LINKING POVERTY REDUCTION AND WATER MANAGEMENT

ABOUT THE POVERTY-ENVIRONMENT PARTNERSHIP

The Poverty-Environment Partnership (PEP) is a network of bilateral aid agencies, multilateral development banks, UN agencies and international NGOs that aims to address key poverty-environment issues within the framework of international efforts to achieve the Millennium Development Goals. Analytical work and knowledge-sharing activities undertaken by the PEP since 2001 point to three broad, fundamental lessons that underpin efforts to link poverty reduction and environmental management:

- The environmental quality of growth matters to people living in poverty;
- Environmental management cannot be treated separately from other development concerns;
- People living in poverty must be seen as part of the solution rather than part of the problem.

PEP Member Organizations: *Bilateral Agencies:* Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Japan, the Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States. *Multilateral/UN Agencies:* African Development Bank, Asian Development Bank, European Commission, UN Food and Agriculture Organization, Inter-American Development Bank, International Fund for Agricultural Development, International Monetary Fund, Organization for Economic Cooperation and Development, UN Department for Economic and Social Affairs, UN Development Programme, UN Environment Programme, The World Bank, World Health Organization. *International NGOs:* International Institute for Environment and Development, IUCN-The World Conservation Union, Stockholm Environment Institute, Stockholm International Water Institute, World Resources Institute, WWF International.

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POVERTY-ENVIRONMENT PARTNERSHIP

LINKING POVERTY REDUCTION AND WATER MANAGEMENT

FOREWORD

The global community is united in its commitment to remove the scourge of world poverty through actions that bring different interests and organisations together in effective partnerships around the Millennium Development Goals agenda. The Poverty-Environment Partnership is a product of these concerns, reflecting a determination of different international organisations that support development to work together to address the links between poverty reduction and the various aspects of environmental management. This Joint Agency paper, a product of deliberations among many donor agencies, focuses on one of the most important issues in this agenda: the contribution of water management to poverty reduction. The issue of ensuring that the poor have access to safe drinking water and improved sanitation has, rightly, been prominent in international discussions, and specific targets have been included in the internationally agreed MDGs. But the contribution of water management to poverty reduction goes far beyond just drinking water and sanitation: water is essential for improving the health and livelihoods of the poor, ensuring wider environmental sustainability, reducing urban squalor and eradicating hunger. It is also critical in addressing gender inequalities and improving access to education for the poor.

This paper analyses these links and outlines the different ways in which improvements to water management can advance the cause of poverty reduction. Indeed, improving access to water is in some cases an essential pre-condition to the attainment of other MDG targets: there is little prospect of many health, environmental or income targets being achieved unless action is taken to address water problems. The paper also gives a clear and optimistic message for the future. It illustrates that improving the contribution of water management to poverty reduction is not just achievable: it is affordable. In many cases, it is a good investment that generates growth and gives rates of return comparable with investments in any other sector. And these benefits are directly targeted to the poor, and especially to women who bear many of the burdens that a lack of investments in water creates. Investing in water, in reforms to the institutions that govern water management and creating more effective partnerships to focus international support to water and environmental sustainability are all essential. The agencies that have worked together to prepare this paper are all committed to supporting these changes. The paper demonstrates that affordable and sustainable actions are

possible, and in many places are already happening. The international community faces a critical challenge in building on and supporting these actions so that the existing role that water management plays in poverty reduction can be enhanced in the future.

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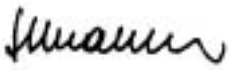

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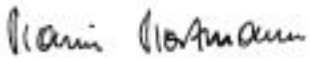

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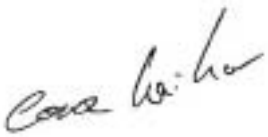

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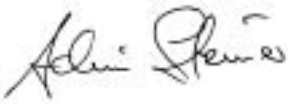

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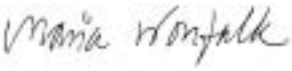

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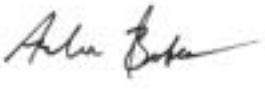

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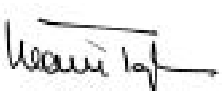

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ACKNOWLEDGEMENTS

This paper has emerged from discussions within the Poverty-Environment Partnership (PEP), reflecting the importance of water as an issue in understanding the relationship between poverty reduction and environmental management. The PEP is an informal partnership of international organisations and government agencies that meets periodically to discuss and establish consensus positions on issues concerned with sustainable development. This paper on poverty reduction and water management reflects this search for a consensus on this key issue for the world's poor.

The drafting process included several rounds of consultation with PEP members and other stakeholders including sessions and discussions on draft versions of the paper at CSD-12 in 2004 and CSD-13 in 2005, the World Water Weeks in Stockholm 2004 and 2005, PEP meetings in Stockholm and Ottawa in 2005 and the 2005 World Summit.

The main author of the paper is John Soussan of SEI, with substantial contributions to the writing also coming from Stacey Noel of SEI and Joakim Harlin and Susanne Schmidt of UNDP. Additional materials and detailed comments have been provided by Yogesh Vyas and Hany Raouf Shalaby of the African Development Bank, Wouter Lincklaen Arriens of the Asian Development Bank, Catherine Coleman of CIDA, Roberto Lenton of Columbia University, Jan Møller Hansen of Danida, Christine Werner of GTZ, Emer O'Brien and Tara Shine of Development Cooperation Ireland, Ger Bergkamp of IUCN, Durk Adema of the Netherlands Ministry of Foreign Affairs, Johan Rockström of SEI, Ingvar Andersson and Bengt Johansson of Sida, Håkan Tropp of SIWI, Peter Hazlewood, Linda Ghanime, Sarah Timpson, Inga Winkler and Carlos Linares of UNDP, Robert Bos and Jackie Sims of WHO and Jan Bojö of the World Bank. Further comments and advice have come from many other PEP members during the preparation and review of the different drafts of this paper.

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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AfDB	African Development Bank
CIDA	Canadian International Development Agency
CSD	United Nations Commission on Sustainable Development
DANIDA	Danish International Development Agency
DFID	Department for International Development, United Kingdom
EC	European Commission
EU	European Union
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information System
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
GWP	Global Water Partnership
IBRD	International Bank for Reconstruction and Development
IIED	International Institute for Environment and Development
IUCN	Word Conservation Union
IWRM	Integrated Water Resources Management
MDG	Millennium Development Goal
NGO	Non-Governmental Organization
OECD	Organisation for Economic Co-operation and Development
PEP	Poverty-Environment Partnership
PRS	Poverty Reduction Strategy
PRSP	Poverty Reduction Strategy Paper
SEI	Stockholm Environment Institute
Sida	Swedish International Development Cooperation Agency
SIWI	Stockholm International Water Institute
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
USD	United States Dollar
WHO	World Health Organization
WSSD	UN World Summit on Sustainable Development, Johannesburg 2002
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

This paper analyses the relationship between water management and poverty reduction. All aspects of poverty are considered: this is reflected in the analysis of water's potential contribution to all of the MDGs, not just those that refer explicitly to water. The basic contention advanced, and supported through reference to a wide range of case studies, is that water management is a good investment: not only can it contribute to poverty reduction, but it can do so in ways that are affordable and, in many cases, generate wealth. This potential is often not understood: the political prominence of water issues is all too often not translated into investment priorities. In particular, water management actions are poorly represented in PRSPs and in other key development strategies intended to focus national efforts on poverty reduction and attaining the MDGs.

The paper builds on the conceptual framework developed in earlier PEP papers through the analysis of the contribution of different aspects of water management to four key dimensions of poverty reduction:

Enhanced livelihoods security: the ability of poor people to use their assets and capabilities to make a living in conditions of greater security and sustainability. Water is both a key input to many types of livelihood activity and a determinant of the health and productivity of ecosystems on which the poor depend. Ensuring continuity in water flows and minimum levels of water quality is essential for maintaining the integrity of ecosystems, which in turn is critical for activities such as fishing, grazing and fuelwood gathering on which many poor people depend. Making sure that adequate and reliable water supplies are available for agricultural activities (including livestock, aquaculture, horticulture and other types of production) is a key to poverty reduction throughout the developing world. Designing domestic water schemes so that water is available for home-based livelihood activities such as vegetable production, pottery or laundering is effective in targeting the poor and supporting diversified livelihoods.

Reduced health risks: the mitigation of environmental and social determinants that put the poor and most vulnerable (especially women and children) at risk from different diseases, disabilities, poor nutrition and premature death. Water-borne (e.g. diarrhoea) and water-related vector-borne diseases (e.g. malaria) are the main killers in many parts of the developing world, and in particular affect children and other vulnerable groups. Providing access to safe and sufficient water and improved sanitation is the most effective way to improve health. It is also a good economic bet: investments in water and sanitation provide rates of return in excess of those found in many productive activities and are positive throughout the develop-

ing world. Improving the design of hydraulic infrastructure and water management in irrigation schemes and reservoirs within a broader IWRM approach supports a sustainable reduction of vector-borne disease transmission. Integrating water, sanitation and hygiene promotion into health systems development, and health management into the water, sanitation and IWRM provisions, is one of the most effective strategies for attaining the MDGs and reducing poverty.

Reduced vulnerability: the reduction of threats from environmental, economic and political hazards, including sudden impact shocks and long-term trends. Water-related disasters such as droughts, floods and major storms undermine development and destroy livelihoods, often throwing people into poverty. Degrading ecosystems, climate change impacts, pollution and soil degradation compound these risks and present formidable barriers to development. Actions to both reduce these risks and increase the resilience of the poor and of ecosystems when disasters strike or resources degrade should be an integral part of any poverty reduction strategy.

Pro-poor economic growth: enhanced economic growth is essential for poverty reduction in most parts of the world, but the quality of growth, and in particular the extent to which it creates new opportunities for the poor, also matter. Water management can be a catalyst for such growth. This is true at a local level, where it provides vital inputs into productive activities and creates opportunities for local entrepreneurs in supplying technologies, constructing facilities and providing services. The potential of local entrepreneurs remains untapped and can be a vital link in poverty reduction. Local investments generate high returns, retain benefits in the local economy and generate significant multiplier effects. It is also true at a national and regional level, where major water infrastructure investments can be a key to transforming development prospects. It is essential that such major investments are done with effective impact assessment and proper safeguards and taking into account all costs and benefits they generate. Where this is the case, and where major infrastructure is accompanied by investments in small additional infrastructure, in crop and livelihood diversification opportunities, in institutional development and in the creation of better access to inputs, markets, knowledge and, not least, the infrastructure itself, large-scale water investments can play a key part in poverty reduction.

The MDGs will only be effectively attained by actions in a number of spheres and, as we illustrate in the next section, water management has the potential to contribute to all of the MDGs in different ways. This will be achieved most effectively where water management is approached in an integrated way, with a clear understanding of how different actions will contribute to the reduction of poverty and the attainment of the MDGs. A key aspect of the actions defined in this framework is that they involve more than just water management agencies: organisations involved with agricultural development, health, industry, energy, trade, wider environmental management all have critical roles to play. A key issue for governments is consequently improving inter-agency coordination, both within the water sector and with related sectors.

KEY MESSAGES

Water management needs to be linked to wider poverty reduction processes at national and local levels: this is the key approach to **integrated water resources management**, and part of a wider process of poverty reduction and sustainable development. The analysis presented in this paper identifies a wide range of positive experiences that demonstrate the potential for making these links. The paper argues that water management can impact on poverty reduction in a variety of ways, and that increased resource flows to water management have positive impacts on poverty (and, consequently, on health) and are beneficial in social, environmental and economic terms. A number of key messages can be distilled from the analysis in the paper:

- **Investing in water (and sanitation) is an economically sound decision**, whether in large-scale infrastructure or in small local developments. Investments can generate rapid returns that make them competitive with investments in other sectors and are beneficial in wider development terms, tackling fundamental causes of poverty. The potential of encouraging local entrepreneurs in particular needs to be explored.

- **Doing infrastructure right:** substantial new investments in water control infrastructure are needed, including major water control structures to increase storage capacity and regulate water flows, but these need to be part of a package of structural and non-structural measures that includes social, environmental and health safeguards.
- **Finding the finance:** innovations in financing the water sector are essential if the potential of water in poverty reduction is to be realised. This includes both increased financial flows from the international community and, more importantly, actions to enhance levels of internal capital generation in developing countries, including from the private sector and the poor themselves.
- **Achieving the sanitation targets:** for many countries there is little prospect of reaching the sanitation MDG without major changes in their approach and allocation of resources. Innovations in technical choices, financial mechanisms, information and awareness raising and institutional responsibilities are needed if this challenge is to be met.
- **Water as a right**: the issue of water as a right is discussed, recognising it as a major area of disagreement internationally with strong arguments on both sides. Despite the contentious nature of this issue, what is clear is that more work is needed to establish the implications of a rights-based approach to water for the poor.

POLICY RECOMMENDATIONS

The final section discusses actions in relation to **policy processes**, through the creation of an enabling framework by national governments. In particular, governments should ensure that actions to enhance the role of water in poverty reduction are supported and take place with secure rights and regulations. This is true regardless of who takes the actions: government agencies, the private sector or communities themselves.

This is an area of decision-making where there is great scope for improvement, and good decision-making and policy development depend on good information. The basis for this should be a **national assessment** of water-poverty relationships and a process for defining **policy and strategic priorities**. These should be linked to national poverty reduction strategies such as PRSPs, with actions to address key constraints identified by the UN MDG Task Force:

- **Policy, legal and regulatory reform** (including rights of access to water).
- **Planning and technology choices** to broaden the range of technology and management choices available to poor people and planners.
- **Financial mechanisms**, including supportive investment environments and cost recovery mechanisms.
- **Institutional reform** and more effective institutional coordination.

Policy actions by governments should initially focus on:

- The integration of water into MDG-based Poverty Reduction Strategies.
- Reforms to reduce fragmentation within and between government agencies through IWRM.
- The improvement of local level water governance through decentralisation, securing rights and enhancing institutional capacities that brings decision-making within reach of the poor.
- The establishment of an effective regulatory system, including creating a level playing field to encourage investments by small local private sector enterprises.
- Advocacy and awareness programmes.

The paper ends with the conclusion that where the right investments are made, wise water management reduces poverty problems by lowering health risks and the multiple vulnerabilities that the poor face. It also creates solutions and generates wealth by helping secure sustainable livelihoods and catalysing economic growth. The result can be healthier, wealthier and more secure and confident people whose choices in life are greatly increased. If this happens, not only will the MDGs be reached (and often surpassed) but the foundations for continuing poverty reduction efforts beyond 2015 (to reach the 50% whose needs are not met by the MDGs) will be built through effective, sustainable and, above all, affordable solutions to the problems the world's poorest people face.

1. THE WATER POVERTY NEXUS

INTRODUCTION

The core argument set out in this paper is that water management is a key factor in the global battle to remove the scourge of extreme poverty and to build secure and prosperous lives for hundreds of millions of people in the developing world. On its own, this statement may seem non-contentious, as almost every statement on poverty reduction and sustainable development, whether from political, intellectual or organisational leaders, affirms the importance of water. But all too often this affirmation is largely rhetorical or, at best, is accompanied by a re-statement of the water supply and sanitation targets with an implicit message that this is the only aspect of water management that really matters. This is not the case: this paper sets out to demonstrate that water management has the potential to be a key factor in many aspects of poverty reduction and sustainable development beyond water supply and sanitation.

It also seeks to go beyond the rhetorical to identify how water can contribute: to show that we can move from commitment to action. As we shall see, in too many cases this is not yet happening: statements on the importance of water are not being followed by the commitments of resources and actions needed to realise the potential contribution to poverty reduction that water management can make. This paper argues that this is, at least in part, because the potential of water management as an engine not just of poverty reduction, environmental sustainability and improved health but also of straightforward economic growth and livelihoods development is not well understood.

The analysis presented in this paper is based on this understanding of poverty as a complex and variable phenomenon that is as much a reflection of insecurity and vulnerability as it is poor access to material goods. This includes an understanding that the poor have limited choices over how they meet their needs and are often forced into pathways that they know are unsustainable but over which they have little or no choice. It also reflects the understanding that effective poverty reduction is about addressing both immediate needs and the structural conditions that prevent people moving out of poverty:

> *"When individuals suffer from extreme poverty and lack the meagre income needed even to cover basic needs, a single episode of disease, or a drought, or a pest that destroys a harvest can be the difference between life and death…For people living in extreme poverty, the [MDGs] are ends unto themselves, directly representing the ambition for a longer, healthier and more fulfilling life. But they are also 'capital inputs' – the means to a productive life, to economic growth and to further development in the future"*[1]

[1]UN (2005). *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals*. Report of the Millennium Project to the UN Secretary General. United Nations, New York.

This statement helps us to understand how water can contribute to poverty reduction. It serves immediate needs: we cannot survive without drinking water and improved sanitation makes an immediate impact on health. Water is also a vital input into many types of human activities and is essential for the health and integrity of ecosystems, whilst improvements (and the way people organise to make these improvements) affect social and gender relations. As we shall see, the multiple character of water as a factor in many aspects of poverty reduction is not reflected in the approaches built into many poverty reduction strategies. That this is the case is the fault of the water community: in our enthusiasm to establish the need to address water issues we have emphasised the problems and failed to capture people's imagination on the solutions to wider development concerns that water can bring. One goal of this paper is to turn this around: to both reinforce familiar messages that water management is vital for the health and welfare of the poor and the ecosystems on which they depend and demonstrate the less familiar message that water management is a vital factor of production in the economies of nations and households. To support this contention, the paper will not only detail water's contribution to pro-poor economic growth but also discuss recent studies that demonstrate how investing in the water sector is a rational economic strategy, with many types of investments in water management generating rates of return as good as or better than those in most other sectors of the economy.

In most cases, the analysis presented here is not new: and indeed many of the actions that are advocated are already found (though perhaps only on a small scale) in many parts of the developing world. But, while the water management-related actions proposed have already proven themselves as being possible, they are as yet not probable. This paper aims at ensuring that what is already possible somewhere becomes probable everywhere: it seeks to show that the challenges that can seem daunting are surmountable when we build from practical actions that are proven around the world.

Investing in Water for Poverty Reduction and Economic Growth

This paper consolidates and builds on a range of work undertaken in the last few years: the analytical framework developed by the Poverty Environment Partnership (PEP), the work of the UN Task Force on Water and Sanitation, reports by different UN and other international agencies, practical on-the-ground experiences by NGOs and others and a variety of other sources. These different sources have been brought together here to demonstrate that that the contribution of water management to poverty reduction is already significant and can be much greater. The final report of the UN Task Force[2] captures the nature of this challenge well:

> *"Investments in water resources development and management can contribute to meeting the MDGs as a whole both through broad interventions designed to promote sustainable development on an area basis -- such as multi-purpose river basin development and aquifer management--and through targeted actions addressing one or more particular goals in a specific location, such as watershed management within degraded areas farmed by poor families. Both types of interventions are important for making many of the Millennium Development Goals a reality; indeed, holistic approaches to water resources development and management can help to deliver the MDGs more cheaply and sustainably."*

[2]UN Millennium Task Force on Water and Sanitation (2005). *Health, Dignity and Development: What Will it Take?* United Nations, New York.

Above all, the paper shows that investments in water are a good bet: not just for social, health and environmental reasons but also to directly generate economic growth that is, in many cases, effective in reaching the poor and that can transform the prospects of many of the world's poorest regions. This argument is needed. There is a widespread awareness of many of the challenges facing the developing world: a billion people without safe water supplies, two billion without adequate sanitation, widespread vulnerability to floods and droughts, widespread hunger because of poor agricultural productivity....the list goes on and forms a familiar litany (see box 1).

Box 1: Poverty Reduction and Water: The Basic Picture[3]

In 1998, 1,175 million people (1,183 million in 1987) survived on the equivalent of less than $1/day, 23.4% of the world's population (28.3% in 1987), while 2,811.5 million (56.1%) survived on less than $2, up from 2,549 million (61%) in 1987. The poorest of the poor live in East and South Asia and Sub-Saharan Africa, where 1090.5 million (93% of the total) of those living on less than $1/day are found.

Progress is being made towards some of the International Development Targets, with significant improvements in infant mortality (59/1,000 in 1998, down from 87/1,000 in 1980) and child mortality (79/1,000 from 135/1,000) and primary education (91% for boys and 86% for girls in 1998, up from 83% and 72% in 1980) in most parts of the world.

Globally, 1.1 billion people lack access to improved water supply and 2.6 are without improved sanitation[4]. Most (84% for water supply and 83% for sanitation) live in rural areas but the number of urban residents without adequate services is increasing rapidly. The majority (63% for water supply and 80% for sanitation) of those without adequate services live in Asia, but Sub-Saharan Africa has the highest proportion of people without water.

Water-associated disease transmission has two dimensions. Water-borne and water-washed diseases, linked to lack of access to adequate quantities of safe water and basic sanitation, are endemic in many regions. There are 4 billion cases of diarrhoea each year, causing 2.2 million deaths, mostly of children. Water-based and water-related vector-borne diseases are linked to aquatic ecosystems to fulfil the requirements for the breeding of intermediate hosts (schistosomiasis) and insect vectors (malaria and others). Millions are affected by malaria, filariasis, schistosomiasis, intestinal worms and other water-related diseases. At some moments in time, cholera, typhoid and other potentially fatal diseases are rife.

Agriculture represents 70% of all freshwater use and per capita food production has risen steadily over the last generation in all regions except Sub-Saharan Africa (where it continues to decline). But many millions are still malnourished. Around 800 million people don't have enough food to meet their basic energy needs and 2 billion lack a balanced diet. Yet, inadequately planned irrigation schemes and dams add to the disease burden of vulnerable groups in their vicinity.

Floods, droughts and major storms kill tens of thousands, cause billions of dollars of damage and affect the lives of many millions each year. And things are getting worse: the incidence of extreme events is increasing and will continue to increase due to climate change, while the most vulnerable are often the poorest people in the poorest countries. As the IPCC stated: "those with the least resources have the least capacity to adapt and are the most vulnerable".

Around 1.7 billion people live in countries that are water-stressed. This number will rise to 5 billion unless major changes are made to global water management. Most are poor countries, and in these countries, scarcity is not evenly distributed. It is often concentrated in more fragile, less productive environments where the poor live and try to make a living. It is again the poor, who are hit first and hardest.

[3] J. Soussan and W. Arriens (2004). *Poverty and Water Security: Understanding How Water Affects the Poor*. Asian Development Bank, Manila. [4] WHO/UNICEF (2004). *Meeting the MDG Drinking Water and Sanitation Targets. Joint Monitoring Programme Report*. WHO, Geneva. The report contains up-to-date definitions of both water supply and sanitation, and the estimated number of people without access to improved sanitation has been revised upwards based on these figures.

This awareness has produced high levels of political commitment to improving water; a fact reflected in the MDGs, in the prominence given to water and sanitation in the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, in the declaration of 2005-2015 as the decade of Water for Life. But, this political commitment is only poorly translated into concerted and sustainable actions on the ground: water hardly figures in many Poverty Reduction Strategy Papers (see box 2), investments in water management in many countries are stagnant or falling and reforms to the sector happen only slowly if at all. There has been a move towards the development of national integrated water resources management (IWRM) plans in some developing countries, with this a reflection of the commitments made in the WSSD in Johannesburg. In most cases, these efforts are in their infancy, however, and their effectiveness is limited by institutional barriers, low political support and public awareness and the lack of mechanisms to bring together stakeholders in the planning process. The realization of IWRM would provide a basis for more effective poverty targeting in water management, an issue discussed in more depth below. In particular, this would be instrumental in avoiding too narrow a focus on water supply and sanitation alone. This sector is, of course, of profound importance in realizing water's potential contribution to poverty reduction, but it is essential that the focus on water supply and sanitation does not lead to the neglect of the many other dimensions of water management that are included within an IWRM framework.

Box 2: Water in the PRSPs

A recent study by ODI and WaterAid[5] of the extent to which water supply and sanitation (WSS) figured in PRSPs in Sub-Saharan Africa concluded that "WSS had been inadequately reflected both in terms of the process of PRSP preparation and the content of emerging PRSPs". In total, 17 African PRSPs were examined and of these only Uganda showed a high level of priority to WSS. This is despite the extremely poor levels of coverage of water supply or sanitation in most of the countries studied, the prominence given to water supply in particular in many political and policy statements and the strong demand for improvements from communities throughout the region.

Several factors were cited as underlying this, with the weak poverty diagnosis and the weak links between central ministries, local governments and local communities within the sector as major culprits. In other words, WSS issues were not represented in PRSPs because the water sector failed to articulate the needs and potential impacts on poverty of investments in this sector: the advocates of WSS failed to engage with the PRSP processes and were their own worst enemies.

An assessment of water resources as a whole in nine Asian PRSPs[6] found similar results. In the Asian cases, water resource issues (including issues such as floods and droughts as well as WSS and irrigation for food production) were often present in the analysis of issues in the PRSPs but were rarely reflected in the programmes for action or priorities for investment. The failure of water advocates to engage in the PRSP processes was again seen as the main reason for this.

The situation found with water reflects a wider problem: work by the World Bank[7] examined 40 interim and full PRSPs from around the world and found that environmental protection and natural resource management issues were only weakly represented in PRSPs. There were exceptions, however, with countries such as Mozambique including a far higher level of prominence and, interestingly, the scores were better for the eight full PRSPs examined than for the 32 interim PRSPs, suggesting that the importance attached to these issues increases once wider consultations takes place.

A report prepared by the OECD DAC Secretariat[8] shows that aid to water supply and sanitation, and in particular grant aid (as opposed to loans) has declined in recent years and in 2002 bilateral commitments

[5]T. Slaymaker and P. Newborne (2004). *Implementation of water supply and sanitation programmes under PRSPs*. ODI, London.
[6]D. Frans and J. Soussan (2003). *Water in Asian PRSPs. Asian Development Bank Water and Poverty Initiative*. Asian Development Bank, Manila. [7]Bojo et al. (2004). *Environment in Poverty Reduction Strategies and Poverty Reduction Support Credits*. World Bank Working Paper No. 102. World Bank, Washington, DC. [8]OECD DAC Secretariat (2004). *Aid for Water Supply and Sanitation*. OECD, Paris.

were at their lowest levels since 1985. The decline is both in real monetary terms and in relation to aid to this sector as a proportion of total aid flows. The decline started in the mid-1990s and has accelerated since 2000. Commitments for bilateral assistance from DAC countries fell from $2,569 million in 1999-2000 to $1,692 million in 2001-2002 (from 9% to 6% of total bilateral assistance). Commitments from multilateral sources increased somewhat in this period but, despite this, total aid commitments fell from $3,161 million to $2,706 million in the same period (from 8% to 6% of total aid flows).

Why is this the case? Why has political rhetoric not been translated into sustainable actions? There are, of course, many reasons for this. In part it is a reflection of a wider trend away from infrastructure investments in development assistance: concerns over the social and environmental impact of major infrastructure and the recognition of alternative approaches have meant that donors are less eager to fund such projects. It also reflects the move towards sectoral support, where donor funds go to support the national budget for specific sectors, whilst by its nature water is often cross-sectoral and almost always involves several ministries.

These trends cannot explain all of the decline in support, however, and two additional reasons stand out. Firstly, the challenges are too often presented as so daunting as to be insurmountable. In particular, the scale of investments argued for from the international community is both exaggerated and disabling. For example, the authoritative report of the World Panel on Financing Water Infrastructure[9] suggested that a figure of $180 billion per annum was needed for investments in water infrastructure as being *"generally accepted as the right order of magnitude".* Faced with such daunting demands for investments, the financial viability and returns on which are not clearly demonstrated, it is not surprising that decision-makers on investment priorities have all too often looked elsewhere, where it is felt demands are lower and returns more secure.

This leads to the second reason: too often investments in water (and especially water supply and sanitation) are not seen as producing direct returns to economic growth and development, so that the limited resources available are prioritised for other sectors that are perceived to be more productive. It is argued that growth is needed before investments that produce no material returns can be afforded. At the core of the arguments in this paper is the contention that this is a mistaken assumption: that investments in water directly reduce poverty and contribute to the overall development of impoverished nations. Water management is not a 'problem': it is part of the solution. As the UN Task Force on Water and Sanitation argue:

> *"National governments—including planning and finance ministries and their supporting agencies—must be convinced of the importance of achieving the MDGs in water supply and sanitation. They need to recognize that water and sanitation are essential for the success of all development."* [10]

[9] J. Winpenny (2003). *Report of the World Panel on Financing Water Infrastructure.* World Water Council, Marseilles.
[10] UN Millennium Task Force on Water and Sanitation (2005). *Health, Dignity and Development: What Will it Take?* United Nations, New York.

Though there are relatively few studies that have examined the economic value of water supply and sanitation investments, two recent studies that did found high rates of return. The first study, a global analysis undertaken by the World Health Organisation, looked at the impact of five different levels of water and sanitation interventions across regions and found that, across all regions and all interventions, cost-benefit ratios were significantly greater than 1, and – in some cases – were as high as 60. The second study, which involved using household-based calculations to analyse the impact of 7 WaterAid projects in two countries, found returns ranging from $2 to $52 for each $1 invested. The specifics of these two studies will be discussed below in Box 17 and under the heading 'Pro-Poor Economic Growth', but these figures illustrate the economic rationale for raising the levels of investment in water.

DEFINING THE CONTEXT

This section helps to define the context within which the actions needed to improve water's contribution to poverty reduction can be understood. This is done through an introduction to three key issues that are essential for the effective management of water resources in all settings: the creation of good governance conditions so that the needs and interests of all are represented in a fair and transparent manner, the move towards integrated water resources management as a means for more effective management of water resources and the integration of gender as a central dimension of decision-making systems.

Good Governance

Good governance is an issue that, in different forms, is now seen as fundamental to any poverty reduction strategy and cuts across all of the issues addressed in this paper. It has many dimensions: creating a fair legal, policy and regulatory framework in which the rights of people to access resources are secured; improving the effectiveness, accountability and transparency of government agencies; ensuring the participation of the poor in decision making; enhancing the role of civil society; ensuring basic security and political freedoms; and others[11]:

> *"Water governance is more than national level water legislation, regulations and institutions, though these are important components. It also refers to the processes that exist to promote popular participation in designing water and sanitation systems and where decisions about those systems are made."*

The recognition of the importance of governance issues in recent years has led to a much stronger focus on institutional processes in poverty reduction. It is based on the premise that sustainable development involves changes to power structures and participation in key aspects of decision-making in society so that the poor are empowered to influence decisions that affect their lives, including in the management of water, the design and operation of water supply schemes and the choices made over how to best utilise scarce resources. Most countries have made progress in these areas, though in many cases a substantial implementation gap remains.

[11]UNDP (2004). *Water Governance for Poverty Reduction*. UNDP, New York.

There are numerous examples of changes to governance conditions in the water sector around the world, with in particular many countries adopting new policies and laws that create the conditions for essential reforms if water is to place a more central role in poverty reduction. There are issues about the effectiveness of implementation of these changes (see box 3), but despite such reservations the momentum in water management is clear: a move away from more traditional technical and sectoral approaches based on infrastructure development alone towards more integrated, demand-led approaches that emphasise management and governance issues, are concerned with economic viability and sustainability, recognise the need for maintaining the integrity of ecological processes and seek to find a balance between needed investments in infrastructure and non-structural issues.

Box 3: Water Policy Reforms in Asia[12]

A comparative analysis of water sector reforms in 17 Asian developing countries considered: (i) the effectiveness of reforms under different circumstances; (ii) the preconditions for success in pursuing reform initiatives; and (iii) the common issues for sharing experiences in sub-regional and cross-regional contexts. Forty policy actions were analysed in the 17 countries. The analysis showed that the greatest progress has been made with the "foundational elements" of water sector reform (sector reviews, policy development, etc.), whilst the weakest progress has come in the area of service delivery and appears to be associated with reforms to transfer responsibility from the government agencies to autonomous water providers and other stakeholders in the sector. The study further found that countries had difficulty implementing policies they had adopted, and that individual countries deviated widely from region-wide trends.

When water sector reforms were examined in a broader context of public sector reforms and institutional change, a range of factors were found likely to influence the success of water sector reforms, including the political and socio-economic environment, the engagement of "elite" decision-makers, the approach used and stage and trajectory of policy and institutional reforms, responses to crisis events such as natural disasters, the activities of external support agencies, the nature of performance/output gaps and the results that flow from reform and change, including most importantly, the outcomes and impacts on society.

Integrated Water Resources Management

This momentum for reform means that innovative, more poverty-focused approaches can be introduced in a supportive environment that recognises the need for change. A critical context for this is the on-going process to develop national **integrated water resources management** (IWRM) strategies. This is an issue that is recognised as important in the WSSD Plan of Implementation, which includes a provision for countries to "develop integrated water resources management and water efficiency plans by 2005" and explicitly recognises the need for support to developing countries to achieve this. The focus of these efforts, and the support provided to them, should be to enhance water management capabilities focused on poverty reduction in a manner that is compatible with sustainable development:

> *"Improve the efficient use of water resources and promote their allocation among competing uses in a way that gives priority to the satisfaction of basic human needs and balances the requirement of preserving or restoring ecosystems and their functions, in particular in fragile environments, with human domestic, industrial and agriculture needs, including safeguarding drinking water quality".*[13]

[12]M.P. Mosley (2004). *Comparative Analysis of Water Sector Reforms Phase 1*. Asian Development Bank, Manila. [13]UN (2002). *WSSD Plan of Implementation*. United Nations, Johannesburg.

As the UNDP[14] points out, this is above all a governance challenge, through which fair, efficient and transparent processes to balance the needs and interests of different stakeholders can be built and a consensus on the priorities for allocating scarce resources (not just water but also institutional, financial and others) established. This perspective on IWRM means that it is an integral and essential part of the approach set out in this paper, and in consequence that support to countries to achieve the WSSD target of developing IWRM strategies can be seen as a contribution to building capacities for more effective poverty reduction. This poverty focus, and in particular the link to national poverty reduction strategies, for IWRM development is one that is advocated by the UN Task Force[15], who argue that it is essential "that there is a coherent poverty reduction strategy in place from which a water resources development and management plan can be derived". As such, the approach set out in this paper advocates that explicit poverty reduction goals are the rationale for and focus of national IWRM efforts.

There is a wide range of potential ways to categorise different dimensions of water management within an overall IWRM framework. The approach set out here is one that reflects the complex and multi-dimensional character of poverty and the need to link specific aspects of water management to particular challenges poor people face and opportunities they possess. These different dimensions of poverty reduction provide a link through which different areas of water management can be related to the attainment of the MDGs.

Gender

These different aspects of poverty do not affect all people in the same way, even in the same community. The need to integrate **gender** as a core issue in any poverty reduction strategy is now generally accepted. Both the analysis of the causes and characteristics of poverty and the identification of strategies to address poverty need to be gender-specific. This is certainly the case with regard to water resources: an issue developed in more depth below. For now, it is worth noting that, whilst the focus of this paper is on the relationship between water management and poverty reduction, the framework through which this relationship is analysed includes gender as a core issue. As the WHO/UNICEF[16] point out:

> *"Ask anyone what it will take to make women's equality a reality and 'toilets' will probably not be the response. Yet it is difficult to exaggerate the impact that access to private, safe and sanitary toilets would have on the daily lives and long-term prospects of the 1.3 billion women and girls that are currently doing without. The burdens of water hauling are widely understood: this tedious, time-consuming and physically debilitating chore reduces the time available for productive activities and, for girls, to attend school…how can the future be better if today's girls must drop out of school for want of something as basic as a toilet?"*

This reflects the approach to sustainable development advanced by the OECD-DAC, which states that *"poverty, gender and environment are mutually reinforcing, complementary and cross-cutting facets of sustainable development"*[17]. It must be stressed that placing gender at the centre of the approach is not done for reasons of political correctness (though social change and empowerment are critical issues), but rather for solid practical reasons: the bottom line is that interventions that mainstream gender are more effective and sustainable than ones that do not (for example, see box 4). The issue of gender as a key focus of water management for poverty reduction emphasises the need to recognise and address the social, political and institutional context (the governance conditions) through which water is managed.

[14]UNDP (2004). *Water Governance for Poverty Reduction*. UNDP, New York. [15]UN Millennium Task Force on Water and Sanitation (2005). *Health, Dignity and Development: What Will it Take?* United Nations, New York. [16]WHO/UNICEF (2004). *Meeting the MDG Drinking Water and Sanitation Targets*. Joint Monitoring Programme Report, WHO, Geneva. [17]OECD-DAC *Poverty Guidelines (2001).* OECD, Paris.

In addition to gender, other aspects of diversity within the poor must be taken into account: the poor are not homogenous. Social, cultural, and ethnic differences must be considered; in designing appropriate sanitation services, for example, all three of these elements are pertinent. The poor are also diverse in terms of their settings: rural, urban, or peri-urban locations; coastal areas versus upland or mountainous areas; and tropical lands as opposed to semi-arid or arid areas. In addition, there is great variety in terms of livelihood assets and opportunities: those individuals with small parcels of land, some of whom may have access to livestock, and the landless, who may work as day labourers or engage in natural resource-based activities (fishing, harvesting of forest products). Thus, interventions must be tailored to the specific circumstances of the poor and their resource base.

Box 4: Ladies First: Accessible Water for Entrepreneurial Women in the State of Punjab, Pakistan[18]

In Punjab women and children bear the brunt of the lack of access to water. The Government of Pakistan has implemented the Punjab Rural Water Supply and Sanitation Sector Project, funded by the Asian Development Bank. The project, using a community-based approach, has provided safe drinking water and drainage facilities to about 800,000 people. The project used a community-based, demand-driven approach wherein the local people participated from planning through construction and eventually became fully responsible for operation and maintenance (O&M) work. Men and women formed community-based organizations to implement the water-related activities and promote other development and livelihood activities. The main impact of the project has been to free women and children from having to carry water 2–6 hours a day. Also, people's income has gone up, as 45% of the time saved is spent on income-generating activities. A survey found a more than 90% reduction in water-related diseases, an average increase in household income of 24%, and as much as 80% increase in the enrolment of schoolchildren. The Punjab Project demonstrates that it is possible to combine an efficient and large-scale extension of services with actions to improve governance through an approach that placed women at the heart of decision-making systems. Their greater concern with and awareness of problems and potentials associated with water supply resulted in cheaper, more effective and more sustainable choices being made.

WATER MANAGEMENT AND THE MDGS

The discussion presented so far argues that improved water management can make a major contribution to poverty reduction. The goals and targets set out in the Millennium Declaration, the MDGs, provide a specific structure for analysing the relationship between poverty reduction and water management. The discussion here looks at all of the MDGs, not just those directly related to water, and argues that water management can play a key role as a part of strategies for achieving most the MDGs, either directly contributing or indirectly by creating conditions where the different goals and targets are more likely to be attained. The key points made here are presented in Table 1, which sets out an analysis of these relationships.

The Millennium Declaration calls for "sustainable water management strategies at the regional, national and local levels which promote both equitable access and adequate supplies". Realising this will require commitments of resources and political will to create the

[18]Asian Development Bank (2004). *Bringing Water to the Poor: Selected ADB Case Studies*. Asian Development Bank, Manila.

Table 1: Water's Contribution to Attaining the Millennium Development Goals

Goals	Targets	Water Directly Contributes	Water Indirectly Contributes
Goal 1: Eradicate extreme poverty and hunger	**Target 1:** Halve, between 1990-2015, the proportion of people whose income is less than $1 a day	Water as a factor of production in homestead gardening, agriculture, animal husbandry, cottage industry and in many other types of economic activity Investments in water infrastructure and services as a catalyst for local and regional development Household water treatment and safe storage reduces the disease burden among the poorest who have no access to safe drinking water	Reduced vulnerability to water-related hazards boosts investments, production and development Reduced ecosystems degradation boosts local-level sustainable development Improved health from better quality water increases productive capacities
	Target 2: Halve, between 1990-2015, the proportion of people who suffer from hunger	Water as a direct input into irrigation and fertilisers from wastewater and human excreta as a direct input into agri- and aquaculture for expanded food production with due regard for health aspects Reliable water and fertilisers from wastewater and human excreta for subsistence agriculture, home gardens, livestock, tree crops Sustainable production of fish, tree crops and other foods gathered in common property resources	Ensure ecosystems integrity to maintain water flows to food production Reduced urban hunger by cheaper food grains from more reliable water supplies
Goal 2: Achieve universal education	**Target 3:** Ensure that by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary education		Improved school attendance from improved health and reduced water carrying burdens, especially for girls A safer school environment for girls through appropriate sanitation facilities in schools results in increased attendance
Goal 3: Promote gender equity and empower women	**Target 4:** Eliminate gender disparity in primary and secondary education preferably by 2005 and at all levels of education not later than 2015	Gender sensitive water management programmes help empower women and give them confidence to increase their role in other societal activities	Community-based organisations for water management including women improve social capital of women Reduced time and health burdens from improved water services lead to more time for income earning and saving activities and more balanced gender roles

Goals	Targets	Water Directly Contributes	Water Indirectly Contributes
Goal 4: Reduce child mortality	**Target 5:** Reduce by 2/3, the under-five mortality rate	Access to improved quantities and quality of drinking and domestic water and sanitation reduces the main determinants of morbidity and mortality for young children	Improved nutrition and food security reduces susceptibility to diseases
Goal 5: Improve maternal health	**Target 6:** Reduce by 3/4 between 1990-2015, the maternal mortality ratio	Improved cleanliness, health and reduced labour burdens from water portage reduce mortality risks	Improved health and nutrition reduce susceptibility to anaemia and other conditions that affect maternal mortality
Goal 6: Combat HIV/AIDS, malaria & other diseases	**Target 7:** Have halted by 2015 and begun to reverse the spread of HIV/AIDS	Improved access to water and sanitation supports HIV/AIDS affected households and may enhance the impact of home care programmes	Improved health and nutrition and increased incomes reduce susceptibility to HIV infection and the onset of AIDS
	Target 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases	Better water management reduces mosquito habitats and the transmission risks of malaria (prevention) Reduced incidence of a range of diseases where poor water management induces the breeding of vectors and intermediate hosts (control)	Improved health and nutrition status reduces susceptibility to a range of major diseases
Goal 7: Ensure environmental sustainability	**Target 9:** Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	Improved water management, including pollution control and sustainable levels of abstraction, key factors in maintaining ecosystems integrity, and eco-sanitation methods reduce water consumption and recycle nutrients and organics	Development of integrated management within river basins creates conditions where sustainable ecosystems management possible and upstream-downstream impacts are mitigated
	Target 10: Halve by 2015, the proportion of people without sustainable access to safe drinking water and improved sanitation	Actions to ensure access to adequate and safe water for poor and poorly-serviced communities Actions to ensure access to improved and if possible of productive eco-sanitation for poor households	Health and hygiene promotion activities to ensure greater service coverage generates improved health benefits Develop operation and maintenance and cost recovery systems to ensure sustainability of service delivery
	Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers	Actions to improve water supply and sanitation services for urban poor communities Actions to reduce water-borne pollution and wastewater discharge and improve environmental health in slum areas	Communities organised around water supply provision better placed to negotiate for other needs

Goals	Targets	Water Directly Contributes	Water Indirectly Contributes
Goal 8: Develop a global partnership for development	**Target 12:** Develop further an open, rule-based predictable, non-discriminatory trading and financial system		Fairer market conditions make exports from water-based production (e.g. Irrigation) viable, generating greater pro-poor growth
	Target 13: Address the special needs of the least developed countries….		Actions to reform water sector and invest in needs of the poor demonstrate poverty reduction commitments
	Target 14: Address the special needs of land-locked countries and small island states	Water problems (e.g. water scarcity, salinity, disasters) major constraint on development in these countries	
	Targets 15-18	Water management not a relevant factor	

institutional capacities, conducive governance conditions and adequate flows of investments needed to make it happen. This is unlikely to be forthcoming unless a more coherent case that demonstrates the role of water in poverty reduction is presented. Such a case can be based on demonstrating the essential role of water in achieving the full set of Millennium Declaration goals and targets.

MDG Goal 1: Eradicate extreme poverty and hunger

Target 1, **to halve by 2015 the proportion of the world's people whose income is less than $1/day** will require sustained economic growth in developing countries, with that growth focused on sectors that provide livelihood opportunities for the poor. Agriculture is and will continue to be a key sector for many poor people, and limited and unreliable access to water is a determining factor in agricultural productivity in many regions. These problems reflect rainfall variability that is likely to increase with climate change. Key strategies include improving the efficiency of existing irrigation and extending the irrigated area where possible, extending rainwater harvesting and improving on-farm water management in rain fed agriculture, crop diversification and improvements to crop strains. New eco-system approaches to sanitation, which are based on the systematic implementation of the reuse and recycling of water, human faeces and urine by using modern and safe sanitation and reuse technologies, can play a major role in increasing yields in subsistence farming and market production of urban and rural agriculture, while simultaneously helping to preserve soil fertility, assure food security, and minimise water pollution.

Water is also an important input into many industrial production processes and into many other types of economic activity. These include both large-scale activities and small, often home-based activities where the poor are themselves entrepreneurs (see box 5[19]). Access to key inputs into production, including water, is critical to the viability of these activities that can act as a ladder out of poverty. In some cases,

[19]The information in the boxes in this section is mostly drawn from the Briefing Notes series produced by the WELL network and available on www.lboro.ac.uk/well.

investments in major water infrastructure such as dams and major irrigation schemes can act as a catalyst for local and regional development. Improved health from better quality water also increases production capacities, increases life expectancy and reduces health care costs.

Water management is of critical importance to reducing the vulnerability of poor people to water-related hazards such as drought and floods that can devastate livelihoods and throw people into poverty, destroy infrastructure and cancel the benefits of major investments. Water management helps to reduce the risks associated with such investments. Finally, water management is a key to maintaining the ecosystems on which many poor people depend and that are the foundation of local-level sustainable development. In these and other ways, water management will contribute directly and indirectly to sustainable development and poverty reduction and should be a key element in any strategy to reduce the proportion of people living below the poverty line.

Box 5: Water and the Poverty MDG

Water supply and sanitation provision can turn the poor into local entrepreneurs, whilst improved water supply opens up new livelihood opportunities:

- In Lesotho, local latrine builders earn the equivalent of the mean monthly income in the country: 45% work part time for an additional income.
- Improved water supply allows women entrepreneurs in Gujarat to earn Rs 750 to Rs 5,500 a year in activities like dairying, crafts and tree nurseries.
- The impact of water, sanitation and hygiene provision on micro-entrepreneurs in Uganda includes reduced costs, increased production and sales, increased consumer demand and the possibility of new water-related enterprises.

Poor food security is reflected in both inadequate total nutrition and in poor nutritional balance, with deficiencies of proteins and other key elements of diet the lot of many hundreds of millions of the world's poor. This is reflected in Target 2: **to halve by 2015 the proportion of the world's people who suffer from hunger**. Food security is in part a national issue, with the need to ensure water is available for expanded and reliable grain production, including ensuring ecosystems integrity to maintain water flows to food production. This is critically important for affordable food for the rapidly growing numbers of urban poor.

In rural areas, food insecurity needs to be addressed at the local level, with landless families, women-headed households, rain-fed farmers, livestock herders and other vulnerable people key targets. Reliable water for subsistence agriculture, home gardens, livestock, tree crops and the sustainable production of fish, tree crops and other foods gathered in common property resources are keys to improving the food security of those most vulnerable to hunger.

MDG Goal 2: Achieve universal education

MDG Goal 3: Promote gender equity and empower women

Education is a critical input into poverty reduction, as reflected in Target 3: to ensure that, by 2015, children everywhere will be able to complete a full course of primary schooling, and Target 4: to eliminate gender disparity in primary and secondary education by 2005 and at all levels of education not later than 2015. Although water does not play a direct role in achieving this, improved health results will play a key role in improving attendance and performance at school, whilst better water supplies will mean millions of girls do not have to spend study time collecting water. Providing adequate water supplies and sanitation in schools in, in particular, poorer rural areas are also important in ensuring school attendance (see box 6). Community organisations for water management improve the social capital of women and lead to more balanced gender roles.

Box 6: Water and Education[20]

- In Pakistan, more than 50% of girls drop out of school in grade 2-3 because the schools do not have latrines.
- A study in Jamaica found that children treated against helminth infection perform much better than children who did not receive treatment.
- In the Noakhali District of Bangladesh, the provision of water and sanitation facilities increased girls' attendance at school by 15%.

MDG Goals 4, 5, and 6: Health-related goals

Water management will play a critical role in achieving the three health-related MDGs and their associated targets: Target 5: **to reduce by two-thirds, between 1990 and 2015, the death rate for children under the age of five years**; Target 6: **to reduce by three-fourths, between 1990 and 2015, the rate of maternal mortality**; and Targets 7 and 8: **to have, by 2015, halted and begun to reverse: the spread of HIV/AIDS, the scourge of malaria and the scourge of other major diseases that affect humanity**. Water-borne diseases are the biggest killer of young children and improved quantities and quality of domestic water and sanitation will directly reduce child deaths (see box 7). Improved nutrition and food security, for which access to water is critical, will reduce susceptibility to a wide range of diseases and will lower both child and maternal mortality rates. Malaria is a scourge that will only be sustainably addressed through water management that removes the breeding habitats of its vectors. Similarly, water management will reduce vulnerability to a range of other diseases transmitted by aquatic vectors.

[20]Briefing Notes series produced by the WELL network and available on www.lboro.ac.uk/well.

Box 7: Water and Child Health[21]

- A study in Salvador, Brazil showed that children in households with no toilet had twice the incidence of diarrhoea of children in families with a toilet.
- The Water and Sanitation Extension Programme in Pakistan found that children not living in programme villages had a 33% higher incidence of diarrhoea.
- A CIDA-CARE programme in Honduras showed that providing water and sanitation greatly reduced the incidence of skin sores and diarrhoea.
- Water, sanitation and hygiene improvements reduced malnourishment amongst the Nuer community in the Upper Nile.
- In Tanzania, increased availability of water during and after childbirth reduced postnatal infections.

MDG Goal 7: Ensure environmental sustainability

Target 10: **to halve, by 2015, the proportion of people without sustainable access to safe drinking water and improved sanitation**, is of course the most directly water-related of the MDG goals and targets. A recent World Bank report, drawing on the WHO/UNICEF Joint Monitoring Program Global Water Supply and Sanitation Assessment 2000 Report, suggests that progress with sanitation in particular has been slow, and that current financial and reform commitments will be insufficient to reach these MDG targets:

> *Investment will need to double, from $15 billion to $30 billion annually. Existing assets must be properly operated and maintained, and new investments will have to be efficient. Additional investment will be needed for wastewater treatment, rehabilitation of existing infrastructure, and infrastructure for water storage and conveyance to deal with urbanization and growing climatic variability…focusing solely on investment will not generate sustainable service improvements, however, as the experience of the International Drinking Water Decade has shown. Success in achieving the millennium goal requires a combination of sound policies, improved governance, capable institutions, increased investment and financing, and more effective financing modalities.* [22]

This is a priority everywhere. Africa and Asia present particularly formidable challenges, given their starting point: in the poorest countries of these two regions, only half of the population has access to improved sanitation and, in Africa and many parts of Asia, only half have access to safe and adequate drinking water as well. Of the two, the situation with regard to sanitation is the most pressing concern: in many countries existing coverage rates are only half those of drinking water and the rate of progress in working towards the MDG target is noticeably slower for sanitation than drinking water. A key to poverty reduction is to ensure that the package of governance reforms, technical capabilities and access to finance needed to extend water supply and sanitation coverage to those in need is put in place. In particular where people do not have access to safe water, it is generally their top priority. Where the means to do so exists, people are willing and able to pay for these services. A key to attaining these targets will be to assist the development of local market-based service providers: an issue discussed in more detail below.

Linked to the target on drinking water and sanitation is the wider goal of stopping the unsustainable exploitation of natural resources; this is reflected in Target 9: **integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental**

[21]Briefing Notes series produced by the WELL network and available on www.lboro.ac.uk/well. [22]World Bank (2004). *Global Monitoring Report 2004.* World Bank, Washington, DC.

resources. Water is amongst the resources most under pressure in many parts of the world. Water management is similarly crucial for the maintenance of many ecosystems such as wetlands, mangroves, reefs and others that are experiencing or threatened by degradation. Direct actions to move to more sustainable patterns of exploitation and improve water management are critical to achieving this goal. Essential to this is the development of integrated management within river basins that creates conditions where sustainable ecosystems management is possible and upstream-downstream impacts are mitigated. Another option is the implementation of eco-sanitation systems; these systems aim to close the natural cycles of water, nutrients and organics and thus recycle important resources that usually get lost in most present "end-of-pipe" sanitation systems.

Improving access to water resources for the poor and for growth sectors in poor economies can potentially be at the detriment of many ecosystems that depend on water extracted from the system, but this need not be the case. There is an increasingly forceful argument for ecosystems-based approaches to water management, in which care is taken to ensure that the minimum flows of water needed to maintain ecological integrity of ecosystems is ensured: *"environmental flows provide critical contributions to river health, economic development and poverty alleviation. They ensure the continued availability of the many benefits that healthy river and groundwater systems bring to society"* [23]. This approach will be the basis for ensuring that target 9 of the MDGs is realised.

Improved water management and services are critical for achieving Target 11: **improving the lives of slum dwellers**. The urban poor suffer poor quality and unreliable water services (for example, in Delhi only 1% of those people with water supply connections enjoy 24 hour service availability, and in Karachi, Dhaka and Kathmandu the figure is less than 1%). Slum dwellers often have to queue for long periods to collect or pay high prices for these inadequate supplies (the poor often pay 10 or more times the price for water to private vendors that better off people with connections to central utilities do). Few have access to decent sanitation and many are vulnerable to flood threats and contamination from polluted waters.

[23] M. Dyson, G. Bergkamp and J. Scanlon. (eds.) (2003). *Flow: the Essentials of Environmental Flows*. IUCN, Gland.

Providing reliable, affordable and accessible water supplies, improved sanitation and protection from floods and pollution will require substantial investments and reform programmes that need to be core parts of wider improvements to urban governance and infrastructure. There are many examples of successful local-level actions to address these issues (see box 8) but, as Bhatia[24] says: *"despite all the ideas and 'pilot' projects, approaches have not proved to be replicable, sanitation policies are absent or not put into practice, investment remains mainly external and limited, and local subsidies have not been sustainable. In the words of Kofi Annan, the Secretary General of the United Nations: "There is a tragic disparity between its human importance and its political priority."*

Box 8: Urban Sanitation: Islands of Success[25]

- Sulabh community toilet complexes (CTC) in India have succeeded in providing clean toilets and bathing facilities to urban poor at nominal charges. There are around 6000 community toilets providing toilet-cum-bath services to around 3 million people in 625 towns on a pay-and- use basis.
- The Orangi project in Karachi, Pakistan is a low-cost sanitation programme which enables low-income households to construct and maintain modern sanitation (pour-flush latrines in their own homes and underground sewerage pipelines in the lanes) with their own funds and under their own management.
- The Water Aid-Bangladesh/DSK Urban Programme has been implemented since 1998 in approximately 168 slums in the Dhaka metropolitan area and in Chittagong City Corporation. Around 25,000 households have gained access to one or more of the services offered: connections to metropolitan water authority lines; tubewells; sanitation blocks combining water points and hygienic latrines; community/cluster latrines with septic tanks; household water-seal, pit latrines; foot-paths; drainage improvements; solid waste management; and hygiene education. All physical improvements are wholly or partly paid for by local users.
- The Ouagadougou Strategic Sanitation Plan has assisted thousands of households in Ouagadougou in upgrading their latrines and installing soakaways. The approach included making the households aware of the technical options available to them. Some subsidies are available if needed. The funds for ONEA's promotional work and subsidies for on-site sanitation come from a surcharge levied on water bills.
- The Kumasi program is well known for its pioneering work to implement a strategy for urban sanitation programs to be replicated in other urban centres in Ghana, the guiding principle of which would be the sharing of costs between the project and end users.
- The Ministry of Construction and Development Workshop Angola started a pilot project to improve water and sanitation infrastructure in slum areas of Luanda. The latrine programme assisted in building of 5,000 on-site family sanitation units between 1995 and 2000. The programme was aimed to achieve near total sanitation by covering 90% of families of specific residential areas in order to maximize health benefits. Families built their own latrines, whilst community mobilisers provided health and hygiene education.
- The World Bank PROSANEAR I programme in favelas of Brazil provided 900,000 poor people with water supply and one million people were connected to sewerage systems at less than $98 per person for water connections and less than $140 for sewerage in the period 1992-1997.

[24]R, Bhatia. (2004). *Community-managed sanitation services for the urban poor in Asia, Africa and Latin America: constraints to scaling-up of 'islands of success'.* Annex to S. Hansen and R. Bhatia (2004), *Water and poverty in a macro-economic context*. Paper commissioned by the Royal Norwegian Ministry of Environment. [25]Based on case studies in Bhatia (2004).

The importance of water in achieving the Millennium Declaration goals and targets varies. It is central to realising goals such as improving incomes and food security, some of the health goals, protecting natural resources and improving the lives of slum dwellers, but less critical for education and other health goals (though even for these it can indirectly contribute). What is clear, however, is that the need for improved water security is an issue that unites the world's poor wherever they live and whatever the specific form their poverty takes. It also unites the poor and the rest of the global community, for all people everywhere are affected by the spectres of increasing water scarcity and degrading environments that impact upon the lives of the poor. Achieving improvements to water management requires investments, changes to governance conditions, institutional reforms and the creation of capacities that will have wider benefits for poverty reduction. In these ways improvements to water management must be central to strategies for poverty reduction and the creation of sustainable development in the poorest parts of the world.

2. Linking Poverty Reduction and Water Management

Setting the Framework – Dimensions of Poverty Reduction

A strong framework of concepts and ideas is needed to understand the relationship between poverty reduction and water management. The framework presented here is based on the conceptual model set out in the first PEP paper on Poverty Reduction and Environmental Management[26] (2002). The discussion reflects the international consensus that poverty is about more than material wealth. It needs to be understood as a complex and multi-dimensional process in which different aspects of water management can contribute to reducing different dimensions of poverty: what the UN (2005)[27] refers to as *"extreme poverty in its many dimensions – income poverty, hunger, disease, lack of adequate shelter, and exclusion – while promoting gender equality, education and environmental sustainability relates to…basic human rights – the right of each person on the planet to health, education and security".* This poverty reduction can, moreover, be achieved through actions that do not jeopardise the integrity of the ecosystems on which many of the poor depend and can even, in some cases, be effective in both reducing poverty and strengthening environmental sustainability. The effectiveness of these approaches is enhanced where an IWRM framework is adopted, but this alone is not a panacea: steps must be taken to ensure that poverty reduction is a, if not *the*, main purpose behind decision-making in an IWRM system. The PEP poverty reduction framework[28] is based on four key factors that need to be addressed in any poverty reduction strategy:

- **Enhanced livelihoods security:** the ability of poor people to use their assets and capabilities to make a living in conditions of greater security and sustainability.
- **Reduced health risks:** the mitigation of factors that put the poor and most vulnerable (especially women and children) at risk from different diseases, disabilities, poor nutrition and untimely death.
- **Reduced vulnerability:** the reduction of threats from environmental, economic and political hazards, including the impact of both sudden shocks and long-term adverse trends.
- **Pro-poor economic growth:** enhanced economic growth is essential for poverty reduction in most parts of the world, but the quality of growth, and in particular the extent to which it creates new opportunities for the poor, also matters.

[26]DFID, EC, UNDP and World Bank (2002). *Linking Poverty Reduction and Environmental Management*. World Bank, Washington DC.
[27]UN (2005). *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals*. Report of the Millennium Project to the UN Secretary General. United Nations, New York. [28]DFID, EC, UNDP & World Bank (2002). *Linking Poverty Reduction and Environmental Management*. World Bank, Washington, DC.

This section elaborates in more detail on these aspects of poverty, particularly looking at how improvements to water management can create new opportunities for the poor and reduce the impact of negative forces upon them. Although the structure of analysis presented here is not contingent upon IWRM being implemented, the coherence and coordination that characterizes effective IWRM would undoubtedly enhance the impacts of water management on poverty reduction. As such, whilst enhanced livelihoods security, reduced health risks, reduced vulnerability and pro-poor economic growth have been identified within a poverty reduction framework, these four dimensions could equally apply to an IWRM approach.

ENHANCED LIVELIHOODS SECURITY

The emergence of livelihoods approaches has led to new understandings on how poverty, and the ability to move out of poverty, reflects the capabilities and assets available to the poor. This includes material assets such as access to land, other natural resources, financial capital and credit, tools and inputs into productive activities. It also reflects human capabilities (the knowledge and skills of the family), social and political factors such as contact networks and the openness of government institutions and people's capability to withstand the effects of shocks such as natural disasters. These social and human aspects of livelihood security are integrally linked to the governance conditions in which the poor live. These capabilities and assets define the sorts of activities that make up the livelihoods of the poor and, through strengthening them, form the basis for many actions to reduce poverty.

The needs and priorities of poor people are better understood when viewed from a livelihoods perspective. In most cases, the livelihoods of poor people are complex, with households depending on a wide range of activities to sustain them: people are not just farmers, or labourers, or factory workers, or fisher

folk. Most families base their livelihoods around complex strategies that seek to maximise the use of the bundle of resources accessible to them: *'rural families increasingly come to resemble miniature highly diversified conglomerates'*[29]. This is not an academic point: understanding this means that we have to look at the opportunities for improving poor people's livelihoods from this perspective.

In this analysis, macroeconomic growth is a crucial factor that cannot be ignored. The 2006 World Development Report describes economic growth as 'the main driver of poverty reduction' and suggests that a 1 percentage point growth in a country's mean income can be expected to reduce the incidence of poverty in that country by about 2.4 percentage points. Economic expansion raises income and consumption levels across the distribution of income, and means more opportunities for the poor. Water can make a major contribution to economic growth and development, both as a critical factor of production in many crucial sectors and through enhancing health, reducing vulnerability and ensuring greater livelihoods security that in turn create a climate more conducive to investments and enhance labour productivity.

Consideration must also be given to understanding the diversity *within* the poor and their livelihood activities and requirements. For example, water needs can be very different between the rural poor and those living in urban or peri-urban areas. Among the rural poor, individuals can be further differentiated between those with land, who practice small-scale farming (irrigated or rain-fed), and the landless, who may be engaged in a number of alternative activities, including fishing or harvesting of forest products. By contrast, the urban poor's mix of activities may include more micro enterprise options undertaken in and around the home (milk production by store-fed cattle, small gardens, operation of small-scale manufacturing and service businesses). The poor in peri-urban areas might be engaged in the same range of micro enterprise activities described for the urban poor, but may also undertake small-scale farming as well. Further, in both urban and peri-urban areas, the situation is often dynamic and presents an additional challenge: water and sanitation services must be able to respond to a constantly shifting landscape. Thus, water services provision requires the design of flexible systems that can accommodate this complex mix of livelihood needs.

The first implication of this is that the provision of improved water services must reflect opportunities for livelihoods improvement. For example, the design of domestic water supplies is usually premised on norms for household consumption (drinking, cooking, bathing) only and does not take into account home-based productive activities that are critical for the livelihoods of poor people (see box 9). Many types of livelihood activities that depend on water take place in and around the house. This includes vegetable gardens, tree crops and livestock that are an important source of both nutritional balance and food security and of income opportunities. It can also include small-scale manufacturing such as brick making and pottery, and service-based businesses such as hairdressing and small eateries.

Making sure that enough water is available, that allocation and cost recovery mechanisms reflect the different needs of different families and that supplies are reliable so that productive activities can work with a level of certainty can mean that domestic water supply improvements will not only help meet health goals: they can also be critical in meeting income, food security and other poverty reduction targets. In poverty reduction terms, an additional advantage is that supporting these home-based activities is self-selecting to the poor, as they are the ones who rely on these activities the most and are affected most when water shortages influences their viability.

[29] M. Cain, and G. McNicoll (1988). 'Population Growth and Agrarian Outcomes' in R. Lee et al. (eds.), *Population, Food and Rural Development*, Clarendon Press, Oxford.

Box 9: Productive Uses of Domestic Water: Re-Defining the Agenda

Improving domestic water supply is often seen as being a health and social issue: the extent to which domestic water is used in productive activities is rarely understood. The reality is often different: extending the provision of water supply, especially in rural and peri-urban areas, leads to significant improvements in livelihood opportunities. These opportunities are often disproportionately beneficial to the poor who have few other assets and rely on home-based livelihood activities more than other parts of the community. For example, a detailed study in Bushbuckridge, South Africa[30] showed that in communities where enough water is available, income from home-based livelihood activities for poor households are more than double those of poor families in communities where levels of water provision were only sufficient to meet the minimum norm of 25/l/day. A better understanding of the productive potential of domestic water, and especially clear evidence of its potential for poverty reduction through increased livelihood opportunities and economic output, will be critical in arguing for greater investments in water for the poor now. The goal is to show that these are good investments, with high rates of return in not just social and health but also economic terms. There is great potential for enhancing these home-based livelihood activities through:

- Changes to the design of water supply systems to ensure adequate water is available, that the supply points are in the right place and that management and cost recovery systems reflect these productive uses.
- Activities additional to infrastructure, such as product diversification and market development, which allow the poor to take advantage of the new livelihood opportunities.

These potential returns reflect a range of potential benefits that enhanced domestic water provision brings. Some are well-known, others less understood:

- Through health improvements that mean poor people are more productive and have to spend less on health care.
- Through the time saved by, in particular, women that can be invested in productive activities (and for children in education).
- Through direct economic activities such as home gardens, livestock, tree crops, home-based manufacturing (e.g. pottery, brick making) and services (e.g. laundries, hair salons).
- Through the social capital and skills enhancement associated with organisations formed for expanding and running water supply, sanitation and reuse schemes.
- Through the multiplier effects associated with the growth of local market-based operations to supply and install water supply, sanitation and reuse schemes and to provide inputs to and markets for the outputs from productive activities.
- Through greater security and reduced vulnerability to external factors that more diversified and productive livelihoods creates.

Actions to maximise these potentials must be rooted in community-level actions. These actions need to reflect the specific characteristics of local social, economic and environmental processes. Alone, however, this is not enough – a supportive policy, regulatory and institutional environment is critical for the widespread development of these approaches.

In many rural areas, poor people depend almost entirely on their ability to access and use natural resources as the basis for their livelihoods. Water is a key to this, being a direct input into many productive activities and a determinant of the health and availability of other natural resources such as plants and animals from local ecosystems. Few livelihood activities are possible without access to water. For water resources, it is not just water itself, but also the flows of other resources (such as hydro power or fish - see box 10) that water resources bring, the investments and knowledge (including traditional knowledge) needed to access these resources and the social and institutional structures that define how they are accessed and managed. From this broad perspective, water management is often a critical factor in, and, where problems exist, a constraint upon sustainable livelihoods development.

[30] J. Soussan, S. Pollard, J.C. Perez de Mendiguren and J. Butterworth (2004). *Allocating water for home-based productive activities in Bushbuckridge, South Africa*. ADB Water for All series No. 5. Asian Development Bank, Manila.

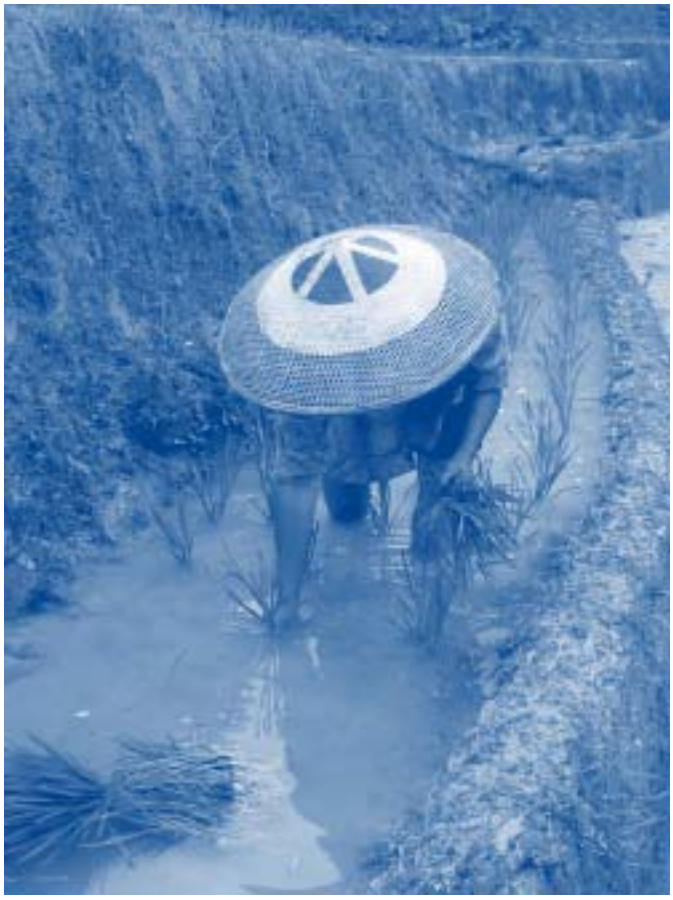
Box 10: Aquatic Resources in the Nutrition and Livelihoods of Rural Lao PDR

A recent study[31] has shown the importance of resources gathered from rivers and wetlands in the livelihoods and nutritional balance of poor rural communities in Southern Lao PDR. Although the main livelihood activity is rice production, detailed discussions with local communities showed that the importance of fishing, of gathering crabs, amphibians and crustaceans, of gathered aquatic plants and of associated activities such as net and boat making, was universal. These gathered foods were an important supplementary source of income, were the main source of food in periods of poor food security and were critical in providing essential nutritional variety. In particular, these foods were the major source of protein for many poor people and provided a range of essential micro-nutrients. The people of these communities, and of similar communities in many other parts of the world, could not survive without access to these resources. Anything that restricts their availability has a severe impact upon the sustainability of their livelihoods.

Thus, the link between these types of rural livelihood activities and natural capital and other ecosystem goods and services must be addressed. A recent IUCN paper points out that the total economic value of ecosystems is often omitted from water cost-benefit considerations, noting:

> *"One essential condition for success will be the ability of planners and investors to factor in environmental concerns - and particularly the links between natural ecosystems, water demand and supply. Despite the importance of healthy ecosystems for secure water supplies, and the importance of secure water supplies for healthy ecosystems, recognition of the relationship between ecosystem status and water infrastructure has long been missing from water rhetoric and practice."*[32]

The report argues that economists have typically valued ecosystems based on their provision of raw materials and physical products and ignored other goods and services not traded on formal markets; this failure to accurately value ecosystems has led in the past to choices that are financially and economically sub-optimal. Similarly, so-called "green water flows" – water used in rainfed farming, rangelands and grazing lands, and forests – need to be valued appropriately and addressed in water planning; as discussed above, the livelihoods of the rural poor are often highly dependent on these flows.



Approaches that link empowerment and improvements to governance conditions with increasing access to water resources can generate benefits in both livelihoods and gender/social equity terms. For example, the work of SEWA, a women's NGO in Gujarat India, on watersheds management has led to sustained improvements to the livelihood opportunities of poor women and has done much

[31]E. Meusch, J. Yhoung-Aree, R. Friend and S.J. Funge-Smith (2003). *The role and value of aquatic resources in the livelihoods of rural people: a participatory assessment in Attapet Province, Lao PDR.* FAO, Bangkok. [32]L. Emerton and E. Bos (2004). *Value: Counting Ecosystems as Water Infrastructure*. IUCN, Gland.

to counter chronic water shortages in a semi-arid area increasingly affected by over-exploitation (box 11). Examples such as this show that improved water management that has clear livelihoods benefits will ensure high levels of local engagement and creates conditions (and especially local institutional capacities) that can help transform social relations and reduce gender discrimination, thereby contributing to a range of MDGs at the same time.

Box 11: Gender and Economic Benefits from Domestic Water Supply in Semi-Arid Areas in Gujarat[33]

Combining improved water supply with micro-enterprise development has much potential for alleviating poverty in semi-arid areas. This case study, implemented by the Self-Employed Women's Association (SEWA) in Gujarat (India), combined the rehabilitation of piped water supply and traditional water sources with a micro-enterprise development program for female entrepreneurs. These actions were based on community-level organization among the women that substantially changed their place in their local societies. Research revealed that the time released by improved water supply enabled women entrepreneurs to make a substantial contribution to the household income. This income was especially useful in times of lack of employment, such as during a drought. In addition, gender relations have changed in favour of these women. One of the main conclusions of the SEWA experience is the potential for using the development of women's enterprises combined with the improvement of domestic water supply as an entry point for rural poverty alleviation programmes.

Box 12: Combined Rice-Fish Production in Lao PDR[34]

Lao PDR has extensive water resources in the form of rivers, lakes and wetlands. Rice is the main crop in most areas and fish are an important part of the national diet. In upland rain fed areas, bunds are often raised to increase water depth for fish cultivation. In some cases, a small channel is constructed to facilitate fish capture. In the Mekong River plain, rice-fish farming is practiced in rain fed rice fields where soils are relatively impermeable as well as in irrigated rice fields, which offer ideal conditions for fish cultivation. Accurate data is not available, but outputs of 125 to 240 kg/ha/year have been reported. The fish are mostly used for home consumption and are a key element of the community's nutritional balance. Rice-fish farming is popular with farmers, but support to integrated pest management (to reduce harmful pesticide use), access to credit and ensuring the availability of fingerlings would all further spread this creative use of limited resources. However, an adverse side effect in this part of the world, where consumption of raw or slightly fermented fish is common practice, is the risk of infection with food-borne trematodes, generally worms with complex life-cycles in snails and/or fish.

Innovative approaches to water management, such as combined rice-fish production (see box 12) can result in both higher total incomes and more secure livelihoods: if one type of production has problems then the family has other products to fall back on. The key is to look at water management from the viewpoint of poor people, not that of technical experts. As part of this, there has been an increasing interest in traditional management systems and local knowledge: traditions of resource management that have built up over generations to produce effective and sustainable models of resource management that are the basis of people's livelihoods. These traditions are not just confined to local levels: for example, traditional management systems in the Niger Delta in Mali cover a huge area and support hundreds of thousands of people (see box 13). A key issue for livelihoods support and poverty reduction is the integration of these traditions into contemporary governance structures for water resources.

[33]D. Frans and J. Soussan (2004). *The water and poverty initiative*. ADB Water for All series No. 3. Asian Development Bank, Manila.
[34]Based on Box 8.7, World Water Development Report (2003), UNESCO, Paris.

Box 13: The Niger Delta in Mali: Traditional Wetlands Management[35]

The Niger Delta in Mali shows how local communities develop effective livelihood strategies that reflect natural processes in wetland areas. This vast wetland covers 20-30,000 km^2 in the wet season but shrinks to around 4,000 km^2 in the dry season. The area supports 550,000 people (including 80,000 fishermen) and provides dry season grazing for 1 million cattle and 1 million sheep and goats. Some 17,000 hectares of rice, half Mali's total, are grown in the wet season and the delta provides 90,000 tonnes of fish per year. The population are a mixture of farmers, fishermen and herders who have developed strategies to make best use of the delta's resources. The upstream areas of the delta are occupied by people who rely mainly on fishing. These areas are also inhabited by communities that grow deep water rice in the flood season and fish the rest of the year. There are also sedentary farmers (who do some fishing) and pastoralists who depend on the delta's dry season grazing resources.

All of these groups have customary rights and management practices that take advantage of the delta's resources, but do so in ways that are in harmony with the natural fluxes of the area and do not damage the ecosystem's basic processes. This example illustrates how sustainable management is nothing new: indeed, in many areas the potential of traditional management regimes is just beginning to be realised. It also shows that different groups can live and work together to take advantage of different resource niches. There are, of course, limits to such systems, but the Niger Delta in Mali is an area that also shows the huge potentials of these wetland areas so long as we learn to work with the ecological processes that define them.

REDUCING HEALTH RISKS

Good health is a key to poverty reduction, directly affecting the quality of life of poor people and an essential pre-requisite for sustainable increases in income. Ill health is a double burden: it reduces productive capabilities and means limited resources (time and money) have to be spent on caring for the sick. It is the most vulnerable, women and children, the extreme poor, the elderly, the malnourished, who bear the burden of ill-health the most and are the least able to cope with it. Sustainable improvements to health conditions are a key to poverty reduction, and in turn improvements to water management are a key to improving health conditions.

Box 14 sets out some of the basic figures for water-related health risks. These absolute numbers are dramatic in their own right: each year witnesses millions of preventable deaths, and hundreds of millions of people ill from preventable diseases. Their impact on the economics of countries and the livelihoods of poor households is even more insidious. Water-associated diseases hit the poor in a disproportionate way and this burden of ill health maintains the vicious cycle where poverty leads to more ill health, and more ill health implies further impoverishment.

Water and health are intricately linked. A workable public health perspective of all water issues requires a clear definition of the nature and magnitude of the links between water and health. There are basically two types of links between water management and the incidence of ill health: water as the conveyance medium of pathogens and water providing the habitat for vectors and intermediate hosts of pathogens. To these can be added the significance of water availability in rural areas in determining food security and nutritional status (itself a key determinant of health) and, in some parts of the world, the growing significance of water-related disasters such as floods, storms and major pollution incidents resulting in injuries, deaths and the incidence of many diseases.

[35] J. Soussan, N. Emmel and N. Howarth (2000). *Freshwater ecosystems management and social security*. IUCN, Gland.

Box 14: Water and Health: The Basic Picture[36]

Every day diarrhoeal diseases cause some 5000 deaths, mostly among children under five. The WHO global estimate of the number of deaths from infectious diarrhoeas amounts to 1.8 million for all age groups, with a heavy toll among children under five: 1.6 million deaths. Malaria kills about 1 million people in the world every year, mainly in Africa south of the Sahara, and about 80% of these are children under 5 years of age. WHO estimates over 160 million people are infected with schistosomes and 133 million suffer from high intensity intestinal helminths infections, often leading to severe consequences such as cognitive impairment, massive dysentery or anaemia. In Bangladesh alone, some 35 million people are exposed, on a daily basis, to elevated levels of arsenic in their drinking water, which will ultimately threaten their health and shorten their life expectancy.

The diseases and conditions of ill-health directly associated with water, sanitation and hygiene include infectious diarrhoea (which, in turn, includes cholera, salmonellosis, shigellosis, amoebiasis and a number of other protozoal and viral infections), typhoid and paratyphoid fevers, acute hepatitis A, acute hepatitis E and F, fluorosis, arsenicosis, legionellosis, methaemoglobinaemia, schistosomiasis, trachoma, intestinal helminth infections (including ascariasis, trichuriasis and hookworm infection), dracunculiasis, scabies, dengue, the filariases (including lymphatic filariasis and onchocerciasis), malaria, Japanese encephalitis, West Nile virus infection, yellow fever and impetigo.

The associated burden of disease is not only felt today; it also affects the potential of future generations. The most important category of personal hygiene-related diseases affecting school-age children is intestinal helminth infections. These parasites consume nutrients, aggravate malnutrition, retard children's physical development and result in poor school attendance and performance. Each year 400 million people are infected with roundworm and whipworm alone, with the highest rate of infection among school-age children. Helminth infections destroy the well-being and learning potential of millions of children. Schistosomiasis (bilharzia) is also a young people's disease; 88 million children under 15 years are infected each year.

Yet there are also indications of water quality, quantity and/or hygiene links to conditions as diverse as ischemic heart disease or malignant bladder tumours. Unintentional drowning is a major cause of death in the category of accidents and injuries, and in that same category comes the permanent skeletal damage to women carrying heavy loads of water over long distances day after day.

Cholera, caused by a variety of strains of the bacterium *Vibrio cholerae*, remains a global threat and a challenge to countries where access to safe drinking water and basic sanitation cannot be ensured for all. In 2001, 58 countries from all regions of the world officially reported to the WHO a total of 184,311 cases and 27,728 deaths. With a total of 173 359 cases, Africa accounted for 94% of the global total of cholera cases. Case numbers reported from Asia remained stable (around 10,000); a decline was observed in the Americas. But, despite efforts by many countries to contain the spread of cholera, the disease is once more on the rise worldwide (and official statistics under-report the incidences of the disease).

Water plays a conveyance role for micro-organisms, chemical pollutants and sources of radiological risks. The importance of this role for health relates mainly to drinking water, but also indirectly to water applied to food crops and livestock, and through aerosols generated by air-conditioning systems. This role converts to a health promotional mechanism when water is used for purposes of hygiene: from this perspective, quantity is a more important determining factor than quality.

Knowledge of these links facilitates the elucidation of cause-and-effect relationships between water management issues and impacts on health. Lack of adequate sanitation is the most critical determinant of contamination of drinking water with micro-organisms. Pollution from urban and industrial waste and run-off of agro-chemicals are by and large responsible for chemical contamination, although naturally

[36]http://www.who.int/water_sanitation_health/factsfigures2005.pdf.

occurring anorganic pollutants (fluoride and arsenic) may also contribute substantially. Wastewater use in agricultural production systems carries specific risks of contamination, both with pathogenic organisms (e.g. intestinal helminths) and chemicals (e.g. heavy metals). More sophisticated water conveyance and treatment systems may become the source of pathogens that are released into the environment as aerosols, such as is the case for *Legionella ssp* in association with air-conditioning.

A number of diseases caused by bacteria or parasites will proliferate for lack of sufficient quantities of water for basic hygiene, including trachoma and intestinal helminth infections. These are traditionally referred to as the water-washed (rather than the water-borne) diseases. Behavioural change, such as hand washing and regular bathing, will only be effective if the required minimum amounts of water really are available.

As Cairncross et al (2003)[37] show, the impact of water on health relates to both the quality of water and the quantity of water available to households. The quality issue is obvious: unsafe water directly causes illness and infection. The quantity of water is particularly important for the regularity and effectiveness of hygiene practices: where water is scarce then far less is available for cleaning.

The significance of this collective knowledge base on water and health links lies in the options they provide on effective ways to prevent ill health and disease, and to promote the health status of communities. Access to safe drinking water, combined with sanitation that prevents contaminants to reach sources of drinking water and with hygiene behaviour such as hand washing and proper food handling, supported by sufficient quantities of water are the main tools in the fight against gastro-intestinal infections. Water management practices that reduce the environment's receptivity to the propagation of disease vectors and intermediate hosts can, in specific settings, be the main contributor to reducing transmission risks of such diseases as malaria, schistosomiasis and trachoma (see box 15). All measures combined, i.e. the supply of safe drinking water and adequate sanitation, improved hygiene behaviour and environmental management aimed at disease vectors, translate into a considerable reduction of the costs of the delivery of health services incurred to governments, and the costs incurred to households, directly and indirectly, as a result of ill health or, worse, death of family members.

Box 15: Improved Water Supply and Sanitation Reduces Global Blindness

Trachoma is an eye infection caused by *Chlamydia trachomatis* that can lead to blindness after repeated re-infections. It spreads easily from one family member to another by ocular and respiratory secretions. Flies can also transmit the infection. WHO estimates that 146 million people presently suffer from trachoma and associated infections, primarily among the poorest rural communities in developing countries. Roughly six million people are blind or severely visually disabled because of trachoma, making it one of the leading causes of preventable blindness worldwide. Central to the control of trachoma is easy access to sufficient quantities of water, facilitating the frequent washing of children's faces and improved environmental hygiene. The WHO *Global Alliance for the Elimination of Trachoma by 2020* has adopted the "SAFE" strategy, consisting of four components: Surgery, Antibiotic treatment, promotion of Facial cleanliness and the initiation of Environmental changes. Recent reviews[38] have emphasized the importance of the F and E components of the "SAFE" strategy, concluding that improved personal and community hygiene has great potential for a sustainable reduction of trachoma transmission. They also concluded that there is likely to be a long-term beneficial effect of a combination of improved water supplies, provision of latrines, facial hygiene promotion and control of eye-seeking flies. Trachoma is just one example of a number of human eye and skin infections that can be reduced through improvements in water supply, sanitation and hygiene promotion.

[37] S. Cairncross, D. O'Neill, A. McCoy and D. Sethi (2003). *Health, environment and the burden of disease: a guidance note*. DFID, London. [38] A. Pruess and S.P. Mariotti (2000). Preventing trachoma through environmental sanitation: a review of the evidence base. *Bull World Health Organ*. 78(2): 258-66. P.M. Emerson, S. Cairncross, R.L. Bailey and D.C. Mabey, 2000. Review of the evidence base for the 'F' and 'E' components of the SAFE strategy for trachoma control. Trop Med Int Health. 5(8): 515-27.

The health sector is under pressure for the control of many of the water-associated diseases. For a number of diseases, prevention through vaccination campaigns is not an option, simply because a vaccine does not (yet) exist. This is the case for malaria, dengue and the gastro-intestinal infections. Even the existing cholera vaccine is of too low an efficacy to contribute significantly to public health efforts. Insecticides for transmission interruption of vector-borne diseases become increasingly less effective because of the development of resistance in important vector species. Similarly, the resistance of disease-causing organisms against antibiotics and drugs is a phenomenon of growing importance, undermining the treatment of bacterial as well as of some parasitic infections. And even where effective tools are still available, they are often out of reach of the poor, who can either not afford them or are not adequately covered by resources-strapped health services.

It is against this backdrop of health sector constraints that the potential of access to improved water sources and best water management practices, basic sanitation and improved hygiene behaviour must be assessed to perceive its full potential. Major health gains can be achieved at the household level through personal protection, whether it is through oral rehydrations salts, through the use of insecticide-impregnated mosquito nets or the use of chlorination tablets for drinking water. Farming communities can be informed about the water management options that benefit agricultural production and reduce health risks. Communities can be mobilised to work towards improved drinking water facilities, be taught about drinking water contamination risks at the household level and about treatment and safe storage of drinking water from unreliable supplies. Promotion of basic sanitation and improved hygiene behaviour can be assured by health workers operating at the district level. In many instances, these local health workers will liaise with the health sector's environmental health programme.

The health sector structure is made up of a well-defined core of health services delivery institutions with a more nebulous margin where many of the more prevention-oriented programmes reside. Environmental health services are amongst these, and they tend to be characterised by a lack of functional programme structure, poor career opportunities and a general lack of resources. Yet, the functions of environmental health services are of great public health importance in relation to the regulation of environmental and social health risk factors. A number of these relate to water resources, water supply and water management. Strengthening of this programmatic weakness in the health sector of most developing countries requires a number of important points to be addressed, including:

- The identification and definition of essential environmental health functions, combining some of the traditional functions, such as those related to drinking water supply and sanitation, with new functions, such as those related to health impact assessment of water resources development.
- The re-adjustment of the balance between operational functions and regulatory functions, to ensure that sectors responsible for water resources development and management decisions are accountable,

within existing public health legislation, for adverse health impacts of their actions.

- Improving intersectoral co-ordination and co-operation between the health sector core (epidemiological surveillance and health services delivery) and those responsible for water resources development and management in other sectors.
- Regular economic evaluations of the hidden costs transferred to the health sector because of water resources development that does not consider health issues, and cost-effectiveness analyses of water supply and management interventions in comparison with conventional health sector ones.

These changes to the operation of the health sector need to be accompanied by changes to water management to take account of the ways in which water management influences the health risks faced by the poor. There is a range of factors that need to be taken into account in this:

- Ensuring that sustainable sanitation has a far higher priority than is presently found in most countries, and integrating health and hygiene promotion into both water supply and sanitation provision.
- The inclusion of potential health impacts, positive and negative, as a key factor in decisions in all aspects of water management. As box 16 shows, water management investments that produce significant improvements to water availability can also generate unintended health problems.
- Placing closer integration between water and health sectors as a key factor in improving governance and institutional reforms related to water management. This should include using local-level health officials (the network of which is usually far more extensive than that of water agencies) as key agents for water-related health and hygiene promotion.
- Making sure that women, as the main health carers in most families and, along with children, the people most at risk, are the strongest voice in determining the scope and management of local level programmes for extending water and sanitation services, improving environmental health and hygiene promotion.
- Actions to improve food security and nutrition amongst the poor, with the assessment of the health benefits that these will generate a significant part of their justification. This should include actions to reduce seasonal variations in food security and ensure more balanced diets in terms of proteins and micro nutrients.
- Ensuring that health risks and associated actions to ensure access to clean water and reduce environmental contamination are a central part of disaster preparation, relief and recovery systems.

Box 16: The Compounded Malaria Impact of Microdams in Ethiopia

Recent studies[39] in Ethiopia using community based incidence surveys revealed a 7.3 fold increase of malaria incidence associated with the presence of microdams. The study sites were all at altitudes where malaria transmission is seasonal (in association with the rains). The increase was more pronounced for dams below 1900 meters of altitude, and less above that altitude. In addition, observed trends in incidence suggest that dams increase the established pattern of transmission throughout the year, which leads to greatly increased levels of malaria at the end of the transmission season.

Taken together, these actions to build capacities in the health sector, to ensure that the water sector takes more effective account of health issues and to create far more effective mechanisms for coordination between the two sectors have the potential to generate enormous benefits. These benefits will be

[39] T.A. Ghebreyesus et al. (1999). Incidence of malaria among children living near dams in northern Ethiopia: community-based incidence survey. *British Medical Journal* 319: 663-666.

significant in social, livelihoods and health terms and will directly impact on many aspects of poverty. As a recent study by the World Health Organisation (see box 17) shows, these actions would also generate enormous economic benefits.

This study shows that, for all different levels of service improvement and across all major regions of the world, the benefits far outweigh the costs of making the improvements: by as much as 60 times and never less than three times in the major regions of the developing world. For the poorer regions of Africa and Asia, every dollar invested generates between $5 and $11 in economic benefits. Attaining the water and sanitation MDG targets would bring annual economic benefits of just under $85 billion, a figure that is higher than the world's total aid flows. These benefits would mostly go to the poorer regions of the developing world in Asia and Africa.

Box 17: The Economic Benefits of Water and Sanitation Improvements

The costs and benefits of improvements to water supply and sanitation are a key issue, but calculating these costs and benefits can be difficult as many are not direct, in terms of material changes to economic costs and outputs. A recent study by the World Health Organisation (WHO)[40] provides an overview at a global level of the main costs and benefits that would flow from different levels of improvement to the access of people to safe and adequate water supply and improved sanitation[41]. The findings are dramatic. For four different levels of intervention, ranging from achieving the MDG for water supply alone to a minimum of water disinfected at the point of use for all and access for all to improved water and improved sanitation, and across all major regions of the world the benefits far outweigh the costs of making the improvements: by at least as much as 3 times and by as much as 60 times in the major regions of the developing world.

The benefits take many forms, most of which directly and materially affect productivity levels or would free up scarce government resources from health interventions. The time saved through reduced illness and water collection times is the greatest benefit. These are burdens that disproportionately fall upon the poor (and especially women), so freeing up their time would allow them to be more productive. The need for less health care expenditure (by governments and households) would also be significant and create conditions for greater investments elsewhere. There are many other benefits: far better nutritional standards, improved school attendance, reduced mortality levels and others. Taken together, the economic case for making investments in improvements to both water supplies and sanitation is compelling, and significantly in poverty reduction terms, the poorer people and countries are then the higher the potential benefit-cost ratio is.

The case for improving health through water management is unanswerable: it is a good investment that targets the poorest and most vulnerable and that produces both immediate economic returns and long-term changes that are critical for sustainable development and poverty reduction. Making this case need not just be on social and health terms, as is generally the case now. It can be demonstrated to be hard-headed economic sense. This is the argument that is most likely to persuade reluctant policy makers and those that allocate budgets. The international community can and should do all it can to support this, and the evidence presented above on declining aid flows to water is disturbing in this light. As we have seen, the poverty reduction benefits of improved water management in health terms alone are tremendous. Making this case should be central to contemporary debates on poverty reduction and sustainable development.

[40] G. Hutton and L. Haller (2004). *Evaluation of the costs and benefits of water and sanitation improvements at the global level*. WHO, Geneva. [41] Some potential benefits (including health benefits other than diarrhoeal disease) were not included for methodological reasons, suggesting that in some cases the economics of improvements would be even more favourable than those presented in the report.

Water-Vulnerability Links

The importance of **vulnerabilities** as a key dimension of poverty has been increasingly recognised. It is now widely understood that the poor first try to reduce their vulnerabilities before they can afford the luxury of maximising their productive potential. Vulnerability refers to the inability of people to avoid, withstand or recover from the harmful impacts of factors that disrupt their lives and that are beyond their immediate control. This includes both shocks (sudden changes such as natural disasters, war or collapsing market prices) and trends (gradual environmental degradation, oppressive political systems or deteriorating terms of trade).

Ecosystem goods and services play a key role in reducing the vulnerability of the poor. As previously noted, the poor are often highly dependent on ecosystem flows. An IUCN report on the value of ecosystems sums up the linkages:

> *"Ecosystems, and the water goods and services they yield, will also continue to provide a vital lifeline for the poorest until such a time these sustainable development and poverty alleviation goals are met. Still, more than one billion people lack access to safe drinking water and perhaps as many as three billion do not have basic sanitation services. 800 million people are chronically malnourished and approximately a third of the world's population lack food security. Ecosystems are often the only source of these water-related goods and services that are accessible or affordable to the poorest sectors of the population, their only fallback in times of stress, and their only protection against disasters such as floods and drought."*[42]

Ecosystems thus serve an important function as a safety net for the poorest, and are particularly effective in bridging gaps in government-provided water and sanitation services. There is also a synergy in this process: reduced vulnerability and increased household resilience mean that people will be less risk averse and more maximizing in their livelihood strategies, which in turn reduces pressures on the resource base. Further, the ability of a healthy ecosystem to insulate the poor from shocks, freeing individuals to optimise their income opportunities, makes clear the role of ecosystems in pro-poor economic growth.

A range of vulnerabilities can be identified in relation to water management:

- **Water-related disasters** such as floods, droughts and major storms are a widespread threat that affects whole communities. They can devastate the lives of poor people and throw the not-so-poor into poverty.
- The declining viability of many distinctive and threatened **ecosystems**, including the mangrove forests, wetlands and marshes and off-shore marine habitats that are key spawning grounds for many commercially important fish species.
- The long-term effects of **climate change**, with predicted rises in sea levels, possible increases in the frequency of major storms and changes to rainfall patterns over many parts of the developing world.
- The impact of **water pollution** from industry, agriculture and poor household waste disposal severely affects many poor people, which is particularly an issue in many low-income urban areas. Modern

[42] L. Emerton and E. Bos (2004). *Value: Counting Ecosystems as Water Infrastructure*. IUCN, Gland.

end-of-pipe sanitation systems are currently dumping about 50 million tons of fertiliser equivalents into our water bodies per year.

- Poor access to many forms of **infrastructure and technologies** and many examples of technical interventions that are poorly designed and adapted to the characteristics of poor areas. In addition, existing infrastructure has even more severe operations and maintenance problems.
- **Soil erosion**, along with the loss of land along rivers and coasts, can reduce the viability of agriculture on which many poor people depend, as can **soil degradation** through the depletion of nutrients and organics, which particularly threatens the poorest farmers, who have limited or no access to artificial fertilisers or organic soil conditioners.
- Surface and sub-surface **salinisation**, including saline intrusion into freshwater aquifers some distance from the coast.
- Poor **resource management**, including the unsustainable exploitation of fish resources and poor ground and surface water management (including drainage problems), the clearance of mangroves and other forests and soil fertility management.

These vulnerabilities are each individually significant in the ways they affect the livelihoods of poor communities. Also important are the ways in which vulnerabilities interact with each other, with most households, and especially the poor, facing **multiple vulnerabilities** that compound each other in terms of both the impact of specific events and the capability of households to recover from these events when they do strike. In general, the more affluent a household is, and in particular the more assets it possesses, the more **resilient** it is to disruption in its livelihoods base from these shocks and trends. People are not passive in the face of these risks. Rennie and Singh (1996)[43] categorise the responses to such threats as either **adaptive strategies** (where a household consciously adopts a process of change in response to long-term trends) or **coping strategies** (short-term responses to immediate shocks and stresses). In these, the household will seek to deploy their different assets to best effect within their often limited range of choices. This set of choices is again conditioned by the wider context within which they live, and in particular by the extent to which they can control the key decisions that affect their lives.

Reducing these multiple vulnerabilities is particularly important in many marginal areas such as semi-arid lands and hilly areas where the poor are often concentrated, the resource base is fragile and existing management practices compound long-term degradation threats. But dramatic improvements are possible even in these areas. Box 18 tells one such story, from an integrated catchment management project in Ethiopia. Similar experiences are found all over India and elsewhere where these integrated approaches, focused on water and land conservation, have been tried.

Water-Related Disasters

The incidence and impacts of water-related disasters on the poor has increased (see box 19). In many parts of the developing world, the prospects for sustainable solutions to poverty without reducing vulnerability to disasters are slim. The poverty and economic significance of water-related disasters is being increasingly recognised. As Hansen and Bhatia (2004) say[44]:

[43] J.K. Rennie and N. Singh (1996). *Participatory Research for Sustainable Livelihoods*. International Institute for Sustainable Development, Winnipeg. [44] S. Hansen and R. Bhatia (2004). *Water and poverty in a macro-economic context*. Paper commissioned by the Royal Norwegian Ministry of Environment.

"The extreme variability in rainfall and river flows in many developing countries clearly affect real output performance....this threatens the survival of subsistence farmers at one level; the competitiveness of agri-business in a globalising world at another level and the structure and performance of national economies at a third level" (page 10).

The poverty, social and economic impacts of water-related disasters are significant. Between 1991 and 2000, over 665,000 people died from natural disasters: 97% were from the developing world and 90% were victims of water-related disasters. It is the poor who are hit first and hardest: *"while poor countries are more vulnerable, in every country it is the very poor, the elderly, women and children who are especially hard hit during and after disasters"*[45]. There are many examples of the impact of droughts and floods (see box 20).

Box 18: Gergera Integrated Watershed Management Project[46]

Land and water resources in Ethiopia are threatened by over-cropping and overgrazing and over-reliance on fuelwood. Development Cooperation Ireland has used an Integrated Watershed Management approach for dealing with this large-scale environmental degradation and resultant poverty. Integrated Watershed Management refers to measures undertaken to conserve water and prevent erosion in a particular catchment area. The measures include terracing the higher ground of a valley, planting trees and shrubs to bind the soil, and 'halfdamming' the rivers. These activities, together with concerted efforts to prevent felling of trees for firewood and the introduction of new farming technologies, contribute to an overall increase in vegetation cover in the targeted watershed catchment area.

The integrated watershed management project was first piloted in Gergera valley in Tigray Region, working in partnership with the Region's Bureau of Agriculture and Natural Resources Development. The concerted measures taken to conserve water in the area has resulted in improved economic, social and environmental conditions for the local community. The beneficiary communities were fully involved in identifying the project from the outset. They also contributed local construction materials and unskilled labour during the implementation. Access to better technologies such as fertilizer and better animal husbandry has led to a 40 percent increase in agricultural production in the area. This has transformed the lives of the local community. The farmers now have fodder available locally for their cattle instead of having to walk 14 km to get it. The reduction in the travelling time required for water and fodder collection has meant that children are now free to attend school. Bee-keeping in Gergera has been revolutionised through modern beehives which produce 15 times as much honey as traditional hives.

Community participation and capacity building have been at the heart of the project. The community has been trained in income generating activities such as modern beekeeping methods, poultry production, marketing and home economics. Training in soil and water conservation, tree nursery programmes, crop production and animal husbandry management have also been provided. The primary objective of the capacity building component of the project was to give both theoretical and practical knowledge to the local community, so that all development efforts would be sustained over time.

Following the success of project, its lessons are being applied elsewhere. There are now 11 other sites in the Tigray Region with similar success stories, with 44 more areas to follow. Communities in neighbouring areas, having seen the positive results, are greatly interested to learn about, plan and implement similar projects with minimal external assistance. This suggests that new technologies are spreading, without external incentives, to neighbouring villages and contributing to improvement of arable and grazing lands. In addition, other organisations involved in rural development initiatives have shown a great interest in replicating the watershed management programme in their respective operational areas all over Ethiopia

[45]World Water Development Report (2003). UNESCO, Paris. [46]Development Cooperation Ireland (2002). *Annual Report 2002*. Development Cooperation Ireland, Dublin.

Box 19: The Increasing Threat of Natural Disasters[47]

In December 1999, 15 million cubic meters of mud, trees, and boulders came barrelling down from Venezuela's coastal mountain range onto the densely populated and heavily urbanized Caribbean coast, killing some 30,000 people and causing about $2 billion in damages. Two years worth of rain had fallen in just two days, dislodging soil already saturated by two weeks of heavy La Niña rains.

The 1990s set a new record for disasters worldwide. During the decade over $608 billion in economic losses was chalked up to natural catastrophes, an amount greater than during the previous four decades combined. In 1998–99 alone, over 120,000 people were killed and millions were displaced from their homes. In India, 10,000 people lost their lives in a 1998 cyclone in Gujarat; the following year as many as 50,000 died when a "supercyclone" hit Orissa. In 2000 major floods submerged much of Mozambique for the second year in a row. The year 2005 has seen a record number of hurricanes hit the Caribbean region and Central America, with devastating results for millions of poor people: even in the United States, it was the poor communities of New Orleans that suffered the most.

Ironically, the United Nations had designated the 1990s as the International Decade for Natural Disaster Reduction, hoping to stem the rising toll taken by natural disasters. Instead, the 1990s may go down in history as the International Decade of Disasters (though the first decade of the new millennium is increasingly likely to attract this dubious accolade). The total number of disasters (not just "great" ones) has also been on the rise, with the year 2000 setting a new record—850 disasters, topping 1999's record of 750. The average for the 1990s was 650 disasters per year. Between 1985 and 1999, nearly 561,000 people died in natural disasters. Only 4 percent of the fatalities were in industrial countries.

In a recent Munich Re report it is shown that the number of, and economic losses from, major natural disasters have been increasing since 1950. The increase in losses is more marked than the number of disasters, implying greater losses for each disaster.

Comparison of Decades:

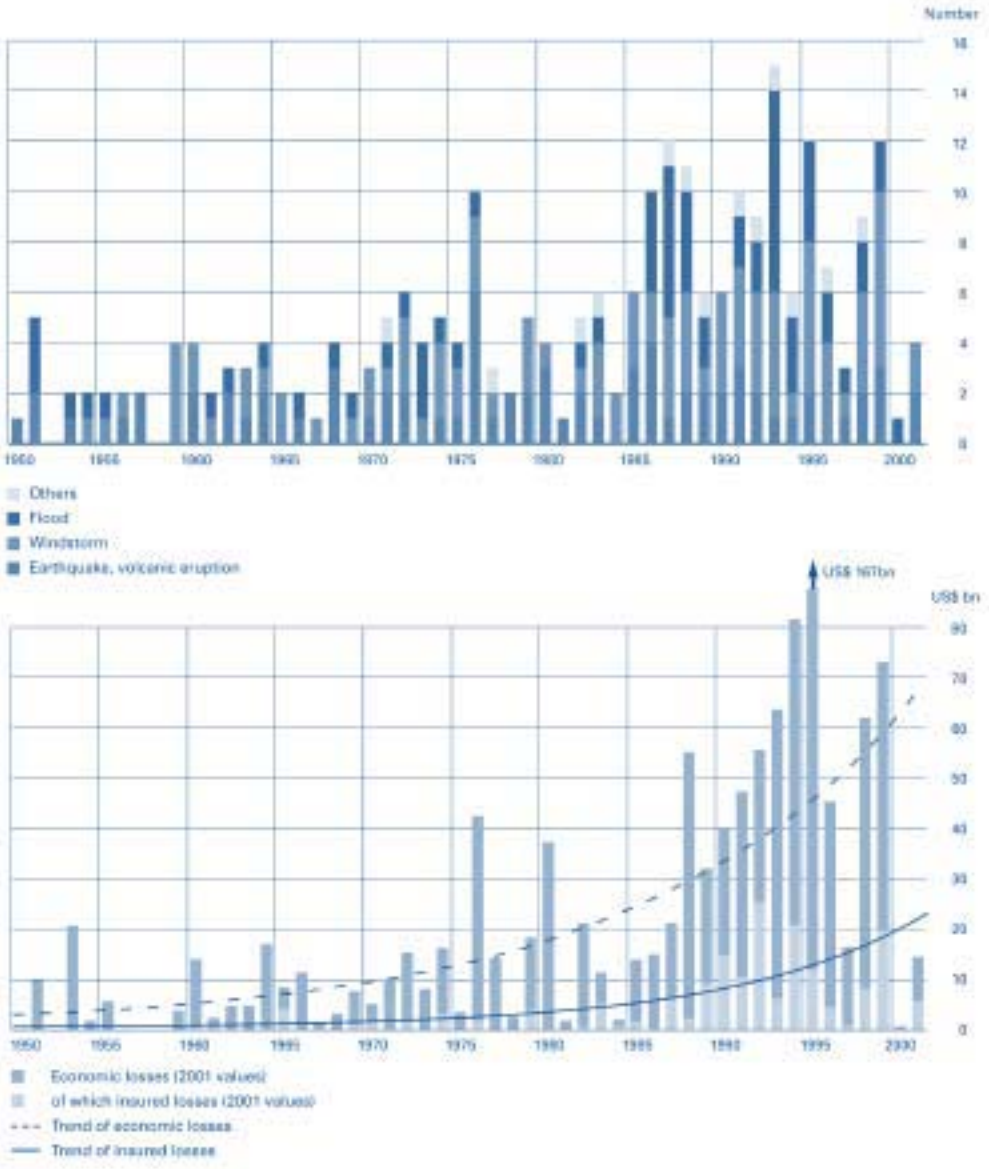
Decade	1950-59	1960-69	1970-79	1980-89	1990-99
Number	20	27	47	63	89
Economic losses	40.7	73.1	131.5	204.2	629.2
Insured losses	unknown	7.0	12.0	25.5	118.8

Losses are US$ bn (2000 values)

In relatively poor countries, natural disasters generally result in larger economic losses (in proportion to GDP). Another result is that the long-term consequences of a natural disaster tend to be more serious the more it is accompanied by the erosion of the country's political, social and economic stability and the less the economy, and especially the government administration, is capable of responding effectively and flexibly. The table shows the more severe natural disasters in recent years, those that caused more than about 1000 deaths. Virtually all of these disasters occurred in developing countries.

[47]Based on J. Abramovitz. (2001). *Unnatural Disasters*. WorldWatch Paper 158, WorldWatch Institute, Washington DC and World Water Development Report (2003), pages 272-273. Chart from Munich Re topics (2001), page 14.

Incidence of and Economic Losses from Major Disasters 1950 - 2000



Box 20: The Impacts of Floods and Droughts[48]

There are many examples of the impact of floods and droughts on the economies of developing countries. Hansen and Bhatia (2004) cite a few:

- The Zimbabwe drought of the early 1990s was associated with a 45% decline in agricultural production, an 11% decline in GDP and a 60% decline in stock market values.
- The 1997-1998 El Nino floods in Kenya caused economic loss estimated to exceed $1.7 billion.
- The 2000 flood in Mozambique led to a 23% fall in GDP.
- The drought of 2000 in Brazil led to a halving of projected economic growth.
- In the 1998 El Nino, Peru suffered $2.6 billion in damage to public infrastructure, equivalent to 5% of GDP.
- Losses due to landslides in Venezuela in 1999 cost $10 billion, equivalent to 10% of GDP.
- In Honduras, Hurricane Mitch caused damage equivalent to 70% of GDP, with huge repair costs (10% of GDP) and an increase in poverty from 63% to 66%.

It is increasingly recognised that natural disaster management should be an integral part of water resources management systems. This involves all stages in the disaster management cycle: prevention and adaptation measures, early warning and disaster preparedness systems, disaster relief during the event and post-disaster recovery. The approach will require a combination of structural measures such as river levees and coastal embankments and non-structural measures like early warning systems, emergency relief measures and post-disaster actions to help affected people rebuild their livelihoods. The limitations of reliance on structural measures alone have become increasingly recognised:

> *"In many river systems where extensive flood control systems have been installed, the handling of large floods becomes a process of crisis management because of the uncertainties surrounding the ability of control works to withstand the floods. Not knowing whether or when flood embankments may overtop or fail, river basin authorities are forced into a state of constant alert…at any time a major disaster could be unleashed."*[49]

The same is true for all sudden-onset disasters, such as major storms and mudslides. In areas where flash floods are a hazard, it is almost impossible to predict where and when they will strike. Consequently, the trend is increasingly to develop systems to assist people to cope with, rather than try to prevent, disasters happening: what Fox calls flood management, not crisis management. Many international organisations are adopting approaches to disaster management that integrate them into water resources management. For example, the ADB has identified a set of guiding principles for effective flood management which are, in summary:

- The preservation of life and the protection of the welfare of households should be given the highest priority in the design of flood protection works; flood proofing and emergency evacuation measures should accompany all structural interventions.
- All stakeholders that benefit from the water resources of a river basin must have a say in how floods should be managed to minimise their adverse impacts while also maximizing their beneficial impacts.
- Flood management requires a comprehensive approach that balances flood mitigation, environmental conservation and sustainable use of water resources.

[48] S. Hansen and R. Bhatia (2004). *Water and poverty in a macro-economic context*. Paper commissioned by the Royal Norwegian Ministry of Environment. [49] I. Fox (2004). *Floods and the poor: reducing the vulnerability of the poor to the negative impacts of floods*. ADB Water for All series No. 11. Asian Development Bank, Manila.

- Flood protection should be based on careful analysis of risk so that the passage of greater-than-design floods can be managed in a predictable and safe way.
- Capacity building of the organisations responsible for managing river basins and public awareness incorporated as a means of reducing risks and loss of life.
- Flood containment to a high standard of protection for urban and other densely-populated areas where the potential for ever larger losses is increasing.
- To safeguard against catastrophic failure of flood control embankments, particular attention is to be given to construction quality and maintenance.
- Traditional means of coping with frequent, low-intensity floods; flood mitigation projects should incorporate these traditional means where possible.
- There is scope to make houses less vulnerable to floods, provide shelters from storm surges and unusually deep floods, establish evacuation roads for people and livestock and develop flood forecasting and warning systems.
- Develop effective and affordable flood damage insurance for crops and property.

Similar approaches can be developed for other types of water-related disasters such as droughts and major pollution incidents and should be adopted wherever possible, so as to ensure that effective and balanced approaches to disaster management are an integral part of the approach and that actions are identified to reduce the vulnerability of the poor to water-related disasters.

PRO-POOR ECONOMIC GROWTH

The improved management of water resources has the potential to be a significant factor in the growth of economies in forms that are pro-poor in character at local, regional and national levels. This is particularly true where investments and reforms in water are part of a wider development strategy for effective and targeted growth in key sectors that will benefit and create opportunities for poor people. The potential of water as a major factor in economic growth is true both at the level of individual entrepreneurs and local communities and at a national or regional level, in relation to major infrastructure investments. Both types of growth are important and actions to enhance both are needed.

Such growth can (and should) be achieved as part of a wider sustainable development process and not take place at the expense of ecological integrity. Indeed, as IUCN (2004)[50] argue, an effective economic analysis of the costs and benefits associated with water management should include ecosystems values: *"ecosystem values may also offer a pathway to increase investments and human well-being. If these values are made visible, they can also be integrated into existing economic arrangements and lead to a new field of incentives, investments and value chains that support the MDGs".* This reinforces the point that the quality, as well as the quantity, of growth matters: it should be targeted to the poor and be sustainable. But **growth is essential**, for without substantial and sustained improvements to the rate of economic growth in the world's poorest nations there is little prospect for long-term poverty reduction. The management of water resources can contribute to achieving this growth through creating opportunities and removing barriers to development at local and national levels in many parts of the developing world.

[50] L. Emerton and E. Bos (2004). *Value: Counting Ecosystems as Water Infrastructure.* IUCN, Gland.

As discussed earlier in this paper, water management is a good investment: the returns on each dollar invested are high. Although there are relatively few studies undertaking a cost-benefit analysis of water and sanitation investments, the ones that do find remarkably high rates of return. The findings of the 2004 WHO global analysis of the potential health-related impacts and time savings that could be realized from water supply and sanitation improvements has already been discussed (Box 17): returns on four levels of water and sanitation interventions ranged from 3 to 60 in the major regions of the developing world, and between 9.8 and 14.8 for two sub-regions of Africa. While these figures stand on their own as a persuasive argument for investment in water and sanitation services, they are even more striking in view of the fact that a number of other benefits were not included, such as increased ecosystem goods and services and other non-use values resulting from improvements in ecosystem health; options from increased water access, such as the productive use of domestic water in income-generating activities (discussed further below); and the cost savings from buying water from more expensive sources.

A 2003 WaterAid study undertaken to develop valuation methodologies also performed a cost-benefit analysis of water investments. This study took a household approach and assessed a small number of projects in two countries, Tanzania (4 projects) and India (3 projects), which were chosen to benefit from extensive data collected for a poverty study and also to capitalize on NGO partners with comprehensive records on water collection and associated time costs. In contrast to the WHO study, this analysis did not consider health-related benefits at all, focusing instead on time savings and calorie energy savings, and also on agricultural output in the case of the Tanzania projects. The cost-benefit analysis performed under these parameters found returns ranging from $2 to $52 for every $1 invested. It must be noted that, in addition to not factoring in the savings from improved health, this study also paralleled the WHO study in not attempting to quantify benefits derived from improved ecosystem health (due to lack of local-level data availability) or options from increased water access. Therefore, as was the case with the WHO paper, actual returns, though difficult to measure, may be even higher than the figures obtained.

Both these studies highlight the competitive rates of return that water investments can deliver. The overall contribution of all aspects of water management (including major areas such as irrigation and disaster management) would be even greater than that of just water supply and sanitation: the focus of the two studies discussed here. While more work, including the development of new valuation methodologies and both microeconomic studies and national-level water accountings, is needed to develop a complete picture, the initial findings outlined above offer a sense of the true contribution of investments in water management (including sanitation) to economic development.

Providing services for water and sanitation provision can generate opportunities for **local entrepreneurs** in two distinct areas: through supplying technology and services (such as pumps, well drilling, storage devices) through which households can access their own water, through supplying water to households and other enterprises (see box 21), and through the provision of sanitation equipment and services (such as the operation of decentralised eco-sanitation systems and the collection, processing and marketing of recyclables). The scale and extent of small-scale entrepreneurial involvement in water services is largely unknown: it is an issue that has been ignored by most studies and is rarely recorded in official figures. The limited evidence available suggests that in some parts of the world, such as South and South-East Asia, the investments made by these small enterprises, or by households investing in the services they provide, may well exceed investments through government, donor and NGO sources, perhaps by a considerable margin.

Box 21: Private Sector Engagement in Rural Water Supply in the Mekong[51]

A recent study by the Water and Sanitation Program on small private service providers in Cambodia and Vietnam found that local service providers were common throughout the region. This included well drillers, pump installers, collecting and transporting water for sale, small companies that pipe water directly to households and retailers selling equipment for individual investments. These enterprises and their customers have invested in this rapidly-expanding water market using a wide range of financial mechanisms and with little support from government. They are able to leverage funds, provide cost-efficient and good quality services and products and maintain accountability for problems that arise. The result is high consumer satisfaction and sustainability. For example, in Tien Giang Province in Vietnam, non-state water companies service 65% of the 1.6 million population. In rural Cambodia, thousands of small water collectors use 200 litre water tanks on motorbikes to sell water to households at around $2.50 per cubic metre. Larger private enterprises are also emerging, at times with some external assistance: the MIREP programme in Cambodia facilitates community-level piped water supply schemes by local private companies, with lower investments and recurrent costs and better quality service than those from government-run programmes.

All estimates of the investment needs for water and sanitation far exceed the resources available through governments and formal financial markets. Given this, the potential of small local entrepreneurs and individual investments through these entrepreneurs to fill this resource gap is a - perhaps *the* - key issue for the future development of pro-poor investments in water management. A 2005 World Bank paper notes:

> *"the potential for private financing of small-scale water supply is significant. The local private sector has demonstrated its ability and interest in the development and management of water supplies even in remote or difficult locations that are unattractive to formal providers."* [52]

The paper goes on to recognise the importance of small-scale private service providers to basic service provision for the poor, highlighting the capability of these providers to fill the gap in private financing of infrastructure by serving those living in marginal urban communities and in peri-urban and rural areas. That the full potential of these local entrepreneurs is largely unknown and generally ignored is a matter of concern. Major programmes to understand and further catalyse the potential of these local markets should be a central part of strategies to further develop the contribution of water management to poverty reduction throughout the world.

[51] World Bank Water and Sanitation Programme (2004). *Tapping the market: private sector engagement in rural water supply in the Mekong*. WSP Field Note. Water and Sanitation Program, Washington, DC. [52] M. Kariuki and J. Schwartz (2005). *Small-Scale Private Sector Service Providers of Water Supply and Electricity: A Review of Incidence, Structure, Pricing and Operating Characteristics*. World Bank Policy Research Working Paper 3727. World Bank, Washington, DC.

Where this has been done (for example, see box 22), it has generally been at a relatively small scale but has nonetheless produced remarkable results. The services provided by small local entrepreneurs are generally more efficient, more responsive to consumer needs and more sustainable than those provided by governments and donor projects. They can also generate considerable multiplier effects as a consequence of investments and service charges staying in the local economy and often being used for additional investments in water or other sectors. The water provided is also widely used for the types of productive activities discussed in the section on livelihoods. These investments can be an engine for local growth and development.

Box 22: Promoting Hand Pumps through the Market in Vietnam[53]

International Development Enterprises (IDE) and the Government of Vietnam developed a programme to promote locally-produced and affordable hand pumps in six provinces in Central Vietnam, one of the poorest areas of the country with average household incomes of less than a dollar a day. The results have been dramatic. By the end of 2003, after eight years of project implementation, more than 84,000 hand pumps had been sold and installed, local manufacturing capabilities and pump installation (including drilling wells) owned and operated by small local entrepreneurs had been established and sustainable servicing systems were set up. IDE worked with government agencies to facilitate involvement of private small-scale service providers and to implement a promotion campaign (in particular working with the Women's Union to target women) in order to stimulate demand for several technology options.

The system is self-sustaining with full market chains developed and many more households buying hand pumps through local retailing shops. In addition, IDE worked with small-scale private providers to adapt existing technologies in order to make them more responsive to local needs. Through consumer research and product development, innovative changes were introduced to existing models. These transformations resulted in an enhanced choice of models and improved affordability of systems for the local users. The hand pumps, fully installed and with a drilled well, cost between $15 and $30, depending on local water table conditions, whether a concrete base is built and whether connections for electric motors (which can be installed for an additional $30) are included.

This experience is not unique: IDE has similar programmes in other countries, as do other NGOs. The need for facilitating markets for the poor is driven by product adaptation, consumer research, capacity building of providers and quality control. These are investments that are critical for market take-off yet normally the small-scale private sector cannot afford. At times external promotion of the market is not needed: in rural areas of Bangladesh, hand pumps are now almost universal and over 90% have been bought by individual households from local entrepreneurs with no government, donor or NGO programme involved. Even in the poorest communities, people will invest in water supply, and where efficient market chains exist simple but effective technologies that the poor can afford can transform their access to safe and affordable water supplies.

Poor households have demonstrated they are willing to pay for water, both in willingness-to-pay surveys and by proxy in the amount spent on water purchased from local entrepreneurs. Small-scale private service providers' ability to offer flexible payment options is particularly important to poor consumers. Further, the local private sector can have positive impacts on cost recovery: where private entrepreneurs had provided water services at a highly localized level, systems have tended to be more successful in achieving effective cost recovery and sustainability.[54] The poor's willingness-to-pay also holds true for the expansion of sanitation: a recent UNICEF study in Bihar[55], one of the poorest states in India, showed that individual full-cost investments in toilets far exceeded (by a ratio of 2.4 to 1) those provided through

[53]International Development Enterprises (2002). *Appraisal and Impact Assessment: IDE Vietnam Hand Pump Programme*. International Development Enterprises, Hanoi. [54]R. Cardone and C. Fonseca (2003). Financing and Cost Recovery Thematic Overview Paper. IRC, Delft. [55]D. Roy (2004). *A strategy for moving away from subsidies: sustainable delivery systems for home toilets in Muzaffarpur, Bihar*. UNICEF India Field Notes.

subsidised programmes. There has been a great deal of controversy over the role of the private sector in water management in recent years. Much of this has focused on the role of multinational companies, primarily in relation to the management of water supply services in major cities. The extreme positions that tend to characterise this debate have diverted attention from any sensible assessment of the role and potential of local private sector involvement in water management. The potential of this sector is great but has so far largely been untapped. However, there are successful examples of systematic government-led programmes to integrate local entrepreneurs in water and sanitation services provision (see box 23). The results of these programmes are encouraging, showing that the advantages of affordability, sustainability and demand responsiveness that characterise local entrepreneurs can be scaled up and integrated into programmes where governments take a leading role. This type of partnership is both effective in addressing immediate needs and can play a key role in establishing new institutional modalities where long-standing barriers between public and private sectors are broken down and a more effective balance between investors, service providers and regulators is established. This creates further potential for multiplier effects and sustainable economic growth in poor parts of the developing world.

Realising the potential of small local entrepreneurs will generate significant economic growth that is locally-rooted, is beneficial to the poor and creates opportunities for many poor people to invest and prosper. It is not the only way that water management can generate economic growth. **Major infrastructure investments**, such as large irrigation schemes and large dams, can and do play an important role in economic development. This relationship is not clear-cut:

> *"The precise linkages between infrastructure and development are complex and debated...many infrastructure investments are political white elephants...what is known, however, is that good infrastructure raises productivity and lowers production costs...a one percent increase in the stock of infrastructure is associated with a one percent increase in GDP across all countries of the world"*[56]

Box 23: Working with Small Scale Water Providers

A recent study of eight Asian cities[57] found that small-scale private water providers supply around 20% of residents, often with a high level of satisfaction and competitive prices. In a number of cities, the proportion is much higher. They particularly supply the poor, who are unable to afford or cannot get access to a piped water connection, and are flexible and responsive to their needs. In some cities, the private sector includes small piped water networks, some of which represent a considerable investment. The paper advocates the wide spread of some existing examples of actions to support these private suppliers, including developing an enabling legal and contractual environment, integrating them into the planning system, assisting their collaboration with each other, assisting with technical support and assisting with access to capital markets.

Studies elsewhere have shown that such an approach can be effective. An analysis of the performance of management contracts for small town water services in Uganda[58] found that well-planned and designed contracts can improve the performance of small town water utilities, benefiting their customers and enhancing their long-term viability. A pilot project[59] to encourage small private entrepreneurs to provide water services to the poor in Colombo, Sri Lanka has been so successful that the government is looking to replicate it elsewhere. Such an approach can be successful in rural areas: the MIREP project in Cambodia has successfully installed 10 piped water schemes serving between 200 and 500 households through local entrepreneurs and based on full cost recovery criteria. The result is very high levels of consumer satisfaction for services that are affordable, reliable and appropriate to their needs.

[56] S. Hansen and R. Bhatia (2004). *Water and poverty in a macro-economic context*. Paper commissioned by the Royal Norwegian Ministry of Environment. [57] C. Andrews and A. Weitz (2004). *Small piped water networks*. ADB Water for All series No. 13. Asian Development Bank, Manila. [58] C. Tumusiime and C. Njiru (2004). *Performance of management contracts in small town water services*. Paper presented at the 30th WEDC Conference, October 2004, Vientiane. [59] D. Samanasekera and D. Seneviratne (2004). *Private entrepreneurs to invest and secure water for urban poor in Colombo City*. Paper presented at the 30th WEDC Conference, October 2004, Vientiane.

These economic benefits take two forms: the direct production benefits associated with, for example, improved access to irrigation or increased power generation from a hydro power scheme and the secondary or multiplier effects that this increased production generates. Specific evidence of the long-term economic benefits that comes from large infrastructure is hard to come by. An analysis of the impacts of the Bhakra Dam in India[60] argued that the direct production benefits were significant, with the aggregate gross economic output of the region around 30% larger than it would have been without the scheme. Around half of this was direct values, increased agricultural and electricity production. But for every 1 Rupee of direct production increases, an additional 0.9 Rupee of indirect or multiplier benefits were generated.

Although the details would vary, well-founded and efficiently run major infrastructure investments in water management are likely to generate similar economic growth benefits in other parts of the world. Where the design of infrastructure goes beyond the immediate infrastructure and includes actions to generate environmental and health benefits within a river basin approach, this can increase the life and economic viability of the infrastructure (for example, see box 24).

Box 24: Water Supplies of the Paute Hydroelectric Scheme, Ecuador[61]

The Paute hydroelectric scheme, in the Andean Highlands of Ecuador, was completed in 1983 at a cost of $600 million. At the time of its construction, INCEL, the Ecuadorian electric power utility, took the unusual measure of investing in a range of upstream catchment management activities in order to generate water supply and quality benefits that would preserve the capacity, output and lifespan of the scheme. A model assessed the economic and financial returns to investing in forest management as part of the construction and management of the hydroelectric scheme. This quantified the costs of upper catchment degradation and increased erosion, and the benefits of undertaking measures to avoid them. It examined their values and effects on dam operations. These included the reduction dam in storage capacity and lifespan, increased delivery of sediments and soils from upstream areas that would have required remediation work to remove stones and boulders and caused turbine blades and other equipment to function less well and require more frequent replacement. These costs and benefits were analysed in order to ascertain the present value of undertaking watershed management activities, in terms of increased power revenues, lower dredging costs and an extension to the dam's lifespan. The results of the analysis showed sizeable present values, mainly accounted for by the extended lifespan of the scheme. Depending on the pace and extent to which benefits are realised, these range between $15 million and $40 million - making the point that upper watershed management is in the direct financial interests of the power utility.

However, even where infrastructure developments take place in accordance with good practice, the poverty reduction impacts are not an unequivocal good. A particularly problematic issue is the pro-poor character of this development: it is often argued that such investments can widen existing inequalities and largely benefit the relatively well off with few benefits for the poor. This is a contentious issue: for example, irrigation developments create new demands for agricultural labourers, both pushing up wage rates and creating more regular work demand throughout the year. There are also often new economic opportunities associated with activities such as crop processing and transport, and the urban poor can benefit from cheaper food.

On the other hand, small scale farmers in areas that do not benefit from the infrastructure (especially rain fed farmers in more marginal areas) can see the price of their crops decline while their production

[60]Cited in S. Hansen and R. Bhatia (2004). *Water and poverty in a macro-economic context*. Paper commissioned by the Royal Norwegian Ministry of Environment. [61]From D. Southgate and R. Macke (1989). *The downstream benefits of soil conservation in Third World hydroelectric watersheds*. Land Economics 65(1), in L. Emerton and E. Bos (2004), *Value: Counting Ecosystems as Water Infrastructure*. IUCN, Gland.

remains static, the price of inputs such as fertilizers increase, the availability of credit squeezed, etc. This is true both in the areas where the irrigation development takes place and, perhaps more importantly, in other parts of the country where irrigation is not a viable proposition. There is also the opportunity cost of the investments, which tend to favour better-off areas. This means that the availability of scarce finance, institutional capacities and political support for other, perhaps more directly pro-poor investments is restricted. People can also be displaced by such developments, with the resettlement and compensation packages available often not reflecting the losses of home, livelihoods and cultural identity that their displacement causes. That the people displaced are often socially and politically marginal (and especially often ethnic minorities) tends to exacerbate these problems.

A recent major study[62] on the poverty impacts of irrigation on poverty reduction in Asia showed mixed results in terms of the extent to which large-scale canal irrigation systems generated benefits for poor people[63]. The overall conclusions were that where irrigation investments were accompanied by measures such as reforms to equalise land distribution, actions to reform and improve the efficiency of irrigation management agencies and the development of improved access to markets for poor people then such large irrigation schemes can generate a range of substantial benefits for poor people. Examples from China and Vietnam in particular demonstrated the effectiveness of such combinations of improvements to water management and broader processes of reform. In contrast, where (as in many of the South Asian examples) such reforms do not take place, then the irrigation schemes tend to be less efficient and productive and, significantly, tend to generate few benefits for the poor. In a number of cases, the results of such large-scale investments were that poor people were worse off in both relative and absolute terms.

These points illustrate that simply making large-scale investments in water management infrastructure alone will not generate the pro-poor impacts that they are intended to provide. In most cases, it also means that the infrastructure is less effective in straightforward productivity terms. In relation to pro-poor growth, the conclusions are clear: large infrastructure has much to offer, but these investments need to be part of a wider process of development and reform that is specifically targeted to make sure that the potentials they create for generating growth and at the same time creating benefits for the poor become a reality. This includes:

- Investments in minor **infrastructure** (both for water such as tertiary canals and other areas such as roads, crop storage and processing, etc) to ensure that poor people are able to access opportunities.
- **Institutional reforms** and mobilisation activities to ensure that poor people participate in the decision-making system associated with all stages of infrastructure development and management. This does not mean that they should have a veto, but it does mean that their needs and interests should be adequately represented.

[62] I. Hussein (2004). *Pro-poor intervention strategies in irrigated agriculture in Asia*. IWMI, Colombo. [63] It should be noted that the study measured direct impacts in terms of crop outputs and rural incomes, and did not take account of indirect secondary benefits such as improvements to road networks, electricity coverage and other services that often accompany irrigation development.

- Extension activities to identify and realise **new livelihood opportunities** for poor people that the infrastructure may generate. This should include things such as aquaculture and crop diversification, the provision of services in areas such as transport, small-scale manufacturing activities and others.
- Transparent, effective and adequate **mitigation and compensation** packages for both people negatively affected by the infrastructure development and the integrity of the ecosystems in the area upon which poor people often depend for their livelihoods. Such impact mitigation packages (such as resettlement policies and environmental impact assessment regulations) generally exist on paper but are all too often ignored or not adequately resourced.
- The effective **valuation** of all costs, including social and environmental costs and the development of strategies to ensure that the design, construction and management of the infrastructure takes into account all costs and seeks to maximise all possible benefits. As box 25 shows, the advantages of this approach can lead to changes to designs and produce additional flows of benefits.

Box 25: Incorporating Ecosystem Costs and Benefits in Dam Construction on the Tana River, Kenya[64]

The original proposal for a new hydropower scheme, the Mutonga-Grand Falls Dam, on the Tana River in Kenya had a positive cost-benefit calculation but did not take account of considerable social and environmental costs resulting from impacts on the water table and downstream ecosystems. These ecosystem losses would affect more than a million people who directly depend on the Tana's flooding for their livelihoods, and four times this number who rely on it for water supplies. The environmental costs and benefits of the proposed scheme were calculated, and a revised cost-benefit analysis was conducted to incorporate these values. This demonstrated that investing in a dam design option which included measures to simulate downstream flooding could not only avoid many of these environmental and economic costs, but also reverse many of the negative impacts that had occurred as a result of past dam construction. At the same time, it would also generate significant profits and would be a financially viable investment option. Taking account of environmental costs and benefits, the additional costs that this design option would incur would be more than justified in economic terms.

The development of water infrastructure needs to be based on a full understanding of all potential uses of the resources and, where appropriate, designs should be modified to ensure that all needs are served. This is often not the case, with the planning and design premised on serving a single dominant type of use only: irrigating main crop fields without serving other needs, domestic water systems that only provide water for consumption purposes. The consequences of this can be serious in relation to missed development opportunities or even negative impacts (see box 26). The failure to include all uses of water also has implications for allocation, pricing and cost recovery systems, and consequently for the initial justification and the long-term sustainability of investments (box 27).

Infrastructure built by governments and donors is particularly susceptible to problems over their **sustainability** caused by ineffective operation and maintenance and extremely low cost recovery rates. This often reflects the failure to include the consumers of these services in their planning and design, and in particular in decisions over what charges should apply and how they should be collected. Creating systems to ensure that there is a sound financial basis for the long-term sustainability of investments in infrastructure is a fundamental requirement for their development. This is unlikely to occur where infra-

[64] L. Emerton and E. Bos (2004). *Value: Counting Ecosystems as Water Infrastructure.* IUCN, Gland.

structure development is seen as a technical issue only: the social and institutional framework and economic organisation of infrastructure is as, if not more, important than their technical characteristics.

Box 26: Allocating Water for Home-Based Productive Activities in Bushbuckridge, South Africa[65]

The case study highlights how water-dependent productive activities are vital to the livelihoods of many poor people, including female-headed households, and how improvements in access to reliable water services can contribute to poverty reduction. The institutional context in South Africa is one of dynamic changes in water laws, policies, and institutional responsibilities, most of them pro-poor. Productive uses of domestic water are recognized in the water use category known as Schedule 1. While no license is required for this use, water-dependent productive activities that take place in the household have yet to be recognized in planning and allocation.

The importance of water for productive activities leads to a reassessment of the concept of water for basic needs. This has traditionally been seen as being about health and hygiene only. However, for many in South Africa and across the developing world, the definition should be extended to include water needs for livelihood activities. A key implication of this is that domestic water needs are likely to occupy a far higher level than that assumed by conventional approaches to basic needs. Different households will have different needs, as the scale and nature of use of domestic water for productive activities vary greatly within any community. This means that current norms-based allocation systems (so many litres per person per day) are a hindrance to poor households trying to work their way out of poverty.

Box 27: Measuring the Willingness to Pay of Small-scale Water Users in Zimbabwe[66]

Since 1993, seven pilot small scale "productive" water points, supported by DFID and the Government of Zimbabwe, have been implemented in the Chivi and Zaka districts of Masvingo province. These water points, designed to give a reliable yield of more than 15,000 litres of water, were to provide irrigation for community managed vegetable gardens. Although these gardens had positive results in terms of returns and income (internal financial rates of return during the 1995 growing season ranged from 11-15% and average gross income per member for the 1996 growing season was US$28), the value of the schemes to the community members – measured through willingness to pay (WTP) surveys – yielded interesting findings with respect to cost recovery. A 1995 survey of 60 project households found a mean WTP of Z$5 per month per household. Based on this result, a study found that hypothetical water payments could reach US$776 per scheme per year, suggesting replacement and even long run marginal costs could be met for the schemes.

Also interesting is how this WTP compares to rates charged large-scale users: the sugar estates of Chivi district. In exchange for capital contributions to the construction of dams in the region, the sugar estates were assured access to a defined share of the water for the first 40 years at O&M price only. A report on water pricing by the Zimbabwean Ministry of Lands and Water Resources, using reasonable assumptions about the companies' costs for their capital contributions, estimated an implied price of water from the Tokwe-Mukorsi Dam that producers would face as approximately Z$225 per ML for an expansion of 8400 hectares, or US$1 per 44,843 litres (at 1994 prices). By comparison, the rural community's WTP for productive water (based on a reliable daily yield of 15,000 litres) equates to US$1 per 7,055 litres of water, or more than six times greater a price than the water charges faced by the large sugar estates.

Where the steps outlined above are an integral and resourced part of the process of development of large-scale infrastructure, there is great potential for generating growth that will generate opportunities for the poor. Where they are absent, are addressed in a token manner or are not fully implemented even

[65] J. Soussan and D. Frans (2003). *Water and Poverty*. Asian Development Bank, Manila. [66] D. Waughray and A. Rodríguez (1998). *Valuing water as an economic good in dryland areas - balancing the need for food, environmental and financial security*. Paper prepared for the World Congress of Natural Resource Economics, June 24-27, 1998.

if included in project design, the impacts of large developments are likely to have few benefits for poor people and are even likely to affect them negatively. It cannot be assumed, as is so often done, that developing infrastructure alone is enough: it needs to be accompanied by pro-poor reforms and additional activities.

There are many means through which healthy ecosystems can impact on economic growth, in both positive and negative manners. The most obvious – and easily measured – avenue for this is through the loss of marketable ecosystem products; as noted previously, the poor are often highly dependent on such goods. A previous PEP paper makes this point:

> *"While there is no simple relationship between growth and environment, there are many examples of how bad environmental management is bad for growth. These short-term growth paths are bad for long-term growth, but also have high social and environmental costs that disproportionately affect the poor."*[67]

Some examples of the mechanism through which this can occur include: a collapse of fisheries; a decline of agriculture from the effects of salinisation from irrigation; and decline in exports of commercially-produced aquaculture products (primarily shrimp) due to disease from pollution and poor environmental controls.

Two recent studies examine the question of ecosystem impact on economic development from a cost-benefit analysis, aiming to quantify these impacts. The recent WHO paper (discussed previously in Box 17) approaches the question by looking at the economic impact of improved health and other add-on effects from five different levels of water and sanitation interventions; it found that for each $1 invested, the returns ranged from $5 to $11 for most regions and interventions. Similarly, IUCN (2004)[68] investigates the issue through case studies measuring total economic value of various areas; for example, it notes that wetland goods and services for the Pallisa District of Uganda are worth more than $34 million a year to the economy, adding that the majority of this value accrues at the household subsistence level. Another case study in the same report offers a reverse corollary, examining the effects of environmental degradation in the form of low freshwater flows in the Indus Delta of Pakistan: the findings there were a total loss of more than $22 million from depleted fisheries, fuelwood, fodder and pasture and reduced crop production.

The use of ecosystems, rather than expensive technical solutions, to address water management problems can also be cost-effective. For example, an IUCN case study of three U.S. cities found that every $1 invested in watershed protection resulted in savings of $7.50 to nearly $200 in costs for new water treatment and filtration facilities. Other examples of methods through which economic benefits can accrue through the mitigative effect of ecosystem maintenance include: using upstream forests to avoid costs in de-siltation facilities; maintaining wetlands for flood control to eliminate the costs of rebuilding roads, bridges, buildings and other infrastructure lost in floodwaters; and prolonging the usefulness of dams and reservoirs to postpone the need for new investments in those areas.

[67] DFID, EC, UNDP & World Bank (2002). Linking Poverty Reduction and Environmental Management. World Bank, Washington, DC.
[68] L. Emerton and E. Bos (2004). *Value: Counting Ecosystems as Water Infrastructure*. IUCN, Gland.

3. Opportunities to Reduce Poverty through Water Management

The Key Messages

The discussion presented in the paper so far has argued that water management can and does make a major impact on poverty reduction in a variety of ways and, following from this, that increased resource flows to water management have positive impacts on poverty and are beneficial in social, environmental and, above all, economic terms. A number of key messages can be distilled from the analysis and evidence in the first parts of the paper.

Crosscutting issues such as mainstreaming gender, promoting better governance, decentralisation, how to scale up innovative local-level experiences and capacity building have been discussed earlier in the paper and their importance is taken as a given. Furthermore these topics are widely discussed elsewhere, for example almost every modern publication uses governance issues as a point of departure.

Five key issues are elaborated in this section based on their importance to the relationship between poverty reduction and water management. These key issues are: investing in water for economic growth; doing infrastructure right; finding the finance; meeting the sanitation targets; and the right to water.

Investing in Water for Economic Growth and Poverty Reduction

Investing in water (and sanitation) is a good bet, whether one is talking about large-scale infrastructure or small local developments. Investments at all levels can generate rapid returns that make them competitive when compared to the direct economic effects of investments in other sectors. They are also beneficial in wider development terms, in many cases tackling fundamental causes of poverty such as ill health, environmental degradation and livelihoods insecurity. The evidence to support this case has been presented throughout this paper, and need not be repeated here, but what is essential is a consolidated effort to make the case for increased investment flows a central dimension of any analysis of water's contribution to poverty reduction and economic development. This case is all too often not made, or is made in a fragmented manner without strong enough evidence to support it,

A key challenge is to create a policy and regulatory environment that supports the scaling up of positive examples of pro-poor water management and policy development, in particular creating the incentives to generate investments, from communities and capital markets, that are essential to supplement government and donor resources. This includes an awareness amongst policy makers of all costs and benefits

and values that water investments generate. The economic argument for water needs to be based on more robust and coherent data than is presently available: the evidence that exists is compelling to the converted, but is too patchy and localised to convince the sceptical. Further analysis of this pivotal issue is needed at the national level (to demonstrate the contribution of water management to the national economy), the level of individual investments (to assess the full range of costs and benefits the investments will generate) and the level of the individual and household, where poverty and livelihood impacts are most convincingly understood.

A key part of the message is that the targeting of investments to the specific circumstances and opportunities of the poor can greatly enhance the efficiency of investments and effectiveness in terms of poverty impacts. The adoption of targets such as those in the MDGs is politically and strategically important, but also has an inherent danger that progress is simply measured through the numbers connected regardless of the sustainability, cost effectiveness or appropriateness of the technologies and management models used. This 'taps and toilets' approach can lead to top-down prescriptive campaigns where uniform solutions are imposed on the poor regardless of their characteristics or desires. The poverty reduction impacts of improved water management are immediate and direct - it enhances livelihoods, improves health and reduces vulnerability - but there is a need to be flexible to reflect the diverse character of both poverty and different environments. Patterns of livelihoods, water use and water resources availability are extremely diverse: there is a need to differentiate policy and regulatory changes to reflect this social and environmental diversity.

Finding the capital for such enhanced investment flows need not and should not place heavy demands on the international community. Throughout much of the developing world the principle source of investment capital for all except the largest infrastructure investments can be from local sources, not least the poor themselves who are often both willing and able to invest in services that meet their needs, are reliable and are under their control. Support from the international community is welcomed, and can be essential in some cases. It is often particularly valuable in removing or reducing risks or uncertainties that local capital can find hard to bear.

Doing Infrastructure Right

It was noted above that water infrastructure development, especially large infrastructure, can make a major contribution to poverty reduction but in the past has often failed to do so (and has even had negative impacts: for example, the 1998 floods in Bangladesh, the worst on record, were at least in part due to flood control embankments restricting drainage in many places). Opinions on the role and potential of large-scale infrastructure vary widely, but in recent years there has been a level of emerging agreement on the need for new investments in parts of the world such as sub-Saharan Africa that have had a history of low investments, leaving a heritage of water control structures far below that of most other parts of the world.

What is also increasingly agreed is that clear guidelines on how to do infrastructure right are needed: any major new infrastructure has to be developed only where all alternatives have been considered and demonstrated to be not as effective, that strong social and environmental safeguards are needed and that physical structures alone are only part of the story. All major international organisations will have

strong guidelines in areas such as resettlement and the protection of minority groups: good practices such as these need to become the norm, not just a feature of infrastructure where international donors are able to influence the agenda. Countries such as South Africa have shown that such safeguard mechanisms can be routine even for less prosperous nations. As the World Bank's Water Resources Strategy argues, a balance between investments and reforms are needed: *"most developing countries need to be active in both management and development of water resources infrastructure. For the World Bank to be an effective partner, it must approach water resources challenges without preconceptions. The Bank must not fall into the trap of thinking that all problems can be solved with infrastructure or the equally dangerous trap of assuming that even in environments with minimal infrastructure all problems can be addressed through better management"*[69].

Although it generates strong opinions on both sides, one example of such guidelines for the development of major water infrastructure is the report of the World Commission on Dams[70]. The Commission's framework for decision-making is based on five core values: equity, sustainability, efficiency, participatory decision-making and accountability. It proposes:

- A rights-and-risks approach[71] as a practical and principled basis for identifying all legitimate stakeholders in negotiating development choices and agreements.
- Seven strategic priorities and corresponding policy principles for water and energy resources development: gaining public acceptance, comprehensive options and impact assessment, addressing existing dams, sustaining rivers and livelihoods, recognising entitlements and sharing benefits, ensuring compliance, and sharing rivers for peace, development and security.
- The establishment of performance contracts that spell out the rights and obligations of affected peoples, communities, government and the developer.
- Criteria and guidelines for good practice related to the strategic priorities, ranging from life-cycle and environmental flow assessments to impoverishment risk analysis and integrity pacts.

The approach set out in the report for the development of large dams, or at least something based on similar principles, is one that could be adapted for all major water infrastructure developments. Where this is the case, the opposition to major infrastructure investments is likely to be reduced, as the economic

[69]World Bank (2004). *Water Resources Strategy*. World Bank, Washington, DC. [70]World Commission on Dams (2000). *Dams and Development*. Earthscan, London. [71]Defined by the WCD as "an approach based on 'recognition of rights' and 'assessment of risks' (particularly rights at risk)" in *Dams and Development*.

and technical feasibility of the proposed interventions will be demonstrated and adequate and effective social and environmental safeguards will be an integral part of the proposal.

Finding the Finance

Whatever actions are taken, all the evidence available suggests that there needs to be a significant increase in the availability of financial resources if the potential contribution of water management to poverty reduction is to be realised. The amount of finance that will be needed is not clear. The Camdessus report[72] based their assessment on a more than doubling of investment needs in developing and emerging countries from $80 billion a year to $180 billion a year. These figures are contested as being too high, but whatever the total there is little doubt that extra finance is needed and will have to come from a range of sources, including local entrepreneurs (whose potential has been stressed in an earlier section of this paper). The CEO Panel for Water also notes the need for large increases in investment, and describes a 'vicious circle' that stands in the way[73]:

> *"…low perceptions of the value of water resources, water services, or water the substance often lead to under funding for water systems and ineffective governance of those systems. Ineffective governance of water systems also leads to or reinforces low perceptions of value."*

The Panel recommends using multi-stakeholder dialogues, in tandem with formal political processes and markets, to develop a broader consensus on water valuation, leading to higher levels of financing. This quote illustrates a central contention of this paper: that the widespread failure to fully understand and value the economic significance of water investments is in many cases the root cause of difficulties in generating adequate levels of finance for water investments. It also highlights the significance of the governance conditions through which finance is generated and channelled: generating higher levels of investment and furthering reform in the water sector are intricately linked.

In part, this finance will be for major infrastructure where there is generally little alternative to a key role for government and, for most poor countries, access to financial support from the international community (whether through commercial channels or some form of concessional aid). The World Bank's Water Strategy signals their intention to *"reengage with high-reward–high-risk hydraulic infrastructure, using a more effective business model"* (page 3), whilst the Asian Development Bank has committed to *"promote innovation, synergies and partnerships in developing the architecture required to enhance financial flows to water infrastructure and management"*[74]. Similar sentiments have been expressed by other international financial institutions and donors, but in most cases these are accompanied by explicit statements on the need for effective safeguards (such as those discussed above) and an active programme of sector reform to ensure that many of the poor investments of the past are not repeated in the future.

The reforms are wide-ranging, but focus primarily on three key issues: effective targeting, to make sure that investments meet the needs of the poor and contribute to poverty reduction processes; the development of sound cost-recovery mechanisms; and institutional reforms to improve governance in the sector. As the Camdessus report argues, these are not marginal issues: the very failure to generate sufficient funds or use existing funds effectively is a reflection of failing in these areas.

[72]World Water Council (2003). *Financing water for all*. Report of the World Panel on Financing Water Infrastructure. World Water Council, Marseilles. [73]Business and Industry CEO Panel for Water (2003). *Valuing Water for Better Governance: How to Promote Dialogue to Balance Social, Environmental, and Economic Values?* Presented at the Third World Water Forum, March 2003.

The issues of effective targeting of the poor and cost recovery from water users are intertwined. In many places, present levels of cost recovery for both irrigation and water supply services are extremely low, often no more than a few percent of the fees that are meant to be collected are ever actually collected and these fees represent only a small fraction of the costs of keeping the systems operational. Low water rates are often justified as pro-poor, but they benefit all users and thus are an inefficient mechanism for reaching low-income households. Also, keeping water tariffs artificially low for domestic water often doesn't benefit the poorest of the poor at all, who are the least likely to have a network connection. Further, irrigation water charges have only a limited effect on income redistribution among farmers, and the majority of benefits from low-cost irrigation water typically accrue to the wealthiest farmers. For both domestic and irrigation water, the results of insufficient levels of cost recovery are poor services, no scope for investments to expand systems or replace defunct equipment and low levels of consumer responsiveness by service providers. These issues are addressed in a 2002 World Bank report[75]:

> *"Although low water prices are often justified as protecting the poor, their impact tends to be regressive: available subsidies are captured mainly by the better off, while lack of funds prevents the extension of water deliveries to the poor. Reducing water subsidies could, therefore, both alleviate a very substantial financial burden on governments (freeing up resources for other uses, including better ways to provide water to the poor) while increasing the efficiency of the sector and reducing its adverse environmental impact."*

Subsidies can be used in an efficient manner to benefit the poor, but they must be carefully designed to target the poor and avoid leakage; examples would be using subsidies for access (rather than consumption)[76] and directing subsidies toward water provided at standpipes and kiosks or by other informal providers[77]. A 2004 OECD-DAC report makes similar points, arguing that higher levels of cost recovery will only transpire when they are part of a wider package of reforms (see box 28).

Without actions in these areas then it is unlikely that either local capital markets will develop or anything like the levels of contributions needed from consumers will be forthcoming. These are the key: money from the international systems and/or national governments can only go so far and will not generate the levels of finance needed for water investments. It is only when an environment conducive to local investments, by entrepreneurs and individuals, is created that adequate levels of finance will be available. This is particularly true for smaller investments, in sanitation, domestic water, small businesses and small-scale irrigation. These are the investments that are of the greatest importance in poverty reduction terms, and in particular where the poor themselves are willing and able to take the key decisions on what to spend where. Developing local level markets is in any case desirable: they can provide better services that are cheaper, more flexible and more responsive to consumer needs than infrastructure developed by governments, whether supported by donors or not.

As such, the **key to finding the finance** is the creation of an environment to stimulate and support local market development, building links between small local entrepreneurs and consumers. Packages of reforms, technical support and incentives for this are effective and cheap when compared to the call for billions for governments to make investments. Such packages should be a focal point of any pro-poor water strategy.

[74]Asian Development Bank (2004). *Response to the Report of the World Panel on Financing Water Infrastructure. Asian Development Bank, Manila*. [75]World Bank (2002). *Generating Public Sector Resources to Finance Sustainable Development*. World Bank Technical Paper No. 538. World Bank, Washington, DC. [76]R. Cardone and C. Fonseca (2003). *Financing and Cost Recovery Thematic Overview Paper*. IRC, Delft. [77]World Bank (2006). 2006 World Development Report. World Bank, Washington, DC.

Box 28: Environmental Fiscal Reform in Drinking Water[78]

Water is often considered a basic good which should be provided free of charge but is costly to provide; as a result subsidies to the water sector are a drain on the national budget, encourage waste and seldom benefit the poorest who are not served by mains water. Water pricing is controversial but must be considered as part of a package of institutional reform, including:

- **Regulatory controls** to separate the functions of water delivery and monitoring the performance of water utilities.
- **Legal status of water utilities** to provide the basis for financial autonomy, accountability and control over upstream activities.
- **Monitoring of water utilities** operational and financial performance.
- **Realistic financing strategies**.
- **Water tariffs** that provide incentives for the efficient use of water.
- **Improving collection efficiency** to generate finances.

Key stakeholders who would be affected by these changes include: **the poor** who spend proportionally more on water than the rich; **the non-poor** who benefit from under-priced water; **water vendors** who wish to maintain the status quo; **international water companies** who are keen to invest but appreciate the risks, and may prefer to operate a publicly-owned network for a fee rather than directly owning it; **politicians** who may seek political power by opposing water price rises; **finance ministries**, which have an interest in reducing subsidies; and **water authorities** who would have to shift from providing services to regulating them.

There are several key steps in the reform process. The **costs of cheap water** and the benefits of a financially and environmentally sound water supply must be publicised. **Strong regulatory systems** that prevent monopolies must be established. **Explicit compensation measures** must be developed to protect the poor. The cycle of **low quality, leading to low willingness to pay, low revenues and poor quality** must be broken. **Cost recovery** should be gradual and should initially cover O&M only.

Meeting the Sanitation Targets

For most countries of the developing world, the sanitation MDG is the one with no real prospect for success with "business as usual". Although progress has been made, in many countries the starting point was extremely low and the rate of improvements is doing little more than keeping up with population growth: according to a joint UNICEF/WHO report[79], if the current trend from 1990 (the baseline year) to 2002 holds, *"the world will miss the sanitation target by a half a billion people. In other words, close to 2.4 billion people will be without improved sanitation in 2015, almost as many as there are today"*. The report also states that *"the situation is most serious in South Asia, sub-Saharan Africa, Western Asia, Eurasia, and Oceania, none of which are on track for meeting the sanitation target"*. Major changes are needed at all levels, but especially at a policy level if sustainable and effective programmes to meet the sanitation targets are to be catalysed. The potential consequences of not reaching these targets, in terms of human health and livelihoods, are one of the most serious challenges facing the developing world.

This is an area where the challenges are as, if not more, serious in cities as in rural areas. Rapid urbanisation in many countries where coverage is lowest means that *"meeting this target…will mean providing sanitation services to a billion new urban dwellers and almost 900 million people living in rural communities"*[80]. The crowded character of urban slums and lack of waste disposal means that the impacts of poor sanitation on both people's health and the local environment is generally much greater in cities, adding to the urgency of addressing the sanitation of the hundreds of millions of people living in the slums of the rapidly growing cities of the developing world. This urban challenge needs different solutions, in technical, financial and organisational terms, to those that are effective in rural areas. There are models of success in devel-

[78]Summarised from OECD-DAC (2004). First draft reference document on environmental fiscal reform for poverty reduction. OECD, Paris. [79]WHO/UNICEF (2004). *Meeting the MDG Drinking Water and Sanitation Targets. Joint Monitoring Programme Report.* WHO, Geneva. [80]Ibid.


oping sustainable urban sanitation (see box 8). These often encompass solutions that are by necessity not focused on individual households but that do not have the costs and organisational complexity of traditional centralised sewerage systems. A more innovative approach to the development of such intermediate sanitation solutions has great potential for many rapidly growing urban areas in the developing world. As Mara et al[81] point out, different approaches based on clear selection criteria are needed in these areas that are based on neighbourhood arrangements but include recycling where possible and are not conventional, high cost sewerage systems.

It is also essential that the expansion of sanitation facilities is accompanied by health and hygiene promotion measures to ensure that the intended health and environmental improvements area achieved. These issues are widely neglected:

> *Sanitation and hygiene, however, somehow disappear during the planning, policymaking, budgeting, and implementation phases, while the lion's share of effort and resources are allocated to water supply. This reality reflects the often low political commitment to sanitation; low effective demand by users for sanitation; strong cultural and personal taboos against discussing human wastes and their disposal; the lack of an appropriate institutional home for sanitation; and the simple fact that expanding access to sanitation is often more costly and technically difficult than expanding water supply services.*[82]

There is a need for vigorous advocacy and awareness-raising amongst politicians and the general public of the benefits of improved sanitation and the costs of not addressing these issues. The UN Task Force argues for the need for public subsidies in many cases: *"given that many of the health and environmental benefits from improved sanitation accrue to the community at large, rather than to individual households, community institutions have a vested interest in expanding access to sanitation"*[83]. The WHO study quoted above[84] shows that at a macro level improved sanitation generates a high rate of economic return through the time saved from preventing ill health and the savings to the health system. There is a need to analyse and show these benefits in individual countries, to make sure that sanitation becomes a much higher priority for allocating resources.

Innovative approaches such as ecological sanitation (see box 29), where both urine and faecal matter are recycled for their nutrient values, can improve the economic attractiveness of these investments, and work by NGOs such as IDE and WaterAid and by international development agencies, such as SIDA and GTZ, show that effective coverage of even very poor communities with a high level of consumer contribution is possible.

[81]D. Mara, J. Drangert, N. Anh, A. Tonderski, H. Gulyas and K. Tonderski (2005). *Selection of sustainable sanitation arrangements*. Draft research paper, School of Engineering, University of Leeds. [82]UN Task Force on Water and Sanitation (2003). *Interim Summary Report*. United Nations, New York. [83]Ibid.; [84]G. Hutton and L. Haller (2004). *Evaluation of the costs and benefits of water and sanitation improvements at the global level*. WHO, Geneva.

Box 29: Eco-Sanitation: A Sustainable System of Sanitation[85]

Considering the environmental damage, the health risks, and the worsening water crisis, a revolutionary rethink of our current sanitation practises is urgently needed. Ecosan provides a solution by applying the basic principle of closing the loop through the application of modern and safe sanitation and reuse technologies, thereby continuing the historic tradition of recycling human wastes once applied in most farming societies.

Benefits of ecological sanitation include:

- the protection of human health through safe sanitation
- the preservation of clean waters, and a safe and healthy environment
- the reuse of plant nutrients as valuable fertiliser restoring soil fertility and substituting expensive mineral fertilizers from limited natural resources
- the reuse of organic matter for improving soil quality, especially its water and nutrient retention capacity
- the recovery of energy contained in excreta and wastewater, for example through the production of biogas
- the reuse of water for irrigation, aquaculture, service water or groundwater recharge

Early ecosan systems developed in the 1980's primarily focused on dry sanitation systems for rural areas only. Through technological improvements, however, ecosan now provides a wide range of sanitation options, ranging from low-cost systems such as composting toilets, urine diverting dehydration latrines and constructed wetlands, to high tech waterborne applications, such as vacuum sewers, anaerobic treatment, chemical processing or membrane technology, which are suitable for use in densely populated urban areas all over the world.

However, there are still some challenges to be faced before ecological sanitation systems are widely adopted. These include:

- Awareness of the alternatives offered by ecosan has to be increased
- Resource reuse needs to be integrated into sanitation planning processes from the very beginning
- Legal frameworks and technical standards need to be revised
- A full cost analysis and comparison of the environmental and health risks of all types of sanitation is required
- Innovation-friendly investors are required, as well as new financing instruments supporting private households investment
- And, most important of all, large scale implementation of ecosan projects are needed in urban areas for showcasing the technical feasibility and the benefits of this new approach

Ecological sanitation is thus a sustainable approach to provide safe and decent sanitation while reducing poverty, promoting health, contributing to food security, and preserving the environment.

There is also a need to clarify institutional responsibilities in many countries: a lack of clarity over who is responsible for monitoring and promoting sustainable sanitation is typically the case throughout the developing world where the needs are the greatest.

The case for sanitation is consequently not a hopeless one, as many people seem to believe. It is one where possibilities need to be demonstrated and advocated. A far higher level of attention to this issue is one of the highest priorities for the coming decade and beyond. There is a need for the international community to support these efforts with resources, expertise and political will.

[85] U. Winblad and M. Simpson-Hébert (2004). *Ecological Sanitation*. Stockholm Environment Institute, Stockholm.

This also reflects the outcomes of the UN Task Force. The challenges sustainable sanitation presents and the limited progress to date means that 'business as usual' will not work and new approaches are needed. A key issue here is the link to water supply. There are clear benefits from linking the two issues, but in practice this has often led to sanitation being neglected when programmes are implemented. There is also a concern that the needs of the many millions who have access to water but lack sanitation will be neglected. A 'risk reduction' approach is advocated, where providing appropriate technology choices is closely linked to health and hygiene awareness promotion and to local level water quality management so that the health and environmental benefits of improved sanitation are realised. The potential of ecological sanitation has been demonstrated but not yet fully integrated into national approaches: robust approaches to 'scale up' this approach need to be demonstrated.

A focal issue for sanitation is to more clearly define who should do what: what are the respective roles of central government agencies, local governments, the private sector, NGOs and civil society and international development partners in facilitating communities to meet their sanitation needs. Governments need to create a policy, regulatory and institutional environment that will support new approaches. Central to this are four key areas for government action: (i) health and hygiene awareness promotion, with this linked closely to wider primary health care programmes that are usually in the provenance of Ministries of Health; (ii) ensuring that schools and other public facilities have good water and sanitation facilities, and that school curricula include good hygiene awareness; (iii) helping those, the poorest of the poor, who are unable to help themselves through targeted programmes of investments and environmental health management; and (iv) establishing and enforcing an appropriate regulatory environment, especially on water quality and wastewater disposal.

The Right to Water

General Comment No. 15 by the United Nations Committee on Economic, Social and Cultural Rights in 2002 recognizes water as a public good, fundamental for life and health, and supports the opinion that water is a prerequisite for the realization of other human rights. Drawing on a range of covenant rights and general comments, it states:

> *"Water should be treated as a social and cultural good, and not primarily as an economic good" [and] "the right to water clearly falls within the category of guarantees essential for securing an adequate standard of living, particularly since it is one of the most fundamental conditions for survival".*[86]

Yet, this is only one view on the issue, as the General Comment does not have the force of law of an international treaty. The issue of water as a human right finds supporters and detractors in governments, multilateral organizations, and civil society and has led to polarization of opinion in many international water fora. Many experts and governments of developing and developed countries are strongly against the concept, arguing that defining water as a human right weakens the origin and focus of this concept as being concerned with civil liberties and freedom from oppression. They regard economic and social rights in general as programmatic clauses instead of enforceable rights. It is also argued that defining water as a right would place an obligation on governments to provide all citizens with adequate water

[86]UN Committee on Economic, Social and Cultural Rights, *General Comment No. 15 (2002) – The right to water* (Twenty-ninth session, Geneva, 11-29 November 2002), paras. 3, 11.

regardless of the costs, or whether it is a practical proposition for governments to assume such a responsibility, particularly in regions where population density is low.

Other experts and organisations strongly advocate the concept, arguing that anything as essential to life and prosperity as access to water is a basic human right and should be guaranteed as such. It is argued that the creation of water as a human right would be a tool for helping the unserved secure access to water, and would assist the global community's efforts to achieve the MDG water and sanitation target by 2015. Advocates for the right to water point to water as an implied human right in long-standing conventions, such as the UN Charter, the Universal Declaration of Human Rights (1948) and the legally-binding International Covenant on Economic, Social and Cultural Rights (1966). According to this reasoning, a right to water is part of an obligation to the "progressive realisation of rights" without which other rights cannot be realized.

The significance of General Comment No. 15, even though it is not generally accepted and does not bind parties, is that it emphasizes the importance of proactively providing access to water for the poor, given that a minimum level of water is necessary for health, hygiene, food security, ecosystem sustainability, and other needs.

Related to the question of the acceptance of the human right to water, but yet a separate issue, is the question of taking a rights-based approach to development and its implications for water issues. The rights-based approach encompasses normative principles and standards such as participation, non-discrimination, and accountability that can be drawn from international human rights treaties. A rights-based approach stresses the relationship between rights-holders and duty-bearers, their mutual roles and responsibilities, and places people in the centre of development.

Apart from the "pros" and "cons" of the issue, there are many questions regarding how a human right to water should be constituted. For example, would such a right be for drinking water only, or might it include all domestic uses, including livelihood activities that depend on water? Could the human rights argument and the concept of water as a public good be used by poor people to claim a share of the benefits of productive uses? Could a human right to water lead to large-scale inter-basin transfers of water, causing fundamental changes at the watershed level and to ecosystems? Would a country with water scarcity - or its people - have a claim on another country's water resources? Questions about what level of service is appropriate, and how such a right could be enforced, add to the uncertainty regarding the implementation of such a right. A further question is whether a right to sanitation should be included: General Comment No. 15 gives less prominence to the issue of sanitation, despite it being included in the MDGs, but does mention it.

There is also a concern among some advocates of creating a human right to water that, in the absence of such a right, the likelihood of privatisation increases. In this context, it is important to distinguish between the privatisation of water supply, i.e. the service delivery and distribution, and the privatisation of the water resource itself. The latter refers to the ownership of certain water resources linked, in many cases, to an area of land. Privatisation of water resources might actually lead to violations of a human right to water and provokes questions about the equitable distribution of water resources. There is a risk that those with ownership could use water in an unsustainable manner, causing the resource to become depleted.

In regard to the question of water supply, General Comment No. 15 does not take a stand on this issue but leaves the mode of service delivery completely up to states. This raises the question as to how closely linked the two issues of water as a human right, and privatisation of water supplies, actually are.

One issue worth further consideration is affordability of water and sanitation services. As the UN Millennium Task Force on Water and Sanitation points out, "some poor families and communities simply cannot pay for water supply and sanitation services; carefully targeted subsidies for this group are essential."[87] General Comment No. 15 does not state, however, that water should be provided free of charge - this is an inference often made by advocates for significantly higher levels of government investment. As such, the issues of rights and finance are inextricably linked to each other: effective solutions to the latter are the basis for creating the conditions where the former is possible.

[87]UN Millennium Task Force on Water and Sanitation (2005). *Health, Dignity and Development: What Will it Take?* United Nations, New York.

Conclusion

The five issues discussed in this section are ones where more thought and further work is needed if the full potential of water management in poverty reduction is to be realised. The points raised are intended to stimulate this discussion, and perhaps to lead to new partnerships to address these issues. It is clear that action on all of them is needed. This is particularly true for the first four, which relate to clear arenas of priority action in water management. It is also true for the fifth, the right to water, as a level of consensus on this is crucial if the international community is to move forward into an era of effective partnerships. Such partnerships are essential if water management's potential as a key factor in poverty reduction is to be realised. A process through which such partnerships could be built is discussed in the last section of this report.

POLICY RECOMMENDATIONS

The analysis and evidence presented in this paper have all been focused on demonstrating the great, and to an extent unrealised, potential of water management as part of a nation's poverty reduction strategy. The importance of integrated approaches – both within the water sector through IWRM and through the integration of water management into wider poverty reduction processes – has been stressed. How can this potential be realised? In particular, what actions can governments of the developing world, supported by the international community, take to enhance water's contribution to poverty reduction? Coherent and effective approaches are needed to address the challenges and mobilise the opportunities that have been identified in this paper. This includes policies and strategies to target resources to the specific needs and opportunities of the poor, and that recognise water's links to the different dimensions of poverty reduction discussed in section 2. It includes the creation of policy and regulatory environments that stimulate increased investment flows and provide a setting in which infrastructure investments can take place with effective planning and safeguard regimes. Above all, it includes the development of governance conditions in which the needs, interests and capabilities of the poor are central and through which the poor are given increased choices on meeting their needs.

Actions to enhance the impacts of water management on poverty reduction are needed at all levels and by all stakeholders. This section focuses on actions in relation to **policy processes**, where the main focus of attention is on the creation of an enabling framework by national governments so that actions by others and at other levels are supported and take place with secure rights and regulations. It was noted above that this is not just about policies directly concerned with water management. Other areas of policy are equally important. The discussion presented here will consequently focus on:

- Policy, institutional and governance reforms in the **water sector** to ensure more effective targeting of poverty reduction. The 'targeting' will be discussed in relation to the 4 dimensions of poverty discussed in preceding chapters: livelihoods, health, vulnerability and growth. These reforms should include moving towards meeting international commitments to prepare national IWRM plans, with care taken to ensure that IWRM has a clear poverty reduction focus.

- Measures to define and act on policy changes in **other sectors** that affect the potential of water to contribute to poverty reduction: e.g. decentralisation, financial mechanisms, stimulating small scale private sector development, linked sectors such as agriculture, forestry, health and environmental conservation.

Good decision-making and policy development depends on good information. A first step, with international development partners supporting governments where needed, is to prepare a **national assessment** of water-poverty relationships, building on the framework presented here to reflect the specific character of these relationships within individual countries. This assessment should be done rapidly, based on existing information: the key is to catalyse discussion and analysis, not be concerned over exactness in data. This assessment will provide a basis for governments to define **policy and strategic priorities** for water management, based on clear poverty reduction priorities. The preparation of national IWRM plans should, where possible, be the basis for this approach. Where available, this should also be closely linked to national poverty reduction strategies such as PRSPs and in all cases the priorities should be linked to the MDGs, based on the framework presented in chapter 1. Lastly, policy priority areas should take into consideration four core areas reflecting key constraints as identified by the UN MDG Task Force Report (see box 30).

Box 30: The UN MDG Task Force Report: Key Constraints in Four Core Areas[88]

In defining policy priority areas, the analysis should focus on four core areas that reflect the key constraints identified in the UN MDG Water Task Force report:

- **Policy, legal and regulatory reform** (including issues of rights of access to water). Governments define the framework through which water management takes place through the set of laws and regulations that determine the rights of different sections of society with regard to access to different aspects of water resources. These laws and regulations are further prioritised by the policy framework for water management and for activities such as agriculture, ecosystems conservation, industry and other sectors that use water. Special attention to defining policies that target the specific needs and opportunities of the poor for improved access to water resources is needed.

- **Planning and technology choices:** defining the national level legal and policy framework is essential but alone will achieve little. What matters is how the policies are put into practice. Governments need to ensure that the planning systems through which their programmes, including programmes supported by donors, reflect the policy priorities through having explicit poverty reduction targets, assessing the possible impacts on the most vulnerable groups and the resources on which their livelihoods depend and containing options that reflect the needs and capabilities of the poor. Above all, the goal should be to broaden the range of technology and management choices available to poor people and to planners so that the full range of possibilities is available to them.

- **Financial mechanisms**, including supportive investment environments and cost recovery mechanisms, are in many places a critical gap in existing systems. Two aspects of this issue are particularly important:

  – Developing credit and financial management systems that are accessible to and affordable by the poor, so that as high a level of cost recovery as possible is achieved. As has been shown repeatedly in this paper, the poor are willing to pay for better water and sanitation. However, they require financial instruments designed to meet their specific needs, such as microcredit options to pay for one-time expenses (connection charges, household water infrastructure) and flexible fee structures to accommodate household income cycles.

  – Creating a regulatory regime and climate where private investments, especially from local entrepreneurs, are encouraged. Reforms to restrictive government regulations that create perverse incentives and the development of targeted programmes to reduce risks and encourage entrepreneurial development should be developed. There is also a strong case for providing tax and other financial incentives to encourage private investments.

Actions in these two areas will mean that the need for funding from the international community will be greatly reduced, that the benefits that come from increased investments will be sustained and that improvements to water management will generate wider economic development benefits.

- **Institutional reform** and more effective institutional coordination, in particular for government agencies but also to create a supportive environment for the further development of private sector, civil society and community level organisations. This issue covers all levels of institutional operations, but in many places two critical gaps are in strengthening decentralisation and local government capacities and supporting the development of local private sector service providers, something that generates substantial wider development benefits.

[88]UN Millennium Task Force on Water and Sanitation (2005). *Health, Dignity and Development: What Will it Take?* United Nations, New York.

Integrating Water in MDG-based Poverty Reduction Strategies

There will be many countries where the foundation of a more coherent approach to maximising water's poverty reduction potentials will be through ensuring that water is integrated as a central element of national poverty reduction strategies, including PRSPs. Experience to date (see box 2) shows that this has all too often not happened, and that this is a significant factor in recent low levels of investment in water. The process of ensuring water is not marginalized and becomes an integral part of the poverty reduction agenda in developing countries should be based on close collaboration between water managers and the authorities responsible for these mainstream poverty reduction programmes. There are two linked reasons for this:

- This process will provide a structure through which the relative merits and potentials of different aspects of water management can be balanced and priorities for investment and reform identified. This should be through ensuring that overall national poverty reduction strategies (including PRSPs where they exist) contain explicit MDG-based goals and targets on water management.
- The process of preparing the strategies, so long as it is participatory, open and inclusive, will provide a vehicle for bringing different stakeholders together and establishing a consensus on what trade-offs are needed, where priorities should lie and who should be responsible for what actions. Through this, the process of preparing the strategy with water as an integral element is as important as the strategy itself.

Reducing Fragmentation Through IWRM

A key policy challenge is for governments to put in place **integrated water resources management**, including meeting the WSSD Plan of Implementation commitment to prepare national IWRM plans. Although governments can benefit from a large body of literature on various aspects of IWRM, no blueprint exists for how this should be done. Establishing IWRM will always need to be tailored to the specific national conditions, processes and on-going developments. Integration between water and other sectors is as critical as integration between agencies that have responsibilities for different aspects of water management. The first stage of the process is to develop an integrated analysis, based on river basins, of patterns of resource flows and uses, with this related to livelihoods, factors causing poverty and broader patterns of development. The four dimensions of poverty reduction identified above - livelihoods, health, vulnerability and economic growth - should be integrated into this analysis. IWRM should develop as a process, should be purpose-driven and must be based on mechanisms to establish a consensus amongst key stakeholders that this is the most effective way forward in addressing development and poverty reduction needs.

The development of IWRM should aim to **reduce fragmentation** in institutional responsibilities amongst government agencies. It is not uncommon for several ministries to have mandates for different aspects of water management, including ministries of water, environment, agriculture, health, construction and others. In some countries, there is also a level of decentralisation, with local government tiers having control of certain aspects of water management. This fragmentation creates great problems for effective coordination and is a barrier to innovation. The IWRM process should lead to the establishment of mechanisms for coordination between the agencies with a bearing on the water-poverty relationship at all levels of government.

Strengthening Local Governance

The importance of governance issues has been stressed: the reforms needed to achieve improvements to the governance of water resources and services are an integral part of any policy agenda for improving the poverty impacts of water. This includes capacity-building at, in particular, local government and community levels, with these capacities made relevant by the devolution of authority for as many aspects of decision-making as possible to the lowest appropriate level (in other words subsidiarity). The goal must always be to give the poor more choices, along with the institutional means to turn their choices into reality.

Improving local level water governance through **decentralisation, securing rights and enhancing institutional capacities is a key issue**. This includes finding the right balance between government, civil society and the private sector in water management and enhancing frameworks for collaboration between these different stakeholders. It also includes enhancing knowledge and institutional capacities amongst the poor so that all sections of the community are represented and investments are effective and sustainable. Enhancing governance of water requires firm commitment from governments to reform and to strengthen the rights and capabilities of local communities, and especially the poor amongst local communities. This issue is particularly important where there is resource scarcity or competition between different uses of the same resources, as it is all too often the poor who lose out when such pressures exist.

A key policy issue is to **clarify rights and entitlements** with regard to the access of different sections of the community to different water resources, including both surface and groundwater. Defining a framework of rights should reflect traditional patterns of access and use even where these are not based on

clear property rights. These traditional systems will need to be adjusted to reflect contemporary realities, however: for example, unregulated rights to fish or to extract water may have not led to over-exploitation at lower levels of population and development pressures but can rapidly destroy the integrity of the resources where such pressures increase. A clear legal basis and regulatory system, whether based on property rights, licensing or a different mechanism, is essential to underpin rights and entitlements of different water users. Whatever system is used, specific attention is needed to ensure that the needs of the poor, of women and of indigenous peoples and ethnic or other minorities are safeguarded. And a rights framework must be supported by a transparent and fair conflict mitigation system where disputes arise.

Creating an Enabling Environment to Encourage Investments

Financial mechanisms, including supportive investment environments and cost recovery mechanisms, are in many places a critical gap in existing systems. Two aspects of this issue are particularly important:

1. Developing credit and financial management systems that are accessible to and affordable by the poor, so that as high a level of cost recovery as possible is achieved. As has been shown repeatedly in this paper, the poor are willing to pay for better water and sanitation. However, they require financial instruments designed to meet their specific needs, such as microcredit options to pay for one-time expenses (connection charges, household water infrastructure) and flexible fee structures to accommodate household income cycles.
2. Creating a regulatory regime and climate where private investments, especially from local entrepreneurs, are encouraged. Reforms to restrictive government regulations that create perverse incentives and the development of targeted programmes to reduce risks and encourage entrepreneurial development should be developed. There is also a strong case for providing tax and other financial incentives to encourage private investments.

Actions in these two areas will mean that the need for funding from the international community will be greatly reduced, that the benefits that come from increased investments will be sustained and that improvements to water management will generate wider economic development benefits.

An effective **regulatory system** is essential to support both IWRM and the rights framework. The regulatory system, which must include effective enforcement capabilities, should focus on both the allocation of water and water quality issues, with in particular the establishment of clear water quality standards and waste disposal licensing and limits essential. Where possible, polluter pays principles should be integrated into the regulatory system, but there are particular problems associated with non-point sources of pollution from, for example, agricultural chemicals. The regulatory system needs to be supported by effective monitoring of the hydrological network, including groundwater resources. There is also a need for good information and awareness raising, both targeted to specific resource users and for society as a whole.

Advocacy and Awareness-raising

Advocacy and awareness programmes to create a broader understanding of water's contribution to poverty reduction should be developed by governments, supported by international development partners. This should include specific and targeted areas of awareness, such as health and hygiene programmes linked to water supply and sanitation development and extension activities to promote new agricultural technologies. It should also include activities to create a broader social consensus and political support to improving water management and increasing investments in water. The need to make a powerful message on the economic and poverty reduction benefits the centre piece of such advocacy and awareness campaigns has been stressed. Governments should join with NGOs and civil society organisations for many of these activities, and should make sure that school and college curricula include improvements to water management as core subjects.

Conclusions

These policy areas define an agenda for governments of the developing world that would catalyse a process of change in water management that would greatly enhance the contribution of water to different aspects of poverty reduction. These policy priority areas would provide greater clarity in what needs to be done and what the rights and responsibilities of different stakeholders are. They would provide a far better understanding of the benefits, including the direct economic benefits, that increased investments in water will generate, and would stimulate all stakeholders to make these investments. Many governments are already taking actions in many of these areas: the agenda for change proposed here is not one that is nice in theory but unlikely to happen in practice. What needs to be strived for and supported is a policy and reform process so that such changes become the norm rather than the exception.

A FINAL NOTE

This paper has set out to do two things: to analyse the potential role of water management in poverty reduction and to identify actions through which this potential can be realised. As has been stressed, in MDG terms this relates to all the millennium goals and targets, not just target 10 (the water supply and sanitation target). Numerous case studies have been cited to show that actions that bring results are possible, and indeed are already being implemented in many places. The problems (what the World Bank calls the *"gloomy arithmetic of water"*[89]) can at first glance seem daunting, even insurmountable, but it is hoped that the analysis set out here shows that effective and sustainable solutions are not only possible, in most cases they are a good investment. This is the core message: investing in water is not a drain on the national exchequer: it positively contributes to it.

Where the right investments are made, wise water management reduces poverty problems by reducing health risks and the multiple vulnerabilities that the poor face. It also creates solutions and generates wealth by helping secure sustainable livelihoods and catalysing economic growth. The result can be healthier, wealthier and more secure people whose choices in life are greatly increased. Finding these solutions, reaching this potential, is not necessarily easy (though it is often easier than some people suggest) and will not happen automatically. The full possibilities of water management in poverty reduction will materialise where different stakeholders in a country, supported by the international community, work together in strong partnerships to realise their distinct roles: the Johannesburg principle of "common but differentiated responsibilities" is fundamental here.

[89]World Bank (2004). *Water Resources Strategy*. World Bank, Washington DC.

The final section of this paper outlines the key messages from the paper and identifies policy priorities for governments from the developing world and for their partners. Developing partnerships to address this issue is fundamental, with governments, civil society, the private sector and, above all, local communities working together to maximise the contribution of water management to poverty reduction. In some places, such partnerships are already emerging. The international community must work together, in partnership, to support and catalyse such processes. If this happens, not only will the MDGs be reached (and often surpassed) but the foundations for continuing beyond 2015 (to reach the 50% whose needs are not met by the MDGs) will be built through effective, sustainable and, most importantly, affordable solutions to the problems the world's poorest people face.

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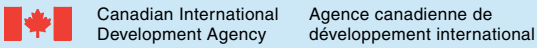
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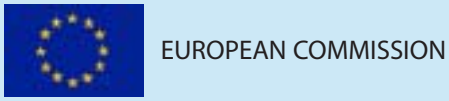
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