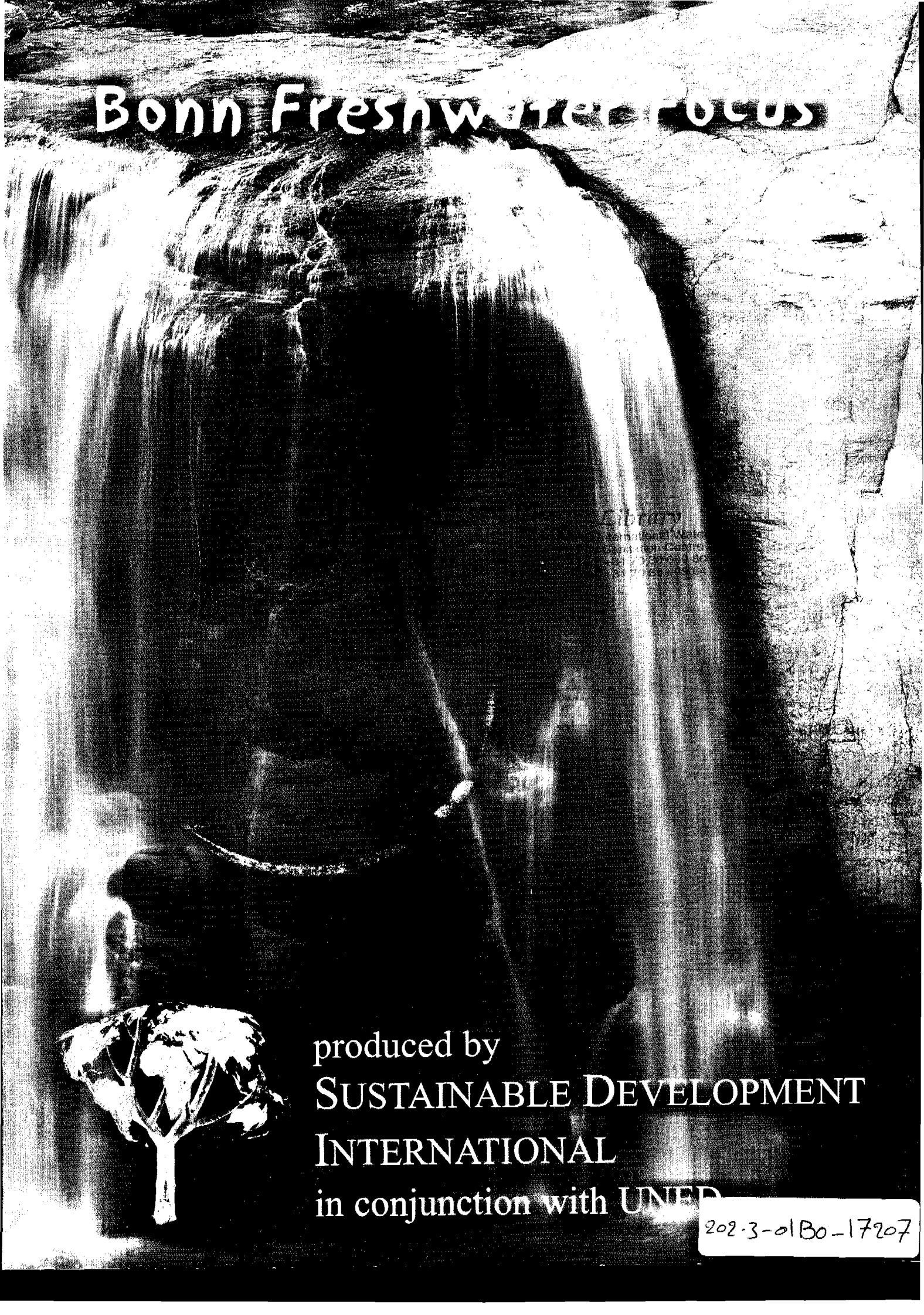
Bonn Freshwater Focus



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INTRODUCTION

The preparation for the World Summit on Sustainable Development, more popularly known as Earth Summit 2002, has been gathering momentum. Over the past six months there have been a series of meetings discussing the agenda for Johannesburg. These have included the Eminent Peoples meetings, Regional Preparatory Meetings and issue focused meetings such as the Bonn International Conference on Freshwater. Through these processes we are starting to see the emergence of certain issues, which Johannesburg will have to address. Freshwater is one of them. It is for that reason that SDI and UNED Forum (to be known as Stakeholder Forum for Our Common Future from January 1st 2002) have collaborated to produce this publication.

At the Millennium Assembly in 2000 Heads of State agreed a set of development targets, which the Johannesburg Summit should try and develop into work programmes to deliver. These targets included halving by the year 2015 the proportion of people who are unable to reach or to afford safe drinking water. This is one of the targets that Bonn will be addressing. There is no doubt that the Bonn Conference on Freshwater will play a critical role in the development of the agenda on freshwater for Johannesburg and the German Government should be complimented by the vision they had three years ago to set up the process for Bonn.

Bonn will also be hosting a multi-stakeholder dialogue session on freshwater between governments with industry, NGOs, trade unions, farmers and local government. This dialogue is a real attempt to ensure that the expertise, views and experience of stakeholders have as much impact on the development of the policies on freshwater as possible.

Building on this dialogue process, UNED Forum's 'Implementation Conference: Stakeholder Action For Our Common Future' (www.earthsummit2002.org/ic), to be held during the week before the Summit in Johannesburg, will further galvanise stakeholders' initiatives on the implementation of international agreements on freshwater, and four other areas.

Sustainable Development International is an educational roadmap towards the World Summit on Sustainable Development. SDI aims to educate a global audience by providing information and knowledge on all aspects of implementation for sustainable development, through cross media platforms. To find out more about the business of sustainability through SDI please view the web site on http://www.sustdev.org

Ultimately whatever plans are developed at Earth Summit 2002 there will need to be new and additional funds. This has been a problematic issue since the Rio Conference where the view held was that a deal had been made to put considerable new funds on the table. The reality is that in the last ten years aid flows have fallen not increased. This must stop. We need to focus on new funds for the critical issues that the world has to address including freshwater. If we fail to create the political will, then we are reminded of the words of Martin Luther King Jr. "Over the bleached bones of numerous civilisations are written the pathetic words: Too late."

Anna Pink
Editor
Sustainable Development International

Felix Dodds
Executive Director
UNED Forum

ICG Publishing Ltd., 14 Greville Street, London EC1N 8SB U.K. Tel: +44 (0) 7871 0123, Fax: +44 (0)20 7871 0101, E-mail: info@sustdev.org Web site: www.sustdev.org

FOREWORD

WATER – A KEY TO SUSTAINABLE DEVELOPMENT

Need for Action-Oriented Recommendations for the World Summit in Johannesburg.

From 3 to 7 December 2001, the German government, represented by the Federal Ministry for Economic Cooperation and Development and my Ministry for the Environment, Nature Conservation and Nuclear Safety, is hosting the International Conference on Freshwater. This Conference will give positive impetus to the negotiations on water at the World Summit for Sustainable Development in Johannesburg in September 2002. The Conference is based on Agenda 21, adopted in Rio de Janeiro in 1992, and on the United Nations Millennium Declaration.

Today, 1.2 billion people – that is one in five – have no access to adequate and clean drinking water. The United Nations Millennium Declaration calls for this proportion to be at least halved by 2015. Around 2.5 billion people have no sanitation, and consequently, where sufficient water is available, it is often so polluted that it cannot be used. This means disease and death for many people. An inadequate water supply, however, also bolsters poverty and inequality between the sexes.

The theme of water is closely connected to foreign, economic, development and environmental policy issues. Water must therefore head the agenda in international politics. If they are to succeed, the necessary reforms in water policy, aiming at a healthy and affordable water supply for poorer sections of the population, must be directly linked to policies on combating poverty and on economic development. Finding ways out of the water crisis also means setting political priorities in favour of a more efficient water use, and taking precautionary action against the pollution of water resources. In arid regions especially, we must endeavour to achieve a high-yield agriculture with low water consumption.

Diminishing water resources can become a source of international conflict in the future. The Millennium Declaration therefore also calls for balanced and adequate water management, in order to stop the unsustainable exploitation of water resources. Where such management occurs, water is also a catalyst for peaceful, transboundary cooperation. An example of this is in international river basins, where the water is managed by the riparian states for their mutual benefit. There are many examples of success: the cooperation along the Nile, the Mekong and the Great Lakes in America. In Germany too, we have instances of such positive developments in our international rivers the Rhine, the Danube, the Elbe and the Oder.

The key message of the recently published annual report of the UN Population Fund is that more people now flee from environmental catastrophies than from wars. In 1998, it was 25 million people. Many of the worst disasters of recent years were flooding – I refer to Mozambique – and droughts, such as those in the Sahel Zone in the 80s. Climate changes are causing shifts in climatic zones and further intensifying extreme weather conditions. The agreement to enter the Kyoto Protocol into force by the World Summit in Johannesburg, which was achieved at the Bonn Conference on Climate Change, is therefore a great step forward. The same can be said of the finalised details coordinated at Marrakech. We must, however, also take preventive action and learn from disasters – e.g. call a halt to, or adapt, building in flood areas and store water wherever possible. Again, it is the poor who are most affected and who require most assistance.

The following problem areas are central to the International Conference on Freshwater:

- Innovative Strategies for Water Supply and Sanitation for the Poor
- Protecting Ecosystems and Water Resources
- Balancing Water Uses for Food and for Nature
- Transboundary Waters
- Coping with Climate Change and Variability

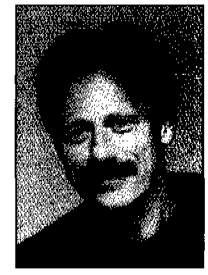
In order to advance these issues, governance and integrated management must be improved, new partnerships formed, financial resources mobilised and technical expertise, know-how and technology transfer developed further.

Providing impetus is primarily a task of governments. They must clearly indicate, regulate and efficiently coordinate the different tasks, roles and responsibilities of the stakeholders: countries, communities and individuals, the private and public sectors. Greater recognition must be given here to the supporting and integrating part played by various social groups, above all by women. I am therefore especially pleased that representatives of major groups have also come to Bonn. In the multi-stakeholder dialogue, they will provide the Conference with input on water problems from the perspective of non-governmental organisations, local authorities, unions, industry, farmers, the scientific community and experts. This is an important supplement to the administrative and political point of view.

The World Summit in Johannesburg will concentrate on the most pressing problems at the interface of environmental, social and economic policies. It is not, as was the case at the 1992 World Summit in Rio, a question of elaborating a concept for sustainable development. The Conference in Johannesburg will be concerned with developing concrete solutions to existing problems, and forwarding their implementation.

Many of the emerging topics for the Summit – energy and water management, the fight against poverty and environmental protection, good government practice, finances and technological transfer – have one thing in common: Behind them is the overall issue of global justice, between North and South, between present and future generations, between man and his natural environment. With regard to our natural sources of livelihood, this means that we should live from the interest, not consume the capital.

At the International Conference on Freshwater, therefore, we must develop action-oriented recommendations in a number of water-related issues, in order to prepare for the World Summit in Johannesburg.



Jürgen Trittin

Federal Minister for the Environment, Nature Conservation and Nuclear Safety, Germany

Partner for innovations

By developing and implementing new ideas, we can really get the ball rolling.

There is enough water in the world for everybody – provided we start managing these resources better. Improved policies, upgraded institutions and enhanced organisations are essential.

Our job is to support decision-makers in elaborating and implementing their reform programmes for sustainable development.

As a government-owned corporation with worldwide operations we promote international cooperation, thus contributing towards sustainable development in developing, newly industrialising and transition countries. We focus on know-how, networks and cooperation with all stakeholders in a spirit of partnership.
We support complex development processes on site as service providers and advisors.The world is full of challenges – we aim to seize development opportunities whenever possible.

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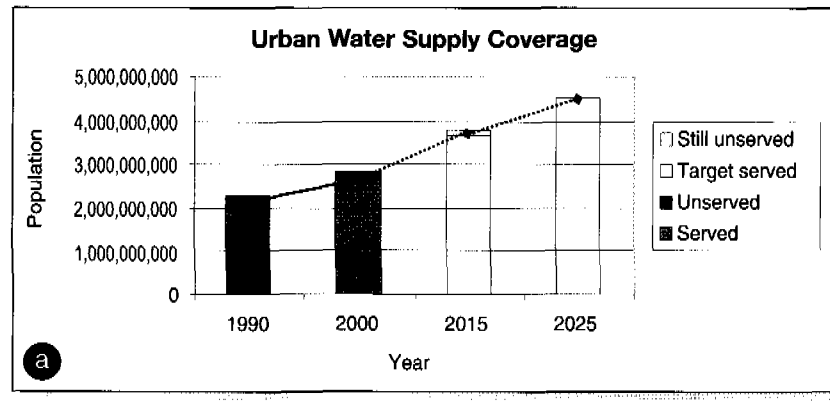
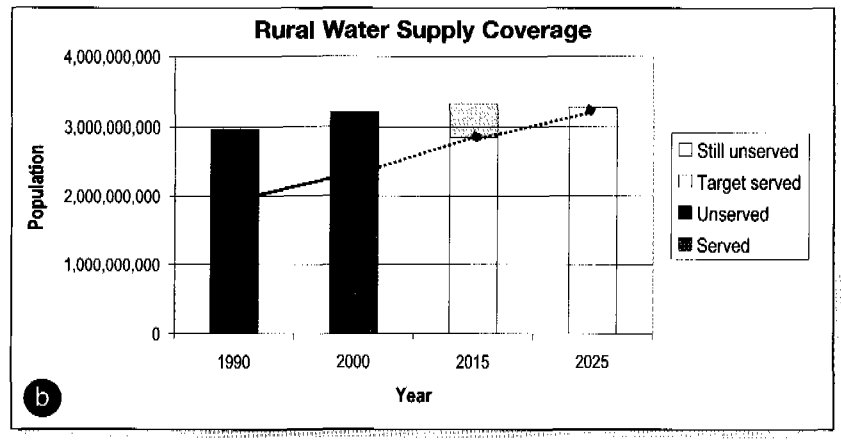
Water Sanitation and Hygiene for All – A Fundamental Requirement for Sustainable Development

Richard Jolly & Gourisankar Ghosh, *Water Supply & Sanitation Collaborative Council (WSSCC), Geneva, Switzerland*

ABSTRACT

A major challenge facing the international community is not only to provide access to water, sanitation and hygiene to every citizen in the world but also to eradicate poverty through universal access to safe water, hygiene and sanitation. The global alliance for reducing poverty is now stronger, more determined and more broad-based than ever before, thanks to a growing commitment by many actors in development and the partnerships that have been promoted by the Water Supply and Sanitation Collaborative Council since its inception in 1990.





Figures 1a & 1b
Trends and targets – progress achieved in the 1990s and the progress needed to achieve the VISION 21 targets (halving the percentage unserved by the year 2015 and universal coverage by 2025)

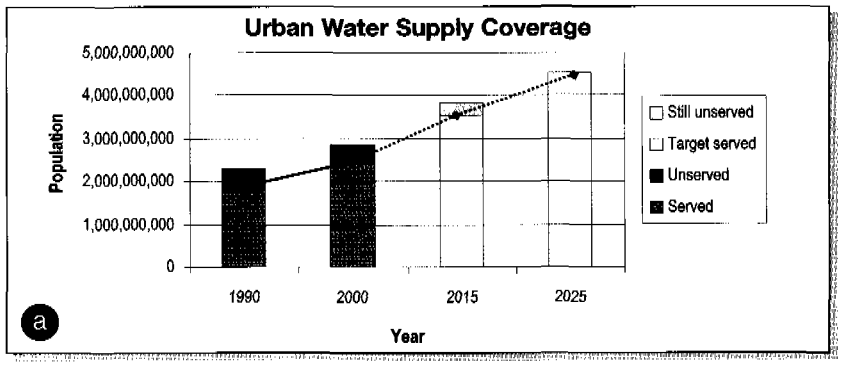
TERRORISM, POVERTY, WATER AND SANITATION

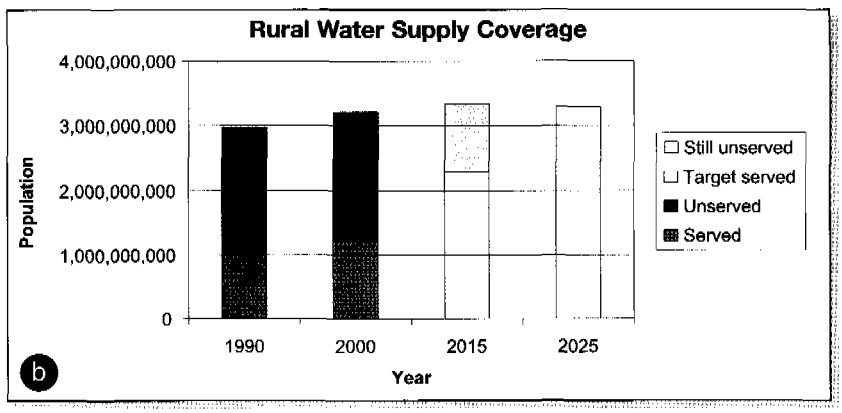
A formidable gap still exists between the rich and the poor, as has been clearly demonstrated by recent events. We must make sure that action against poverty does not get weakened or diverted by the current war against terrorism. Along with determined efforts to fight terrorism on all fronts, countries must also wage a war against poverty, open people's minds and promote tolerance and better understanding among peoples through education and improving their health and status in society. It is no doubt that education is the core of all development activities. Hence, education on the immediate household environment or primary environment becomes more important and needs to be at the core of education policies.

From the beginning of the UN, education for international understanding and tolerance has been emphasised – in the Charter and the Universal Declaration of Human Rights most notably. The Convention of the Rights of the Child, now ratified by all but two countries, states that education should encourage respect for one's own culture and for the civilisations different from one's own and should prepare the child in the spirit of understanding, peace, tolerance, equality of sexes and friendship among all peoples, ethnic, national and religious groups. Education should also develop respect for the natural environment.

The enormous problems faced by refugees, particularly women and children, who are forced to flee from their homes amidst terror and conflict, without access to water, sanitation and hygiene, are stark reminders that even now, there are more deaths in the world due to lack of hygiene and higher morbidity from water-borne diseases than from the scourge of HIV/AIDS. Lack of these fundamental services causes significant damage to the cognitive development of a child due to the insecurity of their primary environment. The deprivation of these basic human rights in the early stages of a child's life is an affront to human dignity and a shameful scandal facing humanity in the 21st century.

The trade-off between guns and butter is an old one and a favourite illustration in economic textbooks. But any trade-off between fighting terrorism and combating poverty in developing countries is a confusion of terms and thinking. In contrast, there is some evidence and much reason to believe that poverty, desperation and hopelessness provide a fertile breeding ground for terrorist acts. Action to tackle material poverty is not the only thing that is required to lay the foundations for human security, but it is certainly one of the essential ones.





Figures 2a & 2b
Trends and targets – note the steepening trend lines, indicating the acceleration needed to meet the sanitation goals.
In particular, progress achieved in the 1990s and the progress needed to achieve the VISION 21 targets (halving the percentage unserved by the year 2015 and universal coverage by 2025)

PRESENT SITUATION AND PAST LESSONS

There are still 1,100 million people without access to an acceptable supply of drinking water and a shameful 2,400 million without hygienic means of sanitation. Improvements are barely matching the population increase. Business as usual will not achieve fast enough progress.

Contrary to the views of some, we believe that the International Drinking Water Supply and Sanitation Decade in the 1980s brought considerable success. The Decade taught us many important lessons and helped identify approaches and technologies to build upon in the 1990s. In fact, during the 1980s, 'private-public partnerships' which has now become a buzz phrase was best demonstrated by the development of affordable, low-cost technologies through pumps, drilling mechanisms and water filtration systems. Technology development was possible and the coverage increase was achievable only through a close partnership with the private sector.

The lowered cost of desalination, solar panels and arsenic removal was made possible through research and application of such new developments by the private sector. Now we need to work in partnership for changes in the institutional management options for better finance, better management and governance.

As a result of all this, we have now moved on from the debate on what to do to giving more time and attention on how to do it together. There has also been impressive progress in developing practical examples of what needs to be done and how to do it - cost effective and participatory approaches, adapted to the specifics of the different urban and rural situations in various regions of the world.

Progress however has been uneven, geographically and sectorally. In spite of the convergence of ideas and approaches at the global level there is a need to strengthen and demonstrate the same at the ground level. The recent WHO/UNICEF/WSSCC Global Water Supply and Sanitation Report in 2000 provides up-to-date data on better water quality than we have had before. We need to draw on this more to emphasise the good news as well as the challenges and the bad news.

To summarise
The good news – progress in water has been faster than many realise; the use of goals in the Decade was more positive than many realise. In spite of rapid population increase we were able to move further ahead.
The bad news – progress in sanitation was very slow, with hygiene the slowest of all; maintenance was very weak; sub-Saharan Africa and the least-developed countries were the weakest and slowest of all. Why is it that water often becomes the central focus, sanitation is in second place and hygiene totally forgotten?

WE DESPERATELY NEED TO CHANGE OUR PRIORITIES

In terms of human health, the priorities need to be reversed. Whereas studies shown that on average improvements in water quality and quantity have led to a 17% median reduction in diarrhoeal morbidity, sanitation has led to a 36% reduction and hygiene a 33% reduction. Impressive, but frequently overlooked figures. Health is not the only area where our priorities need to be reversed. Let's look at the economic benefits from promoting adequate sanitation and hygiene promotion, typically falling in the following areas:

- Reducing the health burden of individuals from water-borne and water-washed diseases;
- Reducing the time taken off work (or school) by ill people and their carers;
- Improving nutrition due to reduced losses of nutrients through diarrhoea;
- Reducing the time and effort spent, normally by women and children, to carry water from distant sources;
- Making time for other activities such as children's school attendance and adults' income generation.

Our focus should be more on priorities and process, not merely on products and not only on subject, but also on scale. Large-scale top-down, even fully subsidised master plans for water supply and sanitation have been proven to be unworkable, inefficient and expensive, just as large-scale water schemes suffer from many of the same problems. Sanitation and water based on people-centred approaches and worked through on the human scale are ultimately much more sustainable and affordable. By way of example, in 1992 Uganda's Water Development Department estimated that the capital cost for sewers in rural towns would be 50 times the cost of a sanitation platform (or 16 times for a Ventilated Pit Latrine), and the recurrent costs to be 20 times that. Despite these well-documented figures, water schemes dominate and appropriate much of the sectoral investment in the sector.

VISION 21

VISION 21 is an initiative to put an end to a global crisis. Despite enormous achievement over the past two decades, an estimated one billion of the earth's citizen's still lack safe drinking water while almost three billion have no adequate sanitation. More than two million children die each year from water-related diseases. These factors compound the suffering of more than a quarter of the developing world's people who are denied a healthy environment for living. VISION 21, brought out by partners in the Water Supply & Sanitation Collaborative Council, offers a practical picture of a future in which this shameful scandal is brought to an end.

VISION 21 is directed to achieving a world by 2025 in which each person knows the importance of hygiene, and enjoys safe and adequate water and sanitation. VISION 21 explains how this can be achieved. "Following

the turn of the 20th century, governments and civil societies accepted access to water and sanitation as basic human rights, and linked water, sanitation and hygiene needs with broader development goals and poverty reduction, using them as an entry point for development work. The real breakthrough came when all agencies recognised that the most effective action came from the energy of people themselves. Quality leadership and democratic governance provided the environment within which 20th century visions become 21st century realities".

VISION 21 has emerged from a consultation process which itself involved some 100 local communities in 21 countries. In developing their "visions" of life in the 21st century, the new stakeholders came out with highly focused and cost-effective plans that in many cases are already leading to progress. Governments in the participating countries are recognising the value of the participatory approach and in several cases are institutionalising it as part of their planning for the sector.

The changes required involve new approaches to the planning and implementation of water and sanitation programmes in the developing world. That includes the way we think to 'implement' water supply and sanitation programmes and projects. VISION 21 reverses the top-down process, which has not been able to cope with the spreading problems. In the new model, individual householders, local community organisations, local NGOs, local entrepreneurs and enlightened local governments work in partnership to plan, initiate and manage improved water and sanitation systems and hygiene education programmes. In this way, community resources backed by the energy and initiative of local people massively multiply the impact of every dollar provided as seed finance. In the core of the VISION 21 are the following basic principles:

People come first
This is the fundamental premise. More than people's participation, it means people as driving forces, with all the empowerment and legislative implications that involves. This is not a weakening of government's role. It means a reinforced need for government's true role in setting standards and protecting public health. But it also means that the local issues of water and sanitation are dealt with by local people and mobilising local resources.

A holistic approach
Acknowledging hygiene, water and sanitation as a human right and relating it to human development, the elimination of poverty, environmental sustainability and the integrated management of water resources.

Committed and compassionate leadership
Changing long-accustomed roles, leading to new responsibilities of authorities and institutions to support households and communities in the management of their hygiene, water and sanitation, and in being accountable to users as clients.

Synergy of action
As local stakeholders join the movement, it is easier to see the common interest in environmental protection, ecosystem management and food production and how these are critically linked.

Many other changes are needed in current thinking, institutional frameworks, technology choices, gender perspectives, and management of water resources as a whole. But – and it is a fundamental point – these changes will follow once the commitment has come from government. The changes needed are wide-ranging – primarily aimed at ensuring that the household and community-based approaches needed to achieve the goal of water, sanitation and hygiene for all can operate unhindered and with the necessary support in terms of capacity building and investment. They will come – are coming in some cases – as a result of the momentum generated by local ownership and commitment.

Figure 3
little boy drinking water in Nepal

In countries as diverse as Senegal and Togo in West Africa, Jamaica and Haiti in the Caribbean, Bangladesh, Nepal and India and in numerous others, the process of formulating VISION 21 is being converted into a formal planning mechanism, and implementation programmes are already being developed with the approval of national/state government agencies.

REACHING THE GOALS OF 2015: FROM VISION TO ACTION

Heads of States at the Millennium Summit in 2000 agreed that the number of persons without access to safe water should be halved by 2015. To reach this 2015 target means that an additional 1,000 million urban dwellers and 580 million rural inhabitants will need to have improved water supply services during the next 15 years. That means improved services for 292,000 people a day, a 30% increase on the progress achieved in the 1990s. A similar sanitation target implies improved facilities for

Figure 4
Women repairing pumps in India

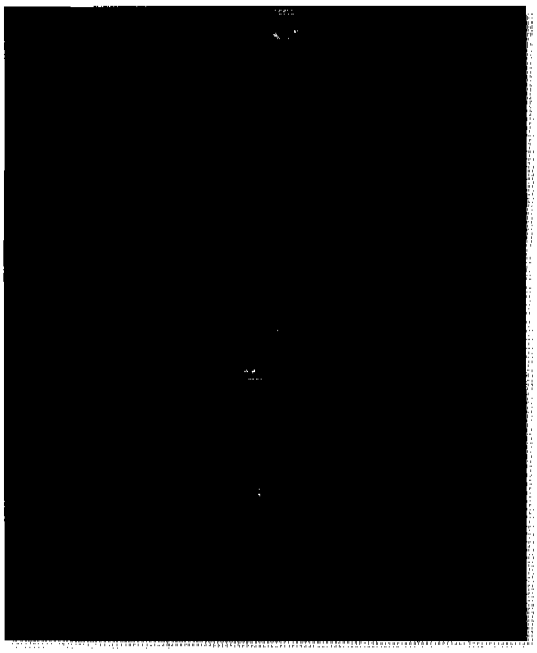


Figure 5
A little boy from Africa carrying water on his head

1 billion urban and 1.1 billion rural people. That converts to 400,000 improved services a day in all, almost doubling the progress achieved in the last decade.

The trends and targets are illustrated graphically in the series of graphs in Figures 1 and 2. Note the steepening trend lines, indicating the acceleration needed to meet the sanitation goals. In particular, the graphs indicate progress achieved in the 1990s and the progress needed to achieve the VISION 21 targets (halving the percentage unserved by the year 2015 and universal coverage by 2025)

ACTIONS NEEDED

- Put people at the centre of all activities
- Recognise the human right to basic services
- Governments to improve governance with decentralisation and transparency, encouraging participation
- Encourage Private-Public Partnership to achieve the goals
- Integrated Water Resource Management to recognise the importance of sanitation and water quality and the need of people-centred technologies like rain water harvesting
- Make some real shift in resource allocations to hygiene and sanitation
- Support local level participatory programmes
- Take goals seriously
- Monitor and evaluate regularly on what we are doing but at community level. Bring the people's voice to the attention of policy-makers. The concurrent evaluation should be done through the involvement of people.

WATER, SANITATION AND HYGIENE FOR ALL – THE WASH CAMPAIGN

The WSSCC and its partners are launching WASH, a global advocacy initiative, at the International Conference on Freshwater in Bonn, Germany, in December 2001. It seeks to mobilise concerned individuals from different sectors of society, UN and other international agencies, bilateral and multilateral organisations, private sector, mass media, government and non-governmental organisations, to raise public awareness and to gain the commitment of decision-makers and opinion-leaders to bring about behavioural and institutional changes that will provide permanent solutions to the burgeoning sanitation, hygiene and water crisis.

The Bonn conference provides us with an opportunity to march to Johannesburg with a clear vision and mandate with a plan for working to the future. We should not miss that opportunity. The conference should not end merely in rhetoric but hopefully will put water and sanitation in the centre of the freshwater and sustainable development agenda. The Collaborative Council's WASH campaign and People's Report (a record of the impact of sanitation and hygiene interventions to the lives of the poor) are but two of a series of steps that WSSCC is taking to ensure that the actions needed to meet VISION 21 targets are achieved. The steps will be taken slowly but surely, building momentum through a series of milestone conferences (Bonn, Johannesburg and Kyoto) and more importantly by generating a groundswell of support locally, nationally and regionally.

ABOUT THE AUTHORS

Richard Jolly, who was formerly Special Adviser to the UNDP Administrator and former Deputy Director of UNICEF, is the current Chairperson. As architect of the *Human Development Report*, Dr Jolly is a strong advocate for actions to improve the health and well-being of the poor, and especially disadvantaged women and children in developing countries.

Gourisankar Ghosh has been the Executive Director of Water Supply and Sanitation Collaborative Council, Geneva, since January 2001. Before that he was the Chief of Water Environment and Sanitation in UNICEF, New York, for nearly a decade. A former member of the Indian Administrative Service of Gujarat cadre, Mr. Ghosh is a Geologist and Economist by academic training. He was the founder director of the present Rajiv Gandhi National Drinking Water Mission, India, between 1986-1991. A widely travelled person, Mr. Ghosh is a Fellow of International Water Academy, Indian Institute of Hydrology, Indian Earth Science Academy and he has several papers and a book to his credit. He is a member of several international bodies related to water, poverty and development.

IF YOU HAVE ANY ENQUIRIES REGARDING THE CONTENT OF THIS ARTICLE, PLEASE CONTACT:

Gourisankar Ghosh
Water Supply and Sanitation Collaborative Council
C/o World Health Organisation
20 Avenue Appia CH-1211
Geneva 27
Switzerland

Tel: +41 22 791 3517
Fax: +41 22 791 4847
E-mail: ghoshg@who.int
Web site: www.wsscc.org

Dr. Richard Jolly is the Chairman of the WSSCC

International Freshwater Governance

JIM LAMB, *Strategic Environmental Management, Nottingham, UK*

ABSTRACT

There is no doubt that lack of safe drinking water and the absence of adequate sanitation are major issues in the developing world. Action is long overdue but opinions differ over how improvements could be made. This paper proposes that Earth Summit 2002 would be an ideal launch pad for an 'International Code of Water Governance' that would set down the ground rules for private sector involvement and take the first step towards delivering long term solutions.

The second World Water Forum and Ministerial Conference at The Hague in the spring of 2000 highlighted the opposing views of governments, international agencies and NGOs.

Governments and Intergovernmental Organisations like the World Bank, the United Nations, the World Trade Organisation and the World Health Organisation all believe that the private sector has a major role to play in the provision of water services. Non-Government Organisations, especially those from the South, are fearful of this approach and are vociferous in their opposition. Both sides can produce evidence to support their views.

The most compelling evidence is that over 2 billion people lack adequate sanitation and over 1 billion do not have access to safe drinking water. This situation has arisen in a water industry that is almost entirely run by the public sector. To rectify this by 2050 would require provision of sanitation services to around 400,000 people a day (allowing for population growth) for the next 50 years. Achieving this, or anything approaching it, by the public sector is highly improbable considering past performance.

The private sector would also struggle to have an impact but they could make progress provided the right conditions exist for them to operate with reasonable ethical and commercial security.

Virtually all of the regions of extreme water stress are in developing countries where commercial investment is very risky and where unethical business practices are commonplace. For these reasons respectable industry is reluctant to become involved in the long term, and capital-intensive, provision and operation of water services. Companies look for high returns to balance

Figure 1
Workers constructing a drinking water well in Madras

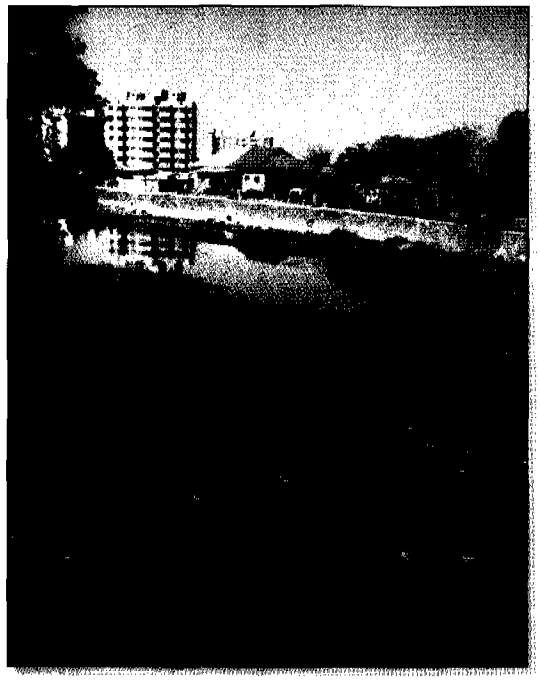


Figure 2
Polluted watercourse in Bombay

Figure 3
A woman carrying water from a river in Ghana

the risks and these are simply not available in the very poor parts of the world.

INTERNATIONAL CODE OF WATER GOVERNANCE

International aid is inadequate to meet even a small part of the needs and it is frequently misused or wasted on inappropriate projects. If this deadlock is to be overcome it is suggested that the first step should be the development of an International Code of Water Governance. The purpose of the code would be to set out ground rules for the provision of water and wastewater infrastructure and its maintenance and operation. The roles of governments, industry and communities could be defined with respect to water management.

The code would deal with issues such as:

- Legal and financial frameworks for transacting water contracts
- Independent regulation of the private sector
- Codes of conduct for the private sector
- Meeting competing demands for water from industrial, municipal and environmental uses
- Water ownership
- Water as a tradable commodity
- Provision of water for the poor
- Water pricing.

Providing the document is succinct and pragmatic it could provide a blueprint for public-private partnerships for the provision and operation of water services in the developing world. Compliance with the Code could be made a condition for funding and its implementation could be monitored by the funding agencies.

Earth Summit 2002 would be an ideal launch pad for this concept, which could bridge the gap between the sectors involved in the debate and pave the way for progress.

Drawing up an appropriate document would need to be promoted by an independent agency, like the UN, and would require extensive stakeholder dialogue including governments, industry and civil society. It must, however, be focused on delivering results, not on satisfying all constituencies.

A major difficulty is that the problems are mostly in the South and the industrial capacity to deliver results is in the North. Cultural differences on how to do business and on the type of water services needed are substantial obstacles to be overcome and guidance must feature in the Code.

The private sector delivers its best results in areas where there is effective legislation and enlightened regulation. This is essential for the water industry because market forces alone will not deliver the required solutions. These legal and regulatory frameworks do not exist in many regions of water stress and their introduction is the first step towards improvement.

Regulation need not be restrictive provided companies offering to provide water services have published codes of conduct that set down their values. This enables all stakeholders to monitor a company's ethical performance and draw attention to failures.

Availability of usable water resources for people depends upon healthy aquatic ecosystems. Sufficient good quality water must be left for the environment so that river ecosystems thrive and provide the natural bio-degradation that is an essential feature of the water cycle. Despite this obvious truth, the environment always comes last in priorities for water use. This is an area where clear guidance is vital.

WATER MANAGEMENT

The economics of water management are complex. To overcome the present deficiencies means providing water services to people who simply cannot afford to pay

Figure 4
Community drinking water standpipes Benin

for them. Ownership of water; whether it should be a tradable commodity; its price and the tariff structures for providing supplies are all areas where the proposed Code would provide guidance. Particular reference must be made to securing services for the poor.

It is usually the poorest people in the world that do not have access to safe drinking water or to sanitation. In rural communities this is sometimes not important because natural resources can be sufficient. In urban areas, however, all water becomes contaminated and there is no safe natural resource. In all areas water can become scarce because of population growth, climate change or as a result of competing demands from industry and agriculture. Richer countries tend to manage demand for water through its price but this is clearly not an option for the poor; any price is always more than they can afford and they can never compete with industry and agriculture. The economic questions and the price that poor people should pay for water are the most contentious and are the areas where guidance, based on stakeholder dialogue, is needed most.

At the moment, resistance to private sector involvement in the provision of water services is often based on ignorance of how this would be achieved. Attention is focused on privatisation, but there are many other ways for the private sector to contribute that do not require private ownership of water infrastructure. A code of water governance would provide guidance on the full range of options available and ensure that monopolistic positions are not exploited. This would help remove some of the opposition to the private sector.

If an acceptable document could be produced, aid from governments could be channelled towards establishing, in developing countries, the legal, regulatory and financial frameworks recommended by the Code. The actual provision of infrastructure, and its operation, would then be funded by the private sector.

There is international consensus that the water issue needs urgent attention, and pressure for action is increasing. An International Code of Water Governance, properly applied, would help ensure that action delivers progress and that good intentions are not wasted on initiatives that do not provide lasting solutions.

ABOUT THE AUTHOR

Jim Lamb is a Chartered Civil Engineer with a Masters Degree in water resources technology. He has over thirty years' experience in the public and private sectors of the water industry. Formerly the Group Head of Environment at Severn Trent plc, he is now the principal in his own environmental governance consultancy.

IF YOU HAVE ANY ENQUIRIES REGARDING THE CONTENT OF THIS ARTICLE, PLEASE CONTACT:

James Lamb
Strategic Environmental Management
35 Hallams Lane
Chilwell
Nottingham
NG9 5FH
UK

Tel/fax: +44 (0) 115 922 0980
Mobile: +44 (0) 7815 500 962
E-mail: jimlamb@waitrose.com

UNED Forum

An International Multi-Stakeholder Organisation

UNED Forum,
3 Whitehall Court, London, SW1A 2EL
Tel: +44 (0)20 7839 7171 Fax: +44 (0)20 7930 5893
Email: info@earthsummit2002.org
Web: www.unedforum.org

Future of Our Food: Dependence on Water in the Soil and Ecosystem

*Biksham Gujja, *WWF, Gland, Switzerland*

Abstract

Food security is a major challenge for many developing countries and will continue to be so for the next several decades. Today, for 800 million people in developing countries, one in five, survival is threatened due to lack of proper food and nutrition. Achieving food security has been viewed from the perspective of 'feeding people'. People become statistics and to match these growing numbers, food production has to be increased. At global level during the last five decades, an increase in the production of food grains has been impressive, but with this increase comes a great cost to the poor and natural resources. Capacity of land and water has been pushed to limits in many places. Methods adopted to increase food production have resulted in ecological degradation and social depravation of poor people. We need to re-examine the validity of these strategies. One side is very clear, there are limits to increasing the food production by adopting the current strategies – increasing the area of cultivation, providing irrigation, and subsidising the external inputs such as fertilisers, pesticides. On the other side, the increase in food grain production at national or global level is not improving the ability for poor people to access the food. There is also evidence that *efforts to increase food production have disempowered the poorest of the poor pushing them towards starvation*. Ecosystems, which have been taken for granted, are not able to support the agriculture due to degradation of soils, depletion of water resources, salinisation, pollution, and eutrophication etc. We need to reverse the cycle adopted of 'feeding the people'. This has led to degradation of natural resources and furthers the dependency of the poor for food from out side sources. Investing in improving the soil and water resources by empowering the rural poor can reverse this cycle. Most of the rural poor do have access to land. By improving soil moisture, stopping the degradation and overall improving the ecosystems can enhance the productivity of their lands. There are several examples in many parts of the world through watershed management, rainwater harvesting and other methods, which have increased the food production. We need to invest in people and those technologies needed. The current 'subsidies' which are leading to ecological and social degradation needs to be re-directed to more socially, ecologically friendly approaches which will empower the rural poor to grow food on their own lands. Future of the food security very much depends on the water in the soils particularly owned by the poor. The future food security of many developing countries very much depends not on water stored which is distributed through the large infrastructure, but on water retained in the soil owned by the rural poor. This approach will also contribute to the restoration of ecosystems. These approaches need greater policy, financial and institutional support in order to address the water and food 'crisis'.

For over 8 million people living with the constant threat of starvation food is the main priority. The World Food Summit of 1996 set a global target of halving the number of people without food by 2015, a target which seems unattainable, and yet while half a billion people go hungry there are other areas of the world investing billions in the name of food security. While the need to grow more food is important, the approaches and methods for achieving this differ significantly. Water has a major role in current food production and will also be crucial in the future.

FOOD SECURITY – A CHALLENGE FOR WATER MANAGEMENT

The global population is estimated to reach 9 billion by 2070 and 8.8 by 2050[1], less than what was previously

* Dr. Biksham Gujja works with Living Waters programme of WWF-International, conservation organisation, based in Gland, Switzerland. He contributed this article on his personal capacity. Opinions expressed in this article are his personal and do not necessarily reflect those of WWF.

1. 'The end of world population growth' Lutz et.al. in Nature Vol. 412, 2 Aug.2001.

Figure 1
African woman building water catchment cistern to improve the soil moisture near Lake Wakuru, Kenya
(Photo: WWF-Canon/Udo Hiltscher)

thought, but still a large increase on food demand. Food production is one thing and food security[2] another. Recently in India, there were 60 million tons in storage, whilst 50 million people did not have access to food. This led to a major political debate about food security and led to intervention by the courts ordering the prevention of death by starvation.[3] More than a billion people are living with less than one dollar. These are the people who need food. Most of them live in rural areas of developing countries. Most of them, if not all, have access to land. Future food security has to take into consideration of their needs and ability to 'purchase' grain from the market. The strategy should be not to increase production, but enabling them to produce food and even supplying to others in urban areas. This has to be achieved without further degrading the ecosystems on which some of the poor depend. That is the challenge. Underground water supplies and soil moisture should be efficiently managed to enable the poor to produce while at the same time improving the ecosystem.

HOW MUCH FOOD DO WE NEED?

Global food requirements depend on several factors – population, level of consumption, type of food, food preferences, etc. As per the FAO estimates per-capita food demand is about 171 kg per year. But this is only part of the requirement, if all other needs are included it will come to 322 kg per year. For industrialised countries the total demand is 573 kg. There are significant differences in food consumption within countries and between the countries of the north and south.

HOW MUCH DO WE HAVE NOW?

Global production of food grains in 2000 reached 2049 million tons, more than twice that of in 1965 (940 Mt.). To put these figures in perspective, the current cereal production of China is about 408 million tons.[4] Three countries – China, USA and India, produce close to 1 billion tons, half of the global production. By 2030 the global food grain production should reach 2805 million tonnes, almost 800 million tons more than today. Most of this increase has to come from the developing countries – from the current level of 1 billion tons to 1615 Mt.

Data on national and global levels of food production may not accurately represent the actual situation. Factors that need to be considered are: first, the accuracy of the data;[5] second, even if the data is correct, its relevance to the food security needs to be taken into account; third, the strategy and methods suggested to meet that production targets do not contribute to the food security of the poor. The production of food grain fluctuates a lot depending on various factors. Those fluctuations, particularly in major countries, could have implications at global levels.

FOOD PRODUCTION AND IMPLICATIONS TO ECOSYSTEMS

Let us assume that an increase of 800 million tons is essential to meet the requirements by 2030. Food security depends on how and where such an increase is made rather than global level production figures. Three possible ways are generally suggested by FAO and other organisations to increase the production: (a) area of cultivation, (b) irrigated area, and (c) increasing yields through massive external inputs. These three methods are not mutually exclusive, but can have serious implications on ecosystems in general and freshwater resources in particular.

INCREASING THE AREA OF CULTIVATION

The major increase, up to 80%, is predicted to come from intensification of land use. However, conversion of swamps and other wetlands are still being advocated to increase food production in certain parts of the world.[6] Projections indicate that about 200 million ha of new agricultural land may be added to increase food production. This will have implications on people and ecosystems. At present about 1.5 billion ha of land, or 11%, is under cultivation and permanent crops. Cultivating additional land poses significant problems economically, politically and ecologically. Therefore the real expansion of agriculture to increase food security is not be suitable option and it might further degrade the lands which are already in cultivation due to land erosion, water losses, salinisation and sedimentation in the rivers and existing dams etc. Much of this land may not actually add to any significant increase in production. However this area may offer a major opportunity for taking up various measures which could improve the biodiversity but also quality and quantity of surface and ground water requirements for the human needs and ecosystem restoration. Instead of reserving this land for 'cultivation' it could be used appropriately to increase food and social security. It is difficult to suggest a single method of improving these lands, but it is possible to make use of these lands to add to the nutritious and food

2. World Food Summit definition: 'Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.' Many NGOs and individuals felt that this definition is not adequate and added 'Food security, at the individual, household, community national, regional and global levels exists when all people...potable water and adequate sanitation...'. www.developmentgateway.org.
3. The mirage of India's food surplus, an article by Radhakrishna Rao, in Free press Journal, 11 Sept.2001 and The Hindu, Aug 30, 2001, 'Starvation Deaths a Shame'.5. FAO data, http://app.fao.org
4. FAO data, http://app.fao.org
5. Based on Machakos district in Kenya, the maize production data has been challenged. On the ground the yield per ha range between 0.5 to 1.0 tons/ha for last 30 years, where as the FAO data indicates yield growth rate of between 1.5 to 2% year. So the official statistics are not reliable particularly when it comes to the data of small scale farmers. Paper by Johan Rockstrom, presented at UNESCO conference in Nov 2000. E-mail: Ihe-dew@ihe.nl.
6. FAO, World Food Summit, technical background documents Vol. 2, page 35 'It is estimated that in West Africa between 20–50 million ha, could be classified as Swamps, which thus offers considerable potential for increasing food production, thanks to the abundance of its water resources. An important contribution to food security could be made if only a part of the existing inland valley swamps could be converted to agricultural land'.

requirements of the many poor and indigenous communities who often depend on these marginal lands.

INCREASE IN IRRIGATION – BOTH SURFACE AND GROUND WATER

Cultivation of more land many not actually contribute to the global, regional or local food security. The next option suggested is to increase irrigation to existing lands. This too has some difficulties and limitations. Currently about 270 million ha are under 'irrigation' in developing countries: more than half is in just two countries – India and China. Globally, the irrigated area increased from 40 million ha in 1900 to 100 million by 1950. This figure reached about 270 million ha by 1998: 30 – 40% of this increase is due to the construction of large dams.

The irrigated area, 22% of the cultivated land, has been reported to have contributed to the 40 – 58% of cereal production in developing countries.[7] By 1980, about 25% of the cultivated area is supposed to have 'suffered' due to the build-up of salts.[8] When we are looking at the total irrigated area and its contribution to food production, one has to take into consideration of the life span of irrigated area. Every year at least 2.5% of the existing irrigated land has to be rehabilitated or substituted by new irrigation.[9] To increase the irrigation by 45 million ha by 2030, 'investment activity over the projected period in the developing countries must encompass some 207 million ha, of which nearly four-fifths would be for rehabilitation or substitution and the balance the balance is net expansion.[10] In other words to increase one hectare of net irrigation by 2030, developing countries have to invest for five hectares.

The effectiveness and appropriateness of the large irrigation schemes has being seriously questioned in recent times. Now there is enough evidence to suggest that the benefits from these projects is far less than anticipated. The review of the large dams and their effectiveness by World Commission on dams have confirmed the following:

- Half of the large dams constructed globally are for irrigation and some of the remaining half do provide some water for irrigation. Together they irrigate about 108 million ha and might have contributed about 12 – 16% (240,320 million tons) of the global food production.
- On the social front about 40 – 80 million people were displaced due to these large dams. Assuming that the large dams constructed for irrigation displaced 50% of these people, the figures comes to between 14 – 28 million people. In other words every five hectares of irrigated land displaced one person, or for every 10 tons of food produced through large-scale irrigation, one individual has been displaced from his land and home.
- A close examination at the country level in India, shows that the contribution of large irrigation projects in increasing the food production is only 10%.
- Only 43% of the water provided for the irrigation is used effectively and the remaining is wasted.
- On the economic front, they are too expensive. Globally about $2 trillion were spent in construction of dams. During the 90s, annual spending on dams exceeded $30 billion. Cost effectiveness of these dams in providing water for irrigation is being seriously challenged. These large irrigation projects often do not meet the targets of the area initially set and it takes up to 30 years to reach the full potential.
- On an ecological level, the impact of irrigation is poorly understood. Loss of forests, damage to wildlife, damage to aquatic biodiversity, loss of wetlands, and the impact on flood plains have not been properly documented. For example in the USA, the loss of wetlands due to various reasons including the expansion of agriculture is even up to 90% in some states. In most countries in Europe the loss of wetlands is more than 60% during the last century. The loss of the ecosystem has serious implications on the food security of the poor and marginalised, particularly in developing countries. Many tribal, indigenous communities were faced with direct loss of fish catch, which was the main source of their food security.
- Some of these constructions over rivers seriously affected the food security by reducing the fish catch. For example construction on Senegal River reduced the amount of fish caught by local people. Similar situations exist in Mekong, Zambezi and many other basins.

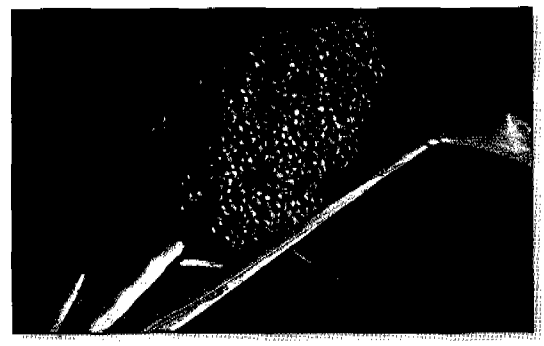


Figure 2
Sorghum crop – staple food for many poor people in semi-arid regions of the world (Photo: WWF Canon/Meg GAWLER)

The recently published report of World Commission on Dams concluded that 'failure to account adequately for these impacts and to fulfil commitments that were made have led to the impoverishment and suffering of millions, giving rise to growing opposition to dams'.

Use of large-scale irrigation needs heavy external inputs such as fertilisers, pesticides and herbicides, which in turn, has serious implications to people and ecosystems. Often these irrigation systems are followed by heavy subsidies for fertilisers and pesticides to promote cash crops, further undermining the food security of the poor. For example during the 90s there was an increase of export of cotton, sugar, tea, tobacco and bananas which all require water and heavy external inputs while the overall food security declined, and imports or dependency on external support for food grains increased.[11]

IMPROVING THE PRODUCTIVITY

Increasing the yield of food grain per unit of cultivated and irrigated area is another way of increasing food production. This is possible, but its impact on people and ecosystems will depend on the methods and the extent of external inputs. For example, India can meet its future food grain demands by simply doubling the productivity of irrigated lands from 2.7 tons per hectare to 4.7 tons per

7. Figures on global irrigated area vary a lot. In World Food Summit publications the quoted figure is 250 million ha and is 264 in more recent publications of FAO. The contribution of irrigated area to the food production varies a lot depending on the source of the information.
8. World Water Vision report, page 8.
9. FAO, report.
10. FAO report.
11. Recent paper by ADB, while stating '45% of African people are live in obsolete poverty and Africans today have poorer access to food, water supply, primary health care and primary education more than 30 years ago' supported $1.3 billion for irrigation primarily large scale. ADB also suggests that development of private sector in agri-business is the 'key to future agricultural and overall economic growth of Africa'.

hectare,[12] which is not impossible.[13] This might eliminate the need for any new irrigation but will have serious implications to water quality due to excessive use of fertilisers and pesticides in selective locations. Increasing the productivity may not feed the poor and will need massive additional state subsidies for fertilisers, pesticides and extension support. Improving the productivity of dry lands and rain-fed crops through various interventions certainly offers a great opportunity to meet future food demands.

WATER AND FOOD SECURITY

Historically, water in all its forms – rain water, groundwater, riverflows, soil moisture, etc, has played a crucial role in food production systems. The future of food security very much depends on the way we manage water.

In 1995, global water drawn for the agriculture sector is around 2500 billion m^3, more than double of 1950.[14] But this is only a partial story. It is estimated that only one third of the water used comes from the physical extraction. The remaining water is from the soil moisture. Whilst water moisture is the most important factor in food production, human efforts – both financial and institutional – to conserve and manage that part of water is almost minimal. In addition, many human interventions have even reduced the capacity of soil water by accelerating the erosion, degradation, etc.

WHAT IS THE WAY FORWARD?

A fundamental shift needs to take place in addressing the food security and environmental restoration. These two aspects are often perceived as different and contradictory. Efforts to create food security has further degraded land, drained wetlands and undermined the existing food security of the poor in many parts of the developing countries. Therefore, future food security efforts should be combined with restoration of the ecosystem. Such an approach not only provides a long-term solution but also improves the living standards of the poor. Food security is still perceived as increasing the production at some locations at the expense of the ecosystems and draining the financial and natural resources of the country in order to 'feed' the poor.[15] This has led to a perpetual situation of the poor depending on food imports. This has also suited excess production[16] and related subsidies to the farming sector in developed countries which exceeded about $360 billion in 1999.

There are several examples of improving food production by improving the water, soil and forest cover management. Although these methods are effective they still lack support from the national and international level institutions and government. To some extent these approaches have been recognised and even praised, but a significant level of investments are not yet forthcoming.

IMPROVE SMALL SCALE IRRIGATION

Irrigation systems have evolved in many parts of the world during the last few centuries. Some of them are still appropriate. Large investments in large irrigation systems have neglected the traditional and more ecologically and social-friendly irrigation systems. For example, in India, the area irrigated by the small irrigation tanks, which have history of 500 years, has dropped from 4.8 million ha to 3.3 million ha in last to two decades. This is primarily due to silting, lack of funds for maintaining, collapse of traditional management systems, etc. These irrigation systems still contribute to the food security of the majority of the farmers in many developing countries. Investments in improving these systems should be the first priority. Significant improvements can be made in these systems which contribute to several social, economic and cultural functions.[17] By rehabilitation, re-establishing the much needed water for food production can be easily met. This way poor can produce food, improve the environment and avoid large scale investment, often destructive to the environment, and eliminate massive subsidies.

INVESTMENT IN RAIN-FED/DRYLAND AGRICULTURE

Poor people own drylands and practise agriculture. More than 1.8 billion people live in arid areas. These lands are fragile, but support the food needs of millions of people, livestock and many other needs without much external input. More than 60% of the food is produced by rain-fed agriculture and these lands meet most of the food requirements of the poor. Improving productivity of these lands through soil water management is the crucial for their future food security. For example, sorghum is cultivated extensively in India and Africa and it is predominantly a rain-fed crop. The yield of sorghum in both Africa and India is very low, less than 900 kg/ha during 2000. But the improvement in India since 1961 compared to Africa is quite interesting. India was cultivating 18.2 million ha in 1961 producing 8 million tons (yield 400 kg/ha) and area of cultivation was reduced to 10.5 million ha by 2000 but production increased slightly to 9.5 million tons (yield 900 kg/ha). During the same time for Africa the area of cultivation increased from 13.2 to 21.5 million ha whereas production increased from 10 – 18 million tons without any improvement in yield. Improving sorghum and other dryland crop yields in developing countries, particularly in Africa, could address the food security. There are several examples where watershed development projects have increased the sorghum and other crop yield significantly while improving the ecosystems.[18]The yields are generally very low in Africa compared to many drylands in India. This is not because of the soil quality but lack of investment in improving the dryland agriculture. There is a great opportunity in Africa to improve the food security by taking up soil moisture conservation without expanding the agriculture and without going for large scale irrigation. Improvement of yields of dryland agriculture means improving the ecosystems and improving the livelihoods of the poorest.

WATER HARVESTING

The future of the food production depends more on water inside the soil than that flowing in rivers. Soil moisture conser-

12. IWMI report 'Basin level use and productivity of water examples from South Asia' by Molden et al., 2001.
13. For example USA average cereal yield for 2000 was 5.8 tons/ha, for wheat it is about 2.8 tons/ha, maize it is 8.6 tons/ha. For China: overall coarse grain, wheat, rice and maize are 4.7, 3.7, 6.2 and 4.6 tons/ha respectively. Apps1.fao.org
14. World Water Vision report page 26. Total global water withdrawals in 1995 is around 3,800 m3, 66% for agriculture.
15. India's public distribution system (PDS), a large-scale food rationing programme meant to reduce food insecurity and improve welfare. It is one of the most important welfare programmes in India, on which the government spends about RS. 90,000 million per year, 2.5% of the overall government spending, Jose Mooij, EPW, Dec 1999.
16. Wheat exports to Africa were 20.1 million tons in 1999. USA exported 7.3 m.t.
17. See 'Dying Wisdom' by Centre for Science and Environment, New Delhi, India. The report published in 1997 clearly documented the scientific, economic, cultural, environmental value of reviving the traditional water management systems in order to meet the current challenges of water needs. The report makes a passionate case for investing in the traditional systems in present day
18. Productivity of lands were improved and sorghum crops yields increased even up to 203% after the watershed management, in dry lands of Mahabubnagar District. 'sustainable watershed management' by V.Ratna Reddy, EPW Sept 16 2000.

vation and water harvesting is labour intensive. That could be considered an opportunity rather than a constraint. The FAO identified land which is 'suitable for cultivation'. Instead of such land being 'cultivated' it could be used for watershed management wherever feasible and appropriate. This will improve the biomass production and cultivation of the wild foods, etc. This can improve the quality of life of the poor. Even though such methods are receiving considerable praise and lip service, the real investments both governmental and the international institutions are not moving in that direction, whereas many large scale investments are still being planed at huge financial, social and ecological costs.

Depending on the conditions, it is estimated that 70 – 150 working days are needed for each hectare of land for the water harvesting structures. Even if 300 million ha of each year is taken up for each year, the next 30 years will only improve the degraded lands of 2500 million ha. This will also create employment and reduce the costs of siltation in dams, improve the productivity of lands, recharge the ground water and improve the forest cover.

The above three approaches are not mutually exclusive. One leads to another. The essence is that they empower the poor and directly contribute to the food security without external interventions and also simultaneously address the question of degradation.

CONSERVATION OF ECOSYSTEMS

Ecosystems in general and freshwater ecosystems in particular provide food, fodder and other needs of millions of people. Global freshwater fisheries, about 25 million tons, support the protein requirements of the people living in and around water. For example, the fish production of the Mekong river basin is around 1.2 million tons and is the source of protein for more than 50 million people. Similarly world-wide all the river systems and wetlands support fisheries production. These freshwater ecosystems are under thereat from water diversions, pollution, land conversion, etc. Conserving them will improve the productivity and the food security of the local communities.

Freshwater ecosystems do play a major role in supplying water for irrigation. Conserving them is essential.

Future efforts to increase food should take into consideration of some of the following aspects:

- No further damage to ecosystems and displacement of people
- Increase the diversity of crops, not the volume of crops
- Future food needs will have to be met by largely by rain-fed agriculture, but comparable investments have to go into that sector
- Food production has to be integrated into employment re-generation and ecological restoration
- Water in the soil will play a primary role in future food production. Flowing water and ground water will have to take a secondary role
- There are plenty of examples and experiments in the world in improving the productivity of the rain-fed agriculture, but they need large investments over large area, not just lip service.

Essentially, the food security question has to be decentralised. Similarly, the concept of water management has also to be decentralised. One will not work without the other. People, particularly the rural poor, need to be assisted in producing food. Soil water management of vast areas of 'unproductive' land is the key for future food security.

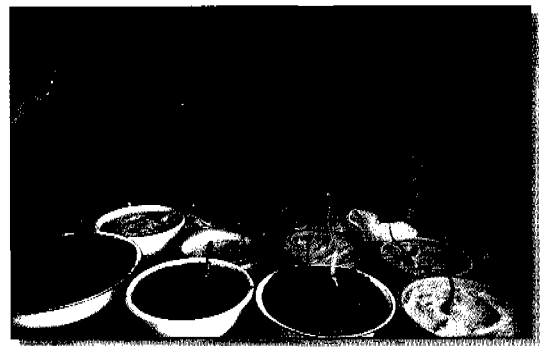


Figure 3
Columbus and other early explorers were searching for a route to the riches of Asia, exemplified here by a spice market – Sumatra, Indonesia (Photo: WWF-Canon/Mauri RAUTKARI)

It may be possible to meet the food needs through local level interventions by improving the soil moisture, watershed management, etc. but they also need to take into consideration of the urbanisation, markets, international mechanisms, etc.

The solution for food security of the poorest lies in reversing the degradation of lands and improving the management of water resources including soil water. There are many positive examples in several countries. These programmes have improved crop yields, created employment, reduced rural migration, improved fodder availability and access to drinking water during critical periods.[19] These approaches need greater financial and institutional support in order to resolve the future water and food crisis.[20]

ABOUT THE AUTHOR

Dr.Biksham Gujja is working with WWF – International, conservation organisation, based in Gland, Switzerland since 1993. He is working with Living Water programme and is currently responsible for Global Freshwater policy. He established several projects related to conserving freshwater ecosystems. He worked on several issues related to freshwater management. Currently he is working on the privatisation of water and its implications to people and nature, implementation of the world commission on dams report, conservation of high altitude wetlands etc. He is a member of the steering group of the international consortium on 'Dialogue on water, food and environment'. Prior to WWF, Biksham Gujja worked as Director of Environment, Deccan Development society, NGO working in Medak district, South India. He has published several papers related to Water resources management.

IF YOU HAVE ANY ENQUIRIES REGARDING THE CONTENT OF THIS ARTICLE, PLEASE CONTACT:

Dr. Biksham Gujja
WWF – International
Avenue du Mont – Blanc
CH-1196, Gland
Switzerland
Tel: +41 22 364 9031
E-mail: bgujja@wwfint.org
Web site: www.panda.org/livingwaters

19. 'Watershed development in India: Recent experience and emerging issues', By C.H.Hanumantha Rao, Economic and political weekly, Nov 4 2000.
20. Some of these critical issues will be discussed as part of the 'Dialogue on Water, Food and Environment' a consortium set up by ten major international organisations – FAO, GWP, ICID, IUCM, WWC FIPA, IWMI, WHO, UNEP and WWF. The secretariat of this consortium is based in IWMI, Colombo, Sri Lanka (www.cgiar.org/iwmi/dialogue). This international process is expected to bridge the gap between food and environment sectors through an open and transparent dialogue. Author of this article is a member or the steering group consortium.

Water Processing

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- COD
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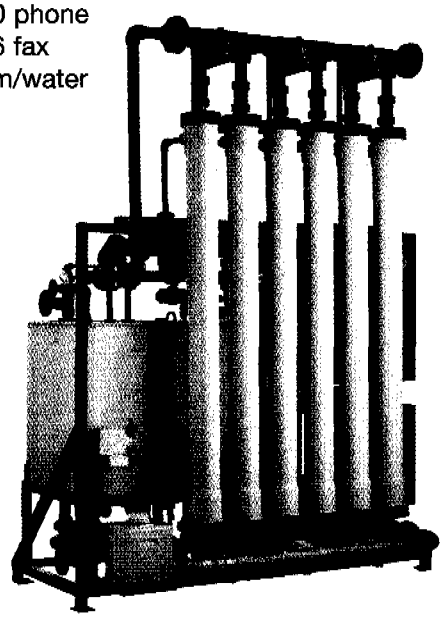

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Making Water Everybody's Business

Anil Agarwal, Sunita Narain & Indira Khurana, *Centre for Science & Environment, India*

ABSTRACT

The value of water harvesting was widely recognised across the country in the summer of 2000 when several western states in India witnessed a severe drought resulting in acute drinking water shortages. The government tried to deal with the problem by providing water tankers and by deepening existing borewells as well as promising to run water trains. Should this be necessary every time the rainfall is less than normal? We didn't think so and we knew that the changes we were advocating would come only if our political leaders are prepared to promote a new approach to water management in this country.

Not surprisingly, few government initiatives have been able to deliver the goods, as the current unprecedented drought has shown in such starkness. Once the monsoon season was over, the government could not have done anything to solve the water problem except to provide some succour in terms of drought relief works, emergency water supply through tankers, and digging deeper borewells for some residual water in the bowels of the earth.

Over the last one hundred years or so, the world and India, too, have seen two major shifts in water management. One is that individuals and communities have steadily given over their role almost completely to the state even though more than 150 years ago no government anywhere in the world provided water. The second is that the simple technology of using rainwater has declined and in its place exploitation of rivers and groundwater through dams and tubewells has become the key source of water. As water in rivers and aquifers is only a small portion of the total rainwater, there is an inevitable and growing, and, in many cases, unbearable stress on water from rivers and groundwater.

Given the fact that India is one of the most well-endowed nations in the world in terms of average annual rainfall, there is no reason why it should suffer from drought. The most important lesson that our decision-makers should learn from the current crisis is how to drought-proof the nation in the years to come – a task that can easily be accomplished in less than a decade if the country puts its mind to it.

Figure 1
Dressed in their colourful best, village women came in hordes to see President K R Narayanan present the villagers of Bhaonata-Kolyala with the Down To Earth – Joseph C John award for the best environment community

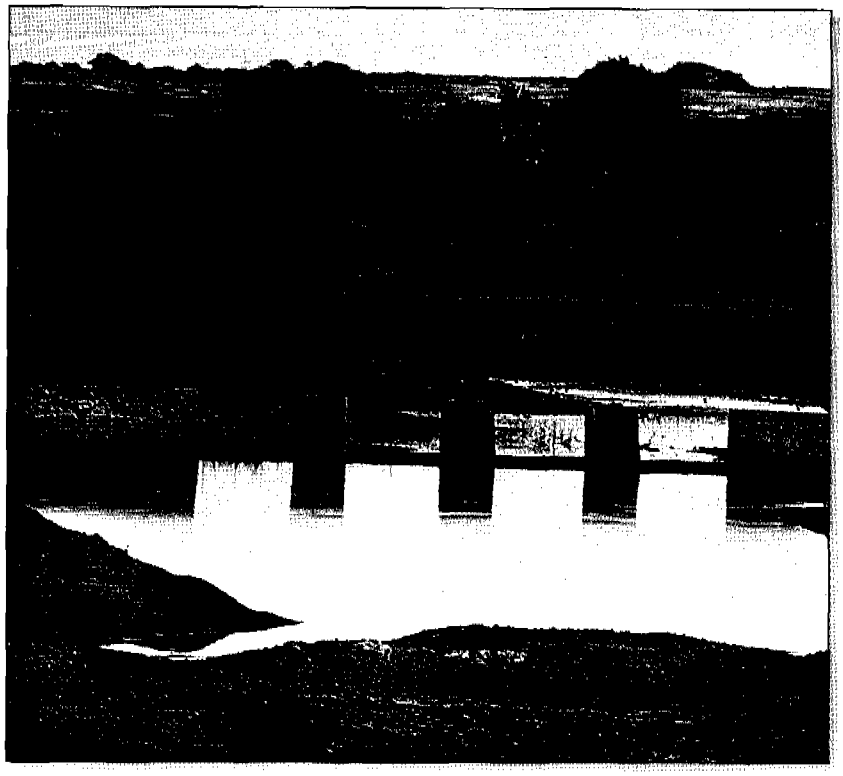

Figure 2
The sarpanch of Raj-Samadhiyala in Gujarat decided to beat the impact of monsoon failures by constructing check dams in the village. Wells no longer run dry and agricultural productivity has increased. A 'dark zone' village has been converted to one where there is water

The country has been constantly encouraging exploitation of groundwater but has done little to recharge it. As a result, groundwater tables are falling all over the country. Considering the fact that over 90% of rural Indians depend on groundwater to get their drinking water, the decline poses a serious problem which becomes an emergency in a year when the rains are low as in 2000. The poor, of course, who depend on dug wells, which dry off first, as compared to tubewells or borewells, are the first to suffer.

COMMUNITIES AND RAIN

Community-based rainwater harvesting – the paradigm of the past – has in it as much strength today as it ever did before. A survey conducted by the Centre for Science and Environment (CSE) of several villages facing drought found that all those villages which had undertaken rainwater harvesting and/or watershed development in earlier years had no drinking water problem whatsoever and even had some water to irrigate their crops. On the other hand, neighbouring villages were desperate for water and planning to migrate when the real summer hit them. This survey revealed that rainwater harvesting can meet even the acid test of a bad drought.

GETTING PRIORITIES RIGHT: POTENTIAL OF RAINWATER HARVESTING

We have consistently argued that there is no village in India that cannot meet its basic drinking and cooking needs through rainwater harvesting. Our ancestors learnt to harvest water in a variety of ways:

- They harvested the rainfall directly. From rooftops, they collected water and stored it in tanks built in their courtyards
- From open community lands, they collected the rain and stored it in artificial wells called kundis
- They harvested monsoon runoff by capturing water from swollen streams during the monsoon season and stored it
- They harvested water from flooded rivers in places like north Bihar and West Bengal.

It is possible to drought-proof the entire country: not just drinking water. Most of India's agricultural fields should also be able to get some irrigation water to grow less water-intensive crops every year through rainwater harvesting. The strategy for drought-proofing would be to ensure that every village captures all the runoff resulting from the rain falling over their land, especially during years when the rain is normal, and store it or use it to recharge the depleting groundwater. It would then have enough water in its tanks or in its wells to cultivate substantial lands with water-saving crops like millets and maize.

DROUGHT-PROOFING VERSUS LARGE-SCALE IRRIGATION

Drought-proofing and large-scale irrigation development are not substitutes for each other. Firstly, because even after all the proposed dams are built to promote large-scale irrigation development, and interlinking of rivers takes place, every piece of the country's cultivated land will still not see the benefit of canal irrigation. These lands will have to depend either on groundwater or local water harvesting. These two will also have to go together because heavy use of groundwater can only be sustained if there are local efforts to keep recharging the groundwater. Therefore, large-scale irrigation development is no substitute for drought-proofing based on local water harvesting systems and sustainable use of groundwater.

Large dams can only help to create pockets of Green Revolution-style agricultural production (with water-intensive crops) but they cannot drought-proof the whole country. As a result, they can at best create 'national' food security as they have done until now – which means that few districts of the country generate a huge agricultural surplus which is then used to feed the ones which are agriculturally poor, especially during drought years.

But they cannot create 'local' food security – which means that all areas of the country must have water management strategies to ensure that local food production is as productive as possible and stable even during water-short years. Local food security is as important as national food security. In addition, it is important to realise that India's future food security will depend heavily on a nationwide groundwater recharging programme which can only be taken by individual communities through rainwater harvesting. If this is not done, agriculture will suffer because of the increasing overexploitation of groundwater and lowering of groundwater tables across the country. During drought years, when rivers dry up, groundwater becomes the main source of water both for drinking and irrigation.

SMALL MEANS EVEN MORE WATER

The key component of water management is 'storage', especially in a country like India where the monsoon gives us on average about one hundred hours of rain and then nothing for the remaining 8,660 hours in a year.

This water can be captured in:

- large reservoirs with large catchments by building large dams;
- small tanks and ponds with small catchments; or,
- by storing it in a way that it percolates down into the ground and gets stored as groundwater.

There is strong scientific evidence to show that village-scale rainwater harvesting will yield much more water than large dams, making the latter an extremely cost-ineffective and unscientific way of providing key water

needs especially in dry areas. Water collected over larger watersheds will have to run over a larger area before it is collected, with a large proportion being lost in puddles, as soil moisture and through evaporation.

MINISTERS ARE NOW TALKING OF RAINWATER HARVESTING

After the media storm on drought hit our politicians, several of them, including the prime minister, made statements regarding the importance of a community-based rainwater harvesting strategy to drought-proof the country.

They hope to gradually replace a government-oriented programme by a people-oriented, decentralised and demand-driven rural water supply programme. A part of the total capital cost and operation and maintenance cost will be borne by the users. In the urban context, the Delhi government expressed interest in water harvesting. Given the fact that groundwater levels have declined by about 4–10 m in several parts of the capital over the last decade, the Delhi government began contemplating a law to make it mandatory for all new group housing societies to harvest the rain falling within their complexes. Meanwhile, the New Delhi Municipal Corporation sanctioned a special water harvesting project which consists of water ponds being constructed in four major parks.

STRUCTURES WITH A SOCIAL PROCESS

Building water harvesting structures is very easy, but building an effective structure which starts off a process of self-management in village communities is much more difficult. This is possible only if each structure is the result of a cooperative social process. Water is a strange natural resource: it can unite a community as easily as it can divide it. Therefore, it is essential that a strong social process precedes each structure to build what economists call the 'social capital'.

It is for this reason that water harvesting works best when combined with watershed development. It is in the nature of these structures to benefit mainly land-owners. But development of watersheds to conserve both water and soil also increases soil and water conservation and leaf and grass production on what are usually common lands, which can greatly benefit landless households, as well as reducing siltation.

Nothing works better than when villagers see all this in practice. It is important to have funds to take interested villagers to see villages where such principles are being observed and how water harvesting has changed their lives.

All this means that progress in the first few years will be slow. In other words, governments must be prepared to accept that their first year's effort will bring nothing, second and third years maybe something, and fourth and fifth years hopefully a lot. It is a gradual exercise.

Social mobilisation is essential for the success of water harvesting for several other reasons. Firstly, the community must be closely involved in the construction of the water harvesting structures to ensure that they are built with technical competence. Secondly, even in properly built structures which deliver water, once the water starts getting available either as increasing levels of groundwater or as surface water in a tank, the community will have to start managing the available water which in the earlier years may not be enough to irrigate lands of all the farmers. In those years, the farmers will have to share the water and use it on crops that don't use too much water. This will happen if there is already a community process associated with the water harvesting

Figure 3
Sukhomajri village, situated in the foothills of the Himalaya, was one of the first villages in India to revive the concept of community-based rainwater harvesting. It built its first earthen dam in 1979

structure. Otherwise a few people will grab the water, leaving the rest of the community alienated.

It is not enough to build new water harvesting structures. Efforts must also be made to revive the vast treasure that already exists but has gone into disuse.

RAINWATER HARVESTING CAN ERADICATE RURAL POVERTY

If water harvesting/watershed development programmes are handled well, some villages have clearly shown that rainwater harvesting is not just the starting point for meeting drinking water needs but the starting point of an effort to eradicate rural poverty itself, generate massive rural employment and reduce distress migration from rural areas to urban areas. Increased and assured water availability means increased and stable agricultural production and improved animal husbandry – both of which together form the fulcrum of the rural economy.

Another interesting dimension of community-based rainwater harvesting is that it helps to generate a community spirit within the village – something that is getting lost across the country – and build up what economists call the 'social capital'.

IF YOU HAVE ANY ENQUIRIES REGARDING THE CONTENT OF THIS ARTICLE, PLEASE CONTACT:

S. Sudha
Centre for Science & Environment (CSE)
41 Tughlakabad Institutional Area
New Delhi 110 062
India

Tel: +91 11 608 1110
Fax: +91 11 608 5879
E-mail: sudha@cseindia.org
Web site: www.cseindia.org

Changing Perspectives of Water and Livelihoods

Barnaby Peacocke, *Intermediate Technology Development Group (ITDG), Warwickshire, UK*

ABSTRACT

ITDG has more than 30 years' experience in water systems development for both productive and domestic use. During this period, the emphasis has shifted from developing equipment and infrastructure for water abstraction and collection; to understanding and responding to the ways poor people use and manage water to secure their livelihoods. This shift has been mirrored by the integration of water related activities into a range of technology strategies including food production, shelter, disaster mitigation, energy, transport and enterprise development, an evolution best illustrated by a short time-line of the group's activities. This article is based on reflections from ITDG under the DfID funded international research project in collaboration with ODI and SC-UK and ITDG entitled, Secure Water: Building Sustainable Livelihoods for the Poor into Demand Responsive Approaches.

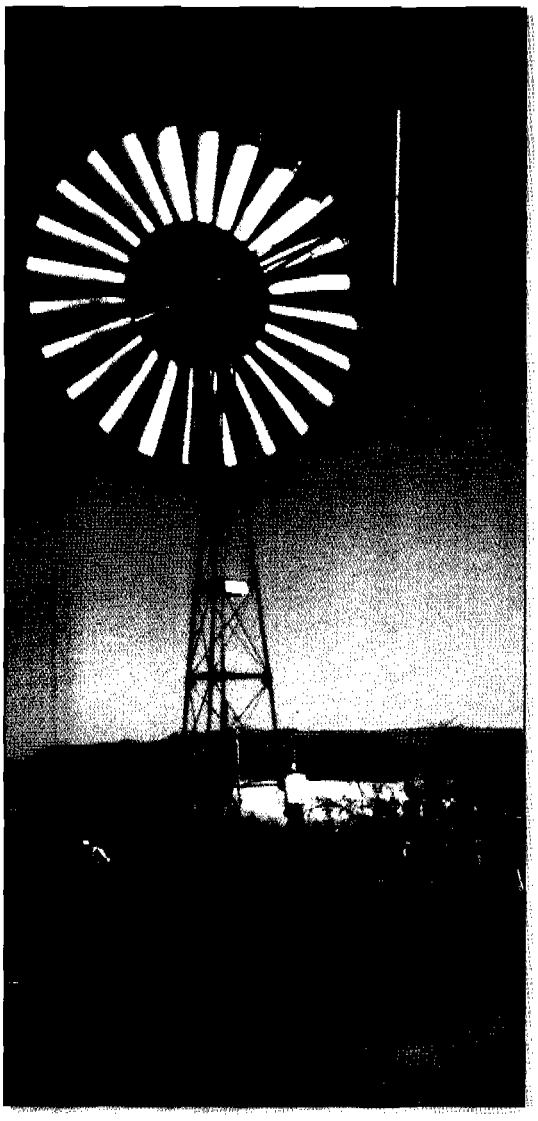

Figure 1
Wind powered water lifting from deep boreholes in pastoralist Turkana, Kenya. Careful attention to rangeland resources, seasonal livestock movements and the differing priorities of pastoralist interest groups is essential to avoid conflict and resource degradation in projects of this kind (Photo: ITDG/Morris Keyonzo)

Some of the earliest work with which ITDG became associated in the 1960s and 1970s centred on the building of water tanks, promoting small-scale irrigation, tube well construction and wind-powered water pumps. This early phase culminated in the late 1970s when the agenda for the United Nations International Water Decade was encouraged to encompass the use of appropriate technology.

During the 1980s water harvesting for rain-fed agriculture was a major issue. Projects during this period included the construction of rubble and earth bunds for animal herders in the Turkana district of northern Kenya. After rain, the land behind the bunds was farmed, and water for domestic use was obtained via shallow wells. This method has since been replicated in flood irrigation projects in many other semiarid areas, including Darfur, in western Sudan. Further examples of irrigation systems using locally adapted and developed technologies are common to agriculture-related projects in Peru, Zimbabwe, Kenya and Sri Lanka, as well as the Sudan.

By the early 1990s, water related activities were increasingly being incorporated into shelter programmes. In the rural Chiota area of Zimbabwe several hundred latrines were constructed using building blocks made from compressed soil, cement and water. In the Alto Mayo of Peru, the construction of gravity fed piped-water systems for new shelters involved a strong focus on local institutional capacities, especially relating to negotiating agreements to mitigate conflicting demands over the available water resources.

Towards the end of the 1990s the shelter programme

Figure 2
Water transport by donkey cart. An income generating delivery system developed and managed by women in Kassala, Sudan (Photo: ITDG/Mohammed Majoub)

became involved in supporting small operators to perform basic public services, including the delivery of water and removal of sanitation waste. Mostly unregulated and untaxed, these operators belong to the informal sector of the economy. However, in contrast to many public or multinational companies who fail to service marginal urban and periurban communities, these entrepreneurs need to win customer loyalty and be ready to innovate to stay in business in a competitive market. The programme now includes rooftop water harvesting, domestic sanitation and water supply, as well as enterprise development for building materials supply, construction, and water and sanitation services.

Managing the relationship between what at first may appear contradictory demands for differing productive and domestic water end-uses now underpins water-related work in a number of contexts. Indeed the primary focus of disaster mitigation is often on resolving the institutional, resource and social aspects of demand, an experience that highlights the need to incorporate the full range of local water perspectives in programme development.

The example of Kassala in eastern Sudan reinforces this point. Here, local institutions must balance the interests of women's groups to transport and sell water using donkey carts as an income generating activity against the demands of brick-makers. The technologies of water abstraction are entirely secondary to the social and organisational relationships that operate between stakeholders and the technologies they use. Nevertheless, the very complexity of needs and end-uses for water can, with some forethought and innovation, be used to the advantage of different interest groups. This can be illustrated by taking a tangential view of water resource management opportunities through an examination of experiences in micro-hydro.

MICRO-HYDRO

ITDG has facilitated community micro-hydro developments in Sri Lanka, Peru, Nepal, Kenya, Zimbabwe and Mozambique for over 10 years. Typical plants have cost around $2,500 per kW in current day terms, for a capacity of up to 200kW, enough power for a grinding mill and lighting for 40–50 houses. In each example, micro-hydro has provided an opportunity to use local natural capital and water, alongside financial and labour provision, for a 'distributed' power system with far lower costs of transmission than central energy investments.

Each scheme has involved three broad components of inter-mediation: The provision of technical, financial and social-organisational support. Project objectives have ranged from the maximisation of micro-hydro supply regardless of income in earlier projects, to providing rural households and services with electric light as a social good, to securing energy supply to livelihoods initiatives such as grinding mills for agroprocessing.

A recent review of the international programme summarised much of the micro-hydro experience as, 'it is easier to make the profitable social than the social profitable'. Plants that run without subsidies tend to be installed initially to produce mechanical power for a profitable end-use. Here lies the dilemma: How do you secure profitable end-uses and the financial sustainability of water systems development with the need for social outcomes? In response, ITDG has had to consider the means of using the micro-hydro plant to secure livelihood opportunities at an early stage, before exploring how the impact of direct energy supply can be spread to marginal households and social centres such as schools and health centres.

Many linkages can and do operate between water for energy and other livelihood outcomes. An important example in rural areas is to agroprocessing. This has the added benefit of attracting investment from both private entrepreneurs and community end-users. By building on these benefits, ITDG experience has shown that micro-hydro development can benefit much wider domestic and productive water opportunities than initially envisaged. Two examples from Zimbabwe illustrate this point.

In Manicaland Province, water for a rehabilitated hydro plant is taken from a tributary of the Mvumvumvu River to Svinurai farm. The farm, managed by a co-operative of 23 members, is now operating a milling system used by both the co-operative and surrounding community at full cost recovery. By Jan 1996, within 3 years of rehabilitating the plant, the co-operative was able to invest income from their milling services in agricul-

Figure 3
Many water structures provide multiple benefits that cross-subsidise one another: Irrigation and micro-hydro conduits, Canchis, Peru
(Photo: ITDG/Steve Fisher)

tural materials, pay a contractor for a communal toilet, and repair their piped domestic water system. The benefits were therefore not only for power, but also to food quality and added value, sanitation, and domestic water supply.

Conversely, in Nyamarambira, the Tangwena community has capitalised on the development of micro-hydro outlets to begin developing conduits and channels for small-scale irrigation. Indeed the primary motivation of community groups in 1992/3 was not for energy, but to develop their available water resources to increase agricultural production for market sales. Increased production has been secured through an effective cross-subsidy of agricultural water supply from the micro-hydro development. Further economic growth has now been made possible by the initiation of small-scale income generating projects focusing on value added agroprocessing, and it is envisaged that this expanding economy may provide the basis for sustainable public health and water sanitation improvements.

Similar examples of the inter-linkages operating between water stakeholder groups and their priority end-uses are common to each of ITDG's technology programmes. These show that significant, cross subsidising, and livelihood-enhancing opportunities can be uncovered by looking at the full range of productive and domestic water end-uses, how they relate one to another, the resources available to pay for them, and how they can be sustainably managed by different interest groups.

ABOUT THE AUTHOR

Barnaby Peacocke is the Rural Livelihoods Senior Specialist in the International Programmes Unit of ITDG. He has over 10 years' project management and research experience from Africa, South and Southeast Asia, covering sustainable agriculture, participatory technology development, and the analysis of socio-economic and environmental impacts of technology change.

IF YOU HAVE ANY ENQUIRIES REGARDING THE CONTENT OF THIS ARTICLE, PLEASE CONTACT:

Barnaby Peacocke
Senior Specialist – Rural Livelihoods
Intermediate Technology Development Group (ITDG)
Schumacher Centre for Technology and Development
Bourton Hall
Bourton on Dunsmore
Warwickshire
CV23 9QZ
UK

Tel: +44 (0)1926 634400
Fax: +44 (0)1926 634401
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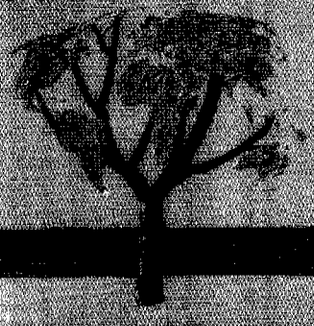

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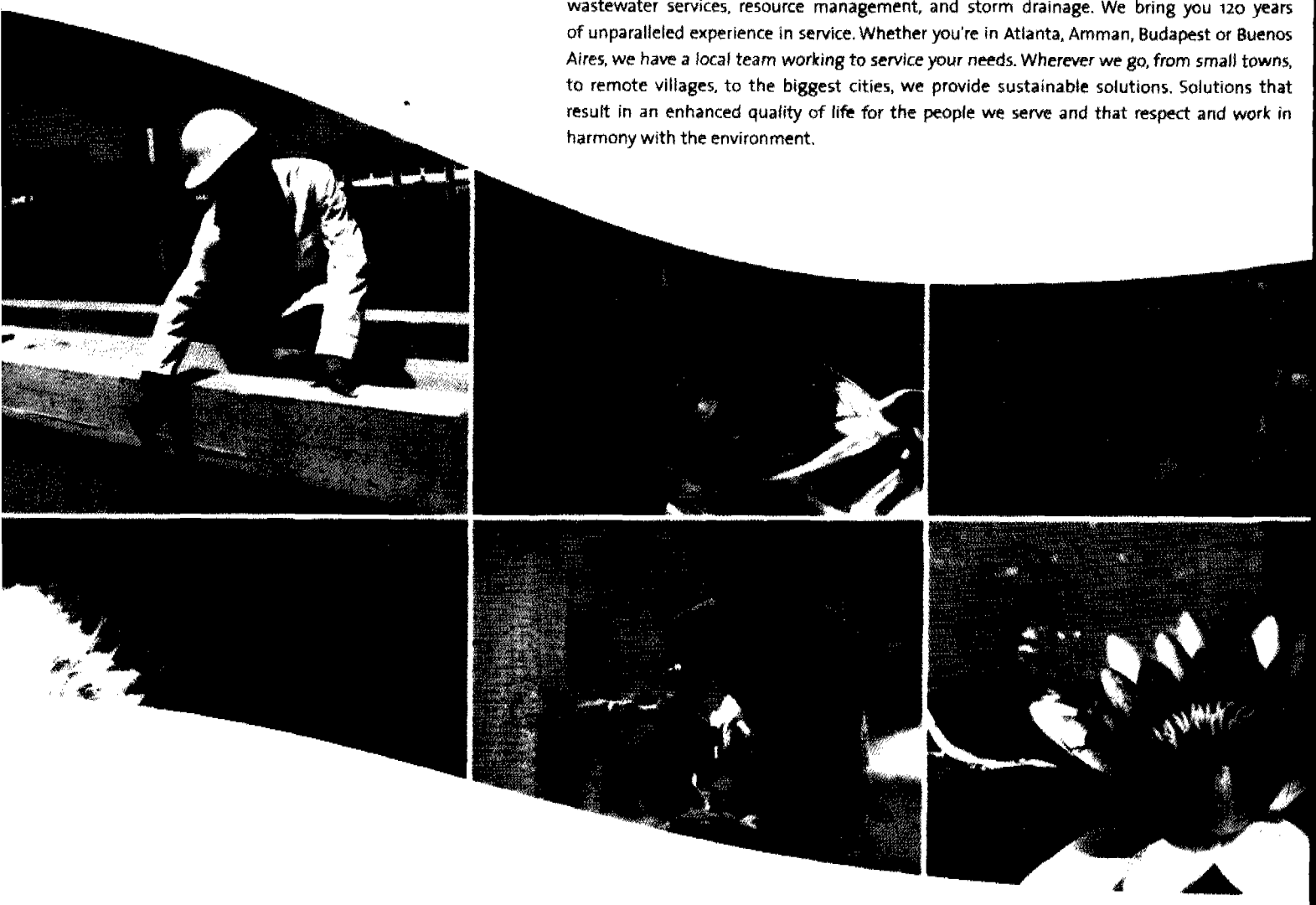

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