

Solutions Through Innovation



Access to water and sanitation are urgent global issues that can only be solved by local action.

There are viable solutions to hand and water professionals are ready to apply the knowledge and understanding needed to manage water sustainably.

Significant future population growth will occur in dry and flood-prone regions – urgent action is required.

Produced by the International Water Association (IWA) and the International Association of Hydraulic Engineering Research (IAHR) and the International Commission on Irrigation and Drainage (ICID) for discussion in the present World Water Forum, within the International Water Associations Liaison Committee (see back cover for membership) and for use by decision makers worldwide.



**International
Water Association**



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OUR KEY MESSAGES

There Has Been Considerable Progress – Yet We Face Three Urgent Challenges that Require Immediate Action

- **20 to 35% of the world's population urgently need access to water and sanitation**
- **Severe shortages of sustainable fresh water supplies will develop in some regions within two decades; droughts will increase, making the problem worse;**
- **Unmitigated flooding and associated economic devastation continues with significant economic consequences for the poorest countries; this is a growing problem worldwide.**

There Are Viable Solutions

Our scarce water resources are often managed wastefully. More efficient solutions are viable, based on thorough understanding and innovation provided by science, technology and management. *We need a blue revolution!*

The Issues Are Global but the Solutions Are Local

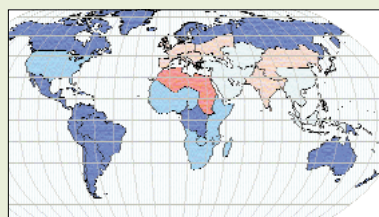
Real solutions are going to be found at the local and basin levels – all with the substantive engagement of national governments and concerted support of donors.

We Can't Sustainably Manage What We Don't Understand

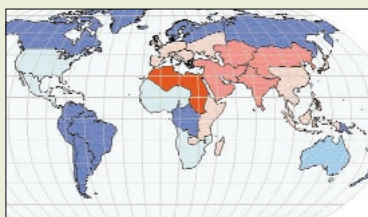
The traditional technocratic approach of dykes, concrete and steel, when unmatched by appropriate management and governance, can lead to solutions that may turn out not to be sustainable. A new balance between natural, economic and social functions is needed. This requires a deep understanding of these functions and calls for a knowledge-based, integrated approach in information gathering, modelling and decision-making – *and much of the knowledge already exists.*

THERE IS A WORLD WATER CRISIS: [Is It Time to Panic or Plan a Blue Revolution?](#)

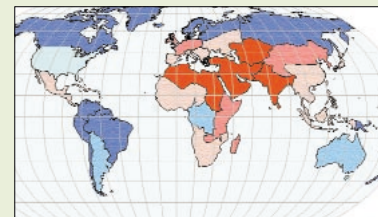
Sustainable freshwater will run out in some regions of the world within two decades if present demands continue. Shortages will multiply as populations continue to grow. Those most affected will be people with low incomes living in dry regions.



Water Availability Per Capita 1950



Water Availability Per Capita 1990



Water Availability Per Capita 2050

At the same time, there is an urgent need to provide nearly a third of the world's population with access to water and sanitation.

This may sound optimistic, yet the means are available. Correcting inefficiencies in current uses of water, particularly in agriculture that accounts for 75 to 85% of total water usage, would be a beginning. This, together with the virtually untapped potential for water reuse and desalination, gives a practical basis for tackling the challenges.

As water professionals, we believe there are solutions to these daunting challenges — solutions that are built on an evolving understanding of the problems, continuing research on alternative approaches and the innovative application of science and technology. The green revolution provides an example of the application of science to drive improved practices, the use of well-directed outreach and the dissemination of knowledge and aid to poor countries.

What we must do now as local communities, as countries and as a global entity is to adopt a similar strategy — we need to inspire a blue revolution. A giant leap that involves re-thinking the way we use water with the aim of ensuring long-term access by people everywhere of this basic resource.

There is no time to lose – we must act.

Our Views on a Pragmatic Framework for Action

The Issues May Be Global but the Solutions Are Local

There are no global solutions to the water crisis that we face. Instead, real and practical solutions are going to be found primarily at local and basin levels because, while these problems have common elements, solutions relate to local conditions. This includes trans-national as well as intra-national river basins.

The key requirement to achieving sustainable water development and closing the access gap is local engagement at community and regional levels backed by commitment from national governments. Without local engagement, experience shows that there will be no progress. Communities must feel empowered to draw up their own agendas suited to their needs and conditions.

We need to formulate a regional strategy for aid with priorities that align the capabilities of the agencies with local agendas. Such a prioritised strategy will allow funds for local development to be provided quickly in a fast-track process as long as they meet the pre-determined value criteria.

National Level Commitments and Plans Are Essential

In all countries, national or state governments are responsible for ensuring that water resources are protected and sustainably used through their efficient allocation. An appropriate policy framework and comprehensive planning at both national and basin level are essential to achieving sustainable results.

In most countries, local communities are either implicitly or explicitly required to provide basic services to their people. Water is one of these. This obligation gives rise to the development of resources and local infrastructure and the provision of services. Ultimately, any strategy for municipal water provision that is not built on the reality of delivering local services will fail.

Compelling and enabling local governments to accept and discharge this responsibility is the obligation of national or state governments. If local government is incapable of carrying out this responsibility, national governments must take the initiative as the provider of last resort.

Many countries have abdicated these most fundamental responsibilities for water policy, resource management and local service provision through lack of direct action or through delegation. Without national or state level commitment and comprehensive planning, it is difficult to tackle the twin goals of closing the gap in access to water and sanitation, or to develop strategies capable of providing water for food, communities and industries in a sustainable manner.

We Can't Sustainably Manage What We Don't Understand

Some ten years after the Rio Declaration important water problems, particularly in developing countries, remain unsolved. This is because sustainable development has turned out to be difficult. The difficulties are often political or institutional, but they are also scientific. Here we address the scientific issue while being aware of the wider background.

The word 'sustainable' is easily introduced in a policy document; in science and engineering, it means a revolution. Why? Sustainable development requires a liaison with nature – minimising interference, maximising the benefits – managing the natural system rather than totally relying on hard-core engineering solutions. In scientific terms, it is much easier to solve problems with dams, pumping systems and canals than to 'build with nature and people'. Working with nature requires a deep understanding of natural processes and an ability to predict its behaviour over many years and over large areas, for nature is never static and is always progressing.

In the complex modern world we seek to manage and, consequently, interfere with nature. But now the sequence of steps in our approach must change. Instead of our traditional approach of designing interventions and then looking at the possible effects, we must now first define the system as desired, with all its natural values, social and economic functions, then design the intervention that should bring about the desired results. This calls for difficult predictions, not only in terms of hydrology, hydraulics and morphology, but also of social and ecological effects. The chain of disciplines involved means that complexity increases rapidly. Yet, without this understanding of fundamentals we cannot manage effectively and we may make dramatic mistakes.



A Practical Framework for Local Action – Priorities

Water and Sanitation, Bangladesh
Child washing under a public water tap.

We advocate immediate action in four priority areas. These will underpin the recommendations that follow. They are based on Local Action Agendas (LAAs) formulated on a knowledge-based integrated approach which takes note of the wider natural, social, economic and institutional picture.

Overarching Recommendations

The following steps need to be undertaken by all countries as an essential component of development activities;

- A.** Develop national level water plans and involve all river basin users within five years.
- B.** Commit to a process for systematically developing and prioritizing LAAs for each town or city, that include basin-level strategies and a commitment to longer-term basin-level planning.
- C.** Launch large-scale, regionally focused and comprehensive community-level action initiatives to promote access to water and sanitation, based on findings developed through the LAAs and basin strategies. Develop an aligned fast-track, prioritised and regionalized strategy for aid.

- 1. Access to Water and Sanitation Through Engagement at the Community Level**
 - 2. Ecological and Economical Methods of Sanitation**
 - 3. Sustainable Water Management in Drought-Prone Regions of the World.**
 - 4. Sustainable Water Management in Flood-Prone Regions of the World**
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- D.** Support the comprehensive use of knowledge-based methods of high technology, low-cost, space-to-earth approaches to basin models for poorly gauged basins to support the rapid development of national water plans in low and medium income countries.
 - E.** Develop and fund a new, credible and commonly accepted methodology for measuring the number of people and communities in need of access to water and sanitation. Use a combination of existing networks (UNESCO, WHO, IWA, etc) and new funding to develop both a commonly accepted baseline and a process for measuring progress in meeting millennium goals.
 - F.** Encourage and fund expanded institutional partnerships and twinning – research institutes, water boards, utilities, universities and regulatory agencies – for both south-south and north-south support. Use existing professional associations and networks to develop a world community of water professionals to facilitate these actions.

1. Access to Water – We Need a Strategy to Stimulate Local Action

To close the gap in access to water and sanitation in line with millennium goals, we need a process that mobilises local communities to develop Local Action Agendas (LAAs) that meet their needs. This shift in focus to the local level runs parallel with securing national commitment to achieve the goals. Aid and investment should be tailored to meet both local needs and conditions.

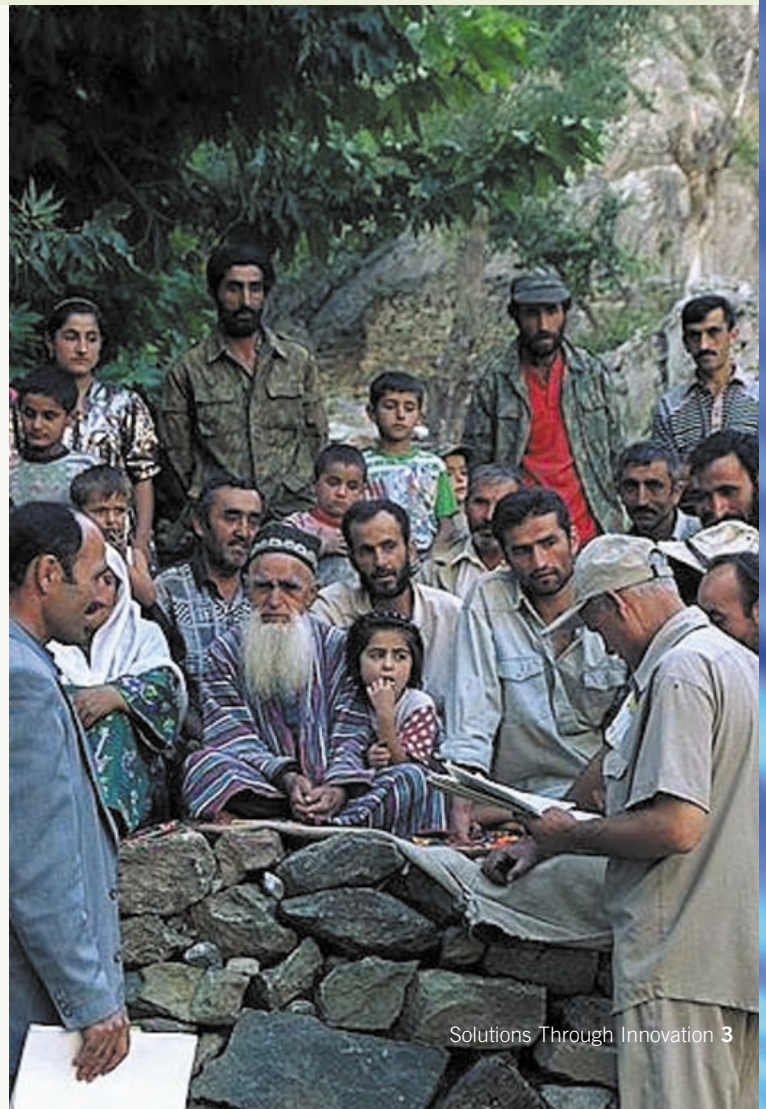


Local Action Agenda Recommendations

- A.** Establish at the World Water Forum in Kyoto an intention by Donor Agencies and Recipient Countries to develop a fast track approach to funding the development of Local Action Agendas.
- B.** Based on the existing donor/recipient relationships, and where necessary the creation of new ones, carry out a preliminary analysis to identify the high-need, high-potential, high-interest communities.
- C.** In these countries, establish links between the Donor Agencies and the water professional networks to provide the knowledge and experience input to support the local communities in developing Local Action Agendas.
- D.** Proceed to develop the Local Action Agenda and prepare a fast track approach to fund the action programmes that emerge.
- E.** Implement the programmes, review the process based on experience, and replicate the process on the larger scale which will then be achievable due to having established centres of expertise.

Shirev, Tajikistan

A village organisation meeting being held outdoors on the top of bunds.





Dakar, Senegal, Dry Sanitation

2. Ecologically and Economically Sound Strategies Are Needed to Provide Sanitation for 1/3 of the World's Population

Waterborne sanitation, developed in the context of water rich northern Europe, cannot be a model for providing sanitation services in the developing world. There is simply not enough water or funds to achieve the millennium goals using such a model.

We must devise a new, equally effective set of alternative solutions for providing sanitation services in water scarce and poor countries. Eventually, these solutions will find their way back to the northern countries because they make more sense environmentally than conventional sanitation.

The challenges are both organisational and technical. The organisational challenge is how to devise a decentralised approach that works as a cohesive system. The apt analogy is solid waste, where local depositions of waste must be systematically collected and centrally disposed of in an environmentally responsible manner. The technical challenges are related to both reliable technologies for deposition (toilets and holding facilities) and for waste treatment (ponds and other low technology treatment processes).

Eco-Sanitation Recommendations:

- A.** Develop five citywide demonstration projects of dry sanitation in middle income and poor countries within two years, building on work done to date, and new town/city projects using key approaches.
- B.** Based on the results of the demonstration projects, including assessment of sustainability and environmental impact, donor and bank funding for urban sanitation should be limited to a family of proven ecological and cost-effective approaches.
- C.** Subsidise the development and demonstration of innovative dry and low water toilets, and urine-separating toilets.
- D.** Fund demonstration projects aimed at developing local and international markets for waste-related organics.

3. Dry and Drought-Prone Regions Require Unique and Urgent Action

The majority of growth in world population over the next twenty years will be in countries that are semi-arid or arid. There is an urgent need to increase the attention paid to these regions and to tackle the underlying problems through a combination of standard development, basin planning, resource development, knowledge acquisition and new technologies.

There are viable solutions to the sustainable provision of water in the majority of dry areas through significant improvements in efficiency – related to both the first use and the reuse of water. Significant (30–50%) reductions in the combined use of agricultural, community and industrial water are viable and cost-effective – *water budgets and the shadow pricing of agricultural water are key elements to an overall strategy in any region.*

Models of efficient and integrated use of water across all water uses are beginning to be seen in countries like Israel, parts of Spain, parts of Australia and communities of the desert southwest of the United States. Per capita consumption for all uses of water in Israel is approximately one quarter of that in California. We must learn from these models and promote best practice drawn from this experience to high- and low-income countries alike through international forums on dry areas.

At the same time, we need to devise ways of simplifying and tailoring technologies key to dry area water management for diffusion to lower income countries.

Recommendations for Dry Regions:

- A. Provide support for the creation of regional dry area forums within existing international professional associations for countries with arid or semi-arid climates to assist in target setting, technical exchanges and

technology transfers. The principle is to use available knowledge to understand the whole system before attempting to manage it.

- B. Consistent with the resource capabilities of these dry areas, set achievable national level and sub national level sustainability targets for efficient water use (e.g. 750 m³/yr per person) and for storage levels capable of sustaining the integrity of water supplies and the environment.
- C. Through donor funding to countries, provide incentives for innovative and efficient water practices in line with the water budgets. These practices would be aimed at all sectors, including integrated use across sectors using water more efficiently in the first use, reuse and the use of water substitutes. The aim is to take advantage of innovative opportunities and to prevent waste.
- D. Expand research and development subsidies through multi-lateral agencies in key areas including agricultural-water efficiencies, low-cost membrane technologies for reuse and desalination, simplified and packaged energy sources, and in situ reuse systems for municipal and industrial water uses.



4. Flood-Prone Regions Also Require Immediate Action

Recent, devastating floods have shown that traditional approaches of building higher dykes, levees or regulating-structures alone are not adequate to take on natural challenges. Safety has not been achieved, valuable ecosystems get destroyed and, in general, the resilience of the system has been reduced. Sometimes effects have even been counter-productive. This situation is worsening with population growth, urbanisation and the further denuding of basins.

The river that brings the flood is often the same body of water that provides water for drinking, irrigation, waste discharge and recreation. In many cases, it is a means of transport and, since historic times, cities have been built along rivers. These multi functions have made human intervention necessary to manage rivers.

A new balance is needed between people, nature and economic development.

Where possible the river must be given more space, while the other functions need to be safeguarded, in some cases, by creating sufficient storage capacity. Clearly, this intervention must be based on a thorough understanding of the whole system.

Recommendations for Flood-Prone Areas:

- A. We must adapt engineering skills and learn to build with people and nature. The natural function of rivers to retain and store water during flooding in wide floodplains must be restored, while economic functions such as shipping, irrigation and drinking water supplies are safeguarded.
- B. Achieve an understanding of the whole system, including social, economic and ecological consequences of piecemeal action, before attempting to apply solutions. A knowledge-based integrated approach is needed which includes information gathering, modelling and decision-making.
- C. Provide support in donor funding for the creation of regional forums for flood-prone countries within existing international professional associations to assist in target setting, technical exchanges and technology transfers.



Shanty Town, Philippines, Manila, Flooded Shanty town on the edge of the Pasig River. The spread of human settlement means the floodwater has nowhere to soak away.

We have failed to take advantage of our most critical resource – the existing research and practice networks.

There are extensive networks of competent water professionals not only in the wealthy countries of the north, but in moderate and lower income countries throughout Latin America, Asia and Africa. These professionals have both the knowledge of the problems and, in many instances, ideas about effective, locally-based solutions that will work in their communities. They come from research institutions, universities, utilities and consulting firms, regulatory authorities and industry.

We believe these networks have been greatly under used, resulting in the costly re-creation of knowledge and solutions. Why has this happened? The reason is often the process of privatisation in the western countries, with the emphasis on the commercial principle of not spending time unless there is a client to pay, and rigid budget control in the mostly government institutions in developing countries. What is clear is that there is a wealth of expertise available and a world community of committed water professionals, represented by international water associations, ready to face the very real problems of access and sustainability.

If we are to make progress in bringing water and sanitation to those in need, or to initiate the changes needed to achieve sustainable supplies of water for food, communities and industry, we must empower the professional networks by building on their goodwill and providing incentives. This needs to occur at all levels.

Cascading knowledge through a combination of south-south, and north-south institutional twinning of utilities, universities and water-related agencies (e.g., regulatory agencies) is essential to provide continuing and relevant support to developing countries.

The global water crisis and related environmental, economic and social problems will only be solved by using the best science available.

The 3rd World Water Forum resolves to underpin water policies with a strong scientific base developed and supported by a world community of water research institutes. The international water associations, coordinated through the International Water Association's Liaison Committee (IWALC), with the list of members annexed, intend to conclude the Science, Technology and Management Panel with a concrete proposal – Professionals for Action. This formulates a programme of actions to harness collective knowledge and best practice to find and apply solutions faster, bringing benefits to those who most need them.

This programme is in three tiers; a Directors' Forum, a regular meeting of directors and CEOs of major water research institutes, water boards, utilities and other water organisations around the world, perhaps once every two years, to assist in target setting, knowledge sharing, technology transfers and the organisation of regional forums for dry and flood-prone regions. The first Directors' Forum is organised within the framework of the Science, Technology and Management Panel of the 3rd World Water Forum to launch the Professionals for Action initiative.

The already existing sections of professional associations, meeting in regular congresses and conferences, will have focused tasks to share knowledge and develop best practice to tackle particular issues. No new organisation is needed.

Putting 'best practice' into effect constitutes the heart of the programme. Based on shared knowledge and best practices developed by the sections and the community as a whole, an institute in a region with a water problem enters into a partnership with one or more institutes from the water community in order to work together on a real, practical project. Other organisations such as water boards and utilities can, and should, join. The participating institutes will seek to engage local government, financing agencies and donor countries in concerted action.

In the dialogue with Ministers and other decision-makers, support will be sought from governments of key countries – that is, countries with major water problems as well as donor countries that might be willing to provide assistance and from financing agencies such as The World Bank and the Asian Development Bank.

Statement from the Chairman and Secretary of IWALC

There is now a universal acceptance of the fact that we need to better manage our water resources if we are to avoid water crises in the future; this will require both better understanding of our world and continued innovation – through science, technology and management. Many different professions are engaged in the scientific study and management of water – biologists, engineers, limnologists, hydrologists to name but a few only in the physical sciences!

These different disciplines are represented by many professional associations which on the national level help – for example – to maintain high professional standards, whilst on the international arena associations serve more as a forum for sharing knowledge and experience. IWALC is the informal Liaison Committee of the International Water Associations established with the support of UNESCO and in publishing this booklet three leading International Associations – IWA, IAHR and ICID – have on behalf of the water professional community set out a framework for discussion for the vital and increased role which science, technology and management must play if we are to better manage our water resources.

Dr C. B. George
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International Water Associations Liaison Committee Members:

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