Combining those experiences with a renewed commitment to provide sustainable water and sanitation systems for all people is the only way forward.

To reach full coverage by the year 2000 with present technologies and approaches would require five times the current investment level. That is not a viable option. In the 1990s, sector agencies can dramatically increase the efficiency of providing and sustaining services. At the same time, increase financial resources must be sought from governments, ESAs and consumers. For example, halving the costs and at least doubling the financial allocation could allow universal coverage to be approached by the end of the century.

For the sector to take up this challenge, there are four guiding principles within an overall philosophy of "some for all rather than more for some":

- safeguarding health and protecting the environment through integrated water resource and waste management;

- a reorientation of institutional strategies to ensure an integrated approach, including educational aspects, a change in attitudes, behaviour and procedures, and participation of women at all levels of sector institutions;
- community management and operation of facilities;
- sound financial practices, improved management of existing assets, and consistent use of appropriate technologies;

The political and financial commitments are substantial. For the sector to achieve its objectives, governments must accept that the enabling environment for progress will often involve profound institutional, economic and social changes, and reallocation of resources and responsibilities at all levels.

## PEOPLE AND THE ENVIRONMENT

**Future sector development must be environmentally sustainable and viewed in the broader context of water resources.** Rapid population growth, aggravated by accelerating urbanization, threatens health and the environment and presents governments with daunting challenges in the 1990s. It is the poor and especially women and children who will be hardest hit. Improvements to the household environment can be most effectively achieved through people's involvement as equal partners in resource management. This involves building on indigenous knowledge systems to ensure that policies and programmes are viewed as rational by people and hence accepted. Emphasis should be placed on education, awareness creation, social mobilization and community participation activities and on further development and dissemination of household technologies to preserve water quality from source to consumption.

Drainage and the sanitary disposal of solid wastes improve the neighbourhood environment. New and environmentally appropriate solutions are required which reflect the need to conserve resources, minimize environmental pollution and are affordable to the community they serve. Wastewater reuse and solid wastes recycling are powerful solutions for the 1990s.

Another challenge is to combat increasing water scarcity and pollution, through integrated water resources management including such measures as water conservation, water harvesting, and water management. Existing supplies should be drawn in ways which do not threaten scarce resources of future generations. An appropriate mix of legislation, pricing policies and enforcement mechanisms will be needed to optimize water conservation and protection.

Water related diseases cause the death of thousands of children and untold suffering and loss of working time every day. Safe water combined with improved hygiene behaviour and better nutrition can reduce, and sometimes even eliminate these diseases. Dramatic reductions in the prevalence of dracunculiasis (Guinea worm) has been attributed to the provision of improved water supplies and hygiene behaviour in endemic areas. The target of total eradication by 1995 should be fully supported, and effected countries should accord it appropriate priority in investment programmes.

Toxic and industrial wastes pose increasing dangers to developing country environments. They represent a potentially significant danger to human health through direct contact and through the pollution of water and soil. Responsible agencies need to take steps to control health hazards caused by these waters.

## PEOPLE AND INSTITUTIONS

**Strong institutions are essential for sustainability.** They require sound management, motivated people and an enabling environment of appropriate policies, legislation and incentives. A changing role of government is envisaged, from that of provider to that of promoter and facilitator, enabling local public, private and community institutions to deliver services. This decentralization demands a strong policy and support role for central government. In addition, private enterprise can have an important role in improving efficiency in service delivery.

The role of NGOs in development must be reconfirmed and strengthened. This can be achieved through a stronger link between NGOs and other actors in the sector. NGOs are flexible, credible, and are ready and able to experiment with innovative approaches. Governments are encouraged to support the role of NGOs to replicate these approaches.

Human resource development is a central element of institutional development, and must include training of professionals, technicians, and managers to build actively people's competence and confidence. Information, education and communication strategies should be integrated within human resource development policies. Women must be trained and guaranteed equal employment opportunities at all levels of staff and management. National professional associations can play an important role in the human resource development.

## COMMUNITY MANAGEMENT

**Community management goes beyond participation to empowering and equipping communities to own and control their own systems and is the key to sustaining services for the rural poor.** It is also a viable option for poor urban settlements when weak urban institutions cannot provide services. Governments should support community management, through legislation and extension, and give it priority in national sector legislation for the 1990s.

Within these strategies, gender issues will be all important. Women should be encouraged to assume prominent roles in planning, resource mobilization, and all subsequent aspects of sector development. Capacity building is necessary to make community management effective and enable women to play leading roles.

Effective linkages have to be established, to ensure that national plans and programmes are responsive to community needs and desires. Models and indicators for the achievement of community management have been developed and should be adopted at the national level and implemented through participatory monitoring and evaluation techniques.

## **FINANCING AND TECHNOLOGY**

**Given the number unserved and the increasing demand, more effective financial strategies must be adopted in the 1990s for the long-term sustainability of the sector. These strategies need to have two key objectives :**

- increased efficiency in utilization of available financial resources;
- mobilization of extra funds by diversification of sources of finance;

Current levels of investments in the sector are about US\$ 10 billion per year. It is estimated that approximately US\$ 50 billion would be needed to reach full coverage by the year 2000, adopting conventional approaches. As this five-fold increase is unthinkable, major gains in sustained coverage will require substantial increases in efficiency in the utilization of financial resources. This will need changes in the incentive environment of service agencies, to make them more cost effective and responsive to consumer needs and demands. For example, involving consumers in choice of technology and service levels has a positive impact on the efficiency of cost recovery. Emphasis on rehabilitation of defective systems, reductions in wastage and unaccounted for water, recycling and reuse of wastewater, and improved operation and maintenance can be more effective than investment in new services.

Choice of technology and level of service are major determinants of construction, operation and maintenance costs of new projects. Sustainability and affordability are important criteria in technology selection. Where adequate operation and maintenance is not assured, no investments should be made.

A powerful case can be developed for higher government and external support agency allocations to the sector by highlighting and quantifying the economic and social benefits and by integrating sector investments with income generation, and poverty alleviation programmes.

### **Annex 1.4**

Funding allocations and user charges are key areas of sector finance. Higher budget allocations and recovery of recurrent costs of operation and maintenance, to ensure system sustainability are the critical goals to be accomplished. Effective cost recovery requires that sector institutions should have autonomy and authority. Appropriate charging mechanisms should reflect local socio-cultural and economic conditions. Collection should be decentralized so that revenues are clearly seen to stay with the community or supply agency, to be used for management and operation of services.

Public sector organizations frequently default on payments for water supply and waste disposal services. For reasons of financial viability and equity, this practice should not be tolerated. Increasing collection efficiency should be part of every financial management improvement programme.

#### FOLLOW-UP

Implementation of the new approach will need to be part of country specific strategies which specify actions to be taken. Countries and ESAs are urged to formulate and implement action plans for water and sanitation incorporating the guiding principles of the New Delhi Statement. Other specialized agencies are invited to support this process. The Water and Sanitation Collaborative Council is recognized as a convenient global forum for the exchange of information on sector issues and experiences. The Council brings together sector professionals from ESAs, NGOs, professional associations, and developing country sector agencies. It can establish task forces in which members can collaborate in activities of mutual interest and undertake promotion and public information efforts to increase public awareness in support of renewed efforts in sector development. ESAs should develop procedures or guide-lines which would reduce project preparation time.

The conclusions of the New Delhi Consultation will be widely disseminated. The New Delhi Statement will be presented to the UNICEF Summit for Children in late September 1990. It will be submitted by the Government of India to the November meeting of the U.N. General Assembly held to review the IDWSSD. In addition, the Statement will be sent to the organizers of the 1992 World Environment Conference in Brazil with a request that it be tabled to emphasize the special importance of water and sanitation in environmental management.



**GENERAL ASSEMBLY RESOLUTION : A/RES/45/181**  
**adopted by**  
**the GENERAL ASSEMBLY of the UNITED NATIONS**  
**on 21 December 1990**

"The general Assembly,

"Recalling its resolution 32/158 of 19 December 1977 adopting the Report of the United Nations Water Conference and approving the Mar del Plata Action Plan<sup>(1)</sup> on drinking water supply and sanitation, and other agreements reached at the Conference, 35/18 of 10 November 1980 proclaiming the period 1981-1990 as the International Drinking Water and Sanitation Decade, and 40/171 of 17 December 1985 containing a mid-term review of the Decade;

"Bearing in mind that the Second United Nations Conference on the Least Developed Countries (3-14 September 1990) and the World Summit for Children providing safe water and sanitation for all;

"Deeply concerned that, notwithstanding the achievements attained during the International Drinking Water Supply and Sanitation Decade, the current rate of progress remains slow, owing to economic problems facing developing countries, and would leave a very significant number of poor people in urban and rural areas without suitable services in water and sanitation by the year 2000;

"Recognizing that the 1990s will require an intensification of national efforts and international co-operation to provide adequate and safe drinking water and sanitation for all by the end of the century;

"1. Takes note with appreciation of the report of the Secretary General on the achievements of the International Drinking Water Supply and Sanitation Decade; <sup>(2)</sup>

"2. Welcomes the New Delhi Statement <sup>(3)</sup> emanating from the Global Consultation on Safe Water and Sanitation for the 1990s, held in New Delhi from 10 to 14 September 1990, hosted by the Government of India and organized by the United Nations Development Programme;

"3. Endorses the four guiding principles enunciated in the New Delhi Statement pertaining to the environment and health, people and institutions, community management, and finance and technology, and the action recommended in those four guiding principles and the follow-up to the Statement;

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(1) Report of the United Nations Water Conference, Mar del Plata, 14-25, March 1977 (United Nations Publication, Sales No E.77.II.A.12), chap.I

(2) A/45/327

(3) A/C.2/45/3, annex.

"4. Urges Governments, in their efforts to implement the recommendations contained in the report of the Secretary-General and in the New Delhi Statement, to stress the following important objectives :

"(a) To assign greater priority to the allocation of development financing to water supply and sanitation by seeking a better integration of the sector within the overall development planning process;

"(b) To implement programmes aimed at expanding service coverage within the framework of integrated water resources and environment planning and management, in the context of sustainable national social and economic plans and urban and rural development policies;

"(c) To mobilize additional funds from existing and new sources, including Governments and donors;

"(d) To assess the current statue of institutions with a view to strengthening national capacities to plan and manage water supply and environmental sanitation programmes;

"(e) To increase their efforts to improve this efficiency and use of available financial resources by, inter alia, continuing to expand the use of cost-effective appropriate technologies, and to intensify South-South co-operation in that regard;

"5. Calls upon the United Nations system and other relevant organizations, in that regard, to increase their financial and technical support to the national endeavours of developing countries;

"6. Urges donor Governments and multilateral financial and developmental institutions to give favourable consideration to requests for grants and concessional financing arrangements to support water and sanitation programmes in developing countries;

"7. Emphasizes the importance of intensifying the co-ordination of national activities undertaken with the assistance of different agencies in the field of water supply and sanitation through the Steering Committee for Co-operative Action for the International Drinking Water Supply and Sanitation Decade and the Water and Sanitation Collaborative Council;

"8. Decides to review at its fiftieth regular session the progress made during the first half of the 1990s, and requests the Secretary-General to submit a report, through the Economic and Social Council, on further progress achieved towards the ultimate goal of providing safe water and sanitation for all, including proposals for action that are needed for the remainder of the Decade."

# ENQUIRY FORM

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