Solving the water dilemma: Keeping our waters alive to serve people's needs

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ABSTRACT

At the start of the 21st century, we are faced with a worldwide water dilemma. This dilemma exists between the protection of water resources, required to guarantee the continued provision of ecosystem goods and services, and the need to increase exploitation, required to meet the needs of users. The dilemma is permanent in character and its resolution requires structural changes. To solve the worldwide water dilemma two fundamental elements of a strategy stand out: (a) maintaining the ecosystems on which environmental goods and services depend and (b) establishing new ways of working to invest in ecosystem maintenance and prevent water conflicts. This requires governments and other stakeholders to establish ecosystem-based management of water resources. An approach that focuses on maintaining the water resource base rather than only commodity production. We equally need to build 'water coalitions' that bring stakeholders together to solve their competing demands jointly. And finally stakeholders need to work together to implement an 'ecological modernisation' of water management. This is to focus on improvement of efficiency and restoration of resources.

1. INTRODUCTION

Although an absolute 'world water shortage' does not exist, we should not underestimate the reality of physical water scarcity in particular regions. Projected physical water scarcity for 2025 in the Middle East, West Asia, and Northern Africa are dramatic under several development scenarios (Cosgrove and Rijsberman 2000). In these areas, agricultural water use is the main cause of water scarcity in villages and dried-up rivers. Water scarcity is less extreme in other regions, but issues are similar: certain water users deprive others of development options.

Over the last decade, many authors have referred to projected water problems as a 'world water crisis' (Gleick 1993; Abramovitz 1996; Postel

1999; Gleick 1999; WWC 2000). These scenarios may give the impression that a 'quick fix' can be found to these problems. However, what we face in reality is a 'worldwide water dilemma'. This dilemma exists between resource protection on the one hand and the further exploitation and allocation of water resources on the other. Protection of ecosystems is necessary to ensure the sustainable provision of resources, whereas the needs of people require increased exploitation of these same ecosystems. The dilemma distinguishes itself from a crisis in its permanent character and the structural changes required for its resolution.

To deal with the dilemma, societies need to maintain the water resource base through the development of political and financial mechanisms that reconcile competitive demands and assit with deciding upon trade-offs. The maintenance of the ecosystems requires collaborative efforts and investments for resource protection and conflict prevention. To resolve the dilemma societies thus need to:

- implement an 'ecosystem approach' to water management, to move from sector-oriented approaches to integrated strategies and work to protect ecosystems;
- establish 'water coalitions' for water resource planning and management, which are based on the active participation of civil society and involve governments, political parties, NGOs, the private sector, science, farmers, municipalities, provincial governments;
- promote the 'ecological modernisation' of water management, to move from 'react-and-cure' and 'anticipate-and-prevent' to 'strategize-and-invest'; offering opportunities for both private and public investments in the maintenance of environmental services.

The above strategies would require new techniques in terms of public policy making and implementation to be developed and implemented over the last decade. Multi-stakeholder involvement in planning and management has developed while removal of perverse incentives and emission taxes are increasingly being used. What is needed now, is a new impulse to a wider application of these new strategies to address the world-wide water dilemma.

2. A WORLDWIDE WATER DILEMMA

2.1 Degrading watersheds, rivers and wetlands

The degradation of watersheds, from mountain ranges to coastal and marine zones, leads to rapid declines in the quality and quantity of water resources that are available to humankind. The deforestation of upper watersheds, drainage of wetlands and destruction of streambanks cause watersheds to lose their function as regulators of water quality and quantity. Evidence of this degradation is widespread in both the developed and developing world. For example, in OECD countries more than 70% of wetlands were lost over the last decades (OECD 1999). In developing countries, deforestation of upper watersheds is increasingly threatening downstream areas with floods and reduced dry-season river flows (Chomitz and Kumari 1998). The continued loss of forests and wetlands reduces biological diversity and ecosystem integrity.

Ecosystem integrity is a key attribute of healthy ecosystems (Costanza et al 1992). It can be defined as the range of interactions between the water cycle, individual species and biophysical, chemical and ecological processes that support the organisation of an ecosystem. To preserve the integrity of freshwater ecosystems it is essential to maintain the hydrological characteristics of watersheds and rivers. These include the natural flow regime, the connection between upstream and downstream sections (including coastal and marine zones), the linkages between groundwater and surface waters, and the coupling between rivers and floodplains (Junk et. al. 1989, Malanson 1993, Petts and Amoros 1996). Rivers are not just streams of water; they are living ecosystems that depend on the maintenance of biodiversity and ecological processes for the delivery of environmental services to people.

Water and land development interventions are generally carried out to improve socio-economic conditions. The irony is that these interventions often lead to the loss of ecosystem services on which people depend for fulfilling their socio-economic needs.

2.2 Increasing overexploitation and competition between water users

Freshwater abstractions have increased in most parts of the world in an unsustainable manner (see Table 1, Shiklomanov 1999). The overexploitation of water resources occurs where abstractions or harvests exceed the total renewable amount. Around the world, the abstraction of groundwater for domestic and agricultural use is increasingly leading to falling groundwater levels. In some cases, the decline in groundwater tables is as high as 0.5 to 5 metres per year (Postel 1999). The overexploitation of groundwater in coastal areas is causing saltwater intrusions that render many of the remaining freshwater resources useless.

Surface water and groundwater abstractions are primarily used to irrigate land. With the application of irrigation without sufficient drainage, salinisation of soils occurs. This phenomenon has already damaged one-fifth of the world's irrigated lands (Postel 1999). A related problem is that upstream drainage to prevent salinisation poses a threat to downstream users. The higher salinity of the water requires farmers downstream to use more and more water to flush excess salt from their soils.

Table 1: World water abstractions (km^3/year) increased sharply during the last decades; abstraction and consumption for agricultural use will continue to predominate in the decades to come. Direct human consumption currently accounts for less than 10% of total abstractions (Shiklomanov 1999*, Cosgrove and Rijsberman 2000[+]). The first row is water withdrawal; the second row depicts water consumption.

Sector	Assessment *								Forecast[+]
	1900	1940	1950	1960	1970	1980	1990	1995	2025
Population (million)			2542	3029	3603	4410	5285	5735	9000
Agricultural use	513.0	895.0	1080.0	1481.0	1743.0	2112.0	2425.0	2504.0	2650
	321.0	586.0	722.0	1005.0	1186.0	1445.0	1691.0	1753.0	1900
Industrial use	21.5	58.9	86.7	118.0	160.0	219.0	305.0	344.0	800
	4.6	12.5	16.7	20.6	28.5	38.3	45.0	49.8	100
Municipal use	43.7	127.0	204.0	339.0	547.0	713.0	735.0	752.0	500
	4.8	11.9	19.1	30.6	51.0	70.9	78.8	82.6	100
Reservoirs	0.3	7.0	11.1	30.2	76.1	131.0	167.0	188.0	220
Total (rounded)	579.0	1088.0	1382.0	1968.0	2526.0	3175.0	3633.0	3788.0	4200
	331.0	617.0	768.0	1086.0	1341.0	1686.0	1982.0	2074.0	2300

The projected increase in water abstraction and consumption leads to an increasing competition for available resources and creates a water resources allocation dilemma. This will manifest itself through disagreements between upstream and downstream users. The increasing demand and reduced availability will lead to incompatible water claims, for example between urban water supply and farmer organisations, tourist agencies and hydropower companies, and environmental protection groups and agro-businesses. The conflict between agriculture and nature is seen by many as a crucial part of the worldwide water dilemma in the coming decade (Hofwegen and Svendsen 2000, IUCN 2000, IWMI et al. 2001).

2.3 Polluted water bodies

Projections of water quality for the coming 25 years indicate that contamination will pose an increasing threat to human and environmental health, especially in developing countries (IUCN 2000, UNEP 2000). Pollution of water bodies originates from industrial and urban effluents, and diffuse sources such as agricultural runoff and atmospheric deposition. Many OECD countries have experienced a series of freshwater pollution problems involving domestic, industrial and agricultural wastes. For example, Persistent Organic Pollutants (POPs), originating from pesticides and herbicides, continue to be used in large quantities. These chemicals gather in people and other predators as they pass through the food chain, causing reproductive and developmental abnormalities in humans and animals (UNEP 2000). Non-point agricultural runoff continues to load surface water and groundwater with overdoses of nutrients. For example, eutrophication due to nitrogen runoff in the United States accounts for almost 50% of the impaired lake areas and river reaches (Carpenter et al. 1998). The dilemma is that, under the current industrial and agricultural production schemes and economic paradigm, the contamination of water bodies is inevitable and will continue to threaten the supplies of downstream users.

In developing countries, water is polluted by domestic sources and industrial activities. Wastewater increasingly deteriorates water quality, which has serious consequences for human and environmental health. Contamination of drinking water with human or animal excreta is the main source of many water-related diseases. The most recent data on water supply and sanitation coverage indicate only minor improvements over the last decade (WHO and UNICEF 2000). Critical issues remain the coverage of urban and rural sanitation and the rural water supply in Africa, Asia, and Latin America. With less than 40% coverage in rural areas and 75% people served in urban areas, sanitation is a major concern for downstream water supplies, rivers, lakes and wetlands (WSSCC 2000, IUCN 2000). The dilemma is that while investments in sanitation are urgently needed to improve human health and water quality, there seems to be insufficient political will for appropriate resource allocations.

Table 2: Water supply and sanitation coverage by region in 2000 (WHO and UNICEF 2000)

Region	Total population	Population Served	Population unserved	% Served
GLOBAL				
Urban water supply	2845	2672	173	94
Rural water supply	3210	2284	926	71
Urban sanitation	2845	2442	403	86
Rural sanitation	3210	1210	2000	38
AFRICA				
Urban water supply	297	253	44	85
Rural water supply	487	231	256	47
Urban sanitation	297	251	46	84
Rural sanitation	487	220	267	45
ASIA				
Urban water supply	1352	1254	98	93
Rural water supply	2331	1736	595	74
Urban sanitation	1352	1055	297	78
Rural sanitation	2331	712	1619	31
LATIN AMERICA and THE CARIBBEAN				
Urban water supply	391	362	29	93
Rural water supply	128	79	49	62
Urban sanitation	391	340	51	87
Rural sanitation	128	62	66	49
OCEANIA				
Urban water supply	21	21	0	99
Rural water supply	9	6	3	63
Urban sanitation	21	21	0	99
Rural sanitation	9	7	2	81
EUROPE				
Urban water supply	545	542	3	100
Rural water supply	184	161	23	87
Urban sanitation	545	537	8	99
Rural sanitation	184	137	47	74
NORTHERN AMERICA				
Urban water supply	239	239	0	100
Rural water supply	71	71	0	100
Urban sanitation	239	239	0	100
Rural sanitation	71	71	0	100

2.4 Disrupted river resources and uses due to water storage

Over 45,000 dams have been built worldwide since the 1930s. These dams are globally significant human interventions in the hydrological cycle. Today, reservoir storage capacity equals 15% of the global annual rainfall and dams fragment 60% of the world's rivers (Johnson et al. 2001). Only 23 % of the total river flow on the Northern Hemisphere remain unregulated (Dynesius and Nilsson 1994). Dams have affected the natural flow, the transfer processes along rivers and the critical linkages between channels and floodplains. They have modified, through disruption of physical, chemical and biological processes, the habitat conditions to which ecosystems and species have adapted over thousands of years (Bergkamp et al. 2000).

The impacts of dams on ecosystems and species are increasingly anticipated due to the use of Environmental Impact Assessments (EIA). A sample of 87 dams showed that between 1950 and 2000 the percentage of unanticipated impacts declined from 83% to 36% (WCD 2000). However, the anticipation of environmental impacts has not resulted in detailed predictions of the effects on ecosystems and species. This is mainly due to the lack of appropriate baseline data, incomplete scientific understanding of ecological interactions and insufficient attention. The WCD found that for projects where ecosystem impacts were anticipated, mitigation was carried out for less than 25% of the anticipated impacts (WCD 2000). This indicates that even when anticipation of environmental impacts takes place, mitigation of these impacts is often not carried out.

The dilemma is that new dams will be constructed in the 21st century to address the rising demand for energy and crop production, despite the fact that dam's compatibility with the protection of ecosystem functions essential for people's livelihoods is questionable.

3 LINKS BETWEEN WATER MANAGEMENT AND NATURE CONSERVATION

3.1 Freshwater degradation causing loss of ecosystem goods and services

Water resources degradation is driven by an unsustainable rise in world population and rapid economic growth. This is leading to increase natural resource consumption, social inequity and poverty. The higher demand for water pressures the ecosystems that provide this resource through habitat destruction, pollution and infrastructure development, and often results in a dramatic degradation. Wetlands and upper catchment forests have disappeared, and the quantity and quality of many surface and groundwater systems are seriously reduced. The result is environmental hazards and, in many areas, water shortages. Health problems and conflicts over limited resources erode the security of individuals, families and societies. Their response is either develop strategies to mitigate or adapt to the changes, or neglect problem and solutions altogether. The identification of drivers, pressures, states, impacts and responses provide us with a conceptual basis for unravelling the complex linkages between societal behaviour and either degradation or conservation of freshwater resources (see Figure 1).

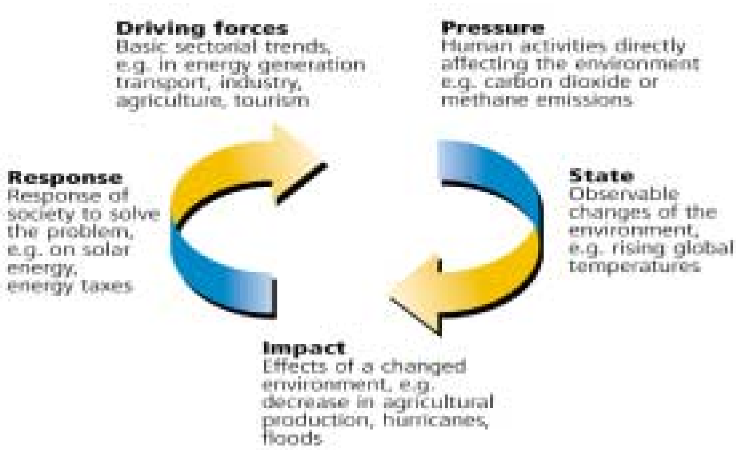

Figure 1: Driver-pressure-state-impact-response model for understanding linkage between societal behaviour and the degradation or conservation of freshwater resources (Jesinghaus 1999)

To reverse the downward spiral of environmental degradation, people must first understand and appreciate the wealth that healthy, functioning ecosystems represent in the form of both their intrinsic value and the many socio-economic benefits they provide. These can be summarised as the range of functions (goods and services) that ecosystems perform and that form the basis of the security of individuals and societies. They include production, regulation, habitat and information functions (Table 3). Lakes, rivers, wetlands, and the coastal and near-shore marine ecosystems provide valuable fishing grounds and a major protein source for many societies. Upper catchment ecosystems and wetlands regulate water quantity and quality by storing water, reduce sediment loads, and filter and break down chemical and biological contaminants. Ecosystems provide the habitat and nurseries for fish, birds, amphibians and mussels and these species, in turn, contribute to healthy rivers. Tourism and recreational opportunities provided by rivers and lakes often form an important source of local income and security. The total global monetary value of freshwater and wetland goods and services is estimated at USD 1.7 billion per year or 26% of the total global monitory value of ecosystem services (de Groot 1992, IUCN 2000).

Table 3: Natural ecosystems provide many goods and services (functions) to humankind that are often neglected in (economic) planning and decision making (adapted from de Groot 1992, IUCN 2000)

1. REGULATION FUNCTIONS *The capacity of natural and semi-natural ecosystems to regulate essential ecological processes and life support systems*	3. PRODUCTION FUNCTIONS *Resources provided by natural and semi-natural ecosystems*
Maintenance of bio-geochemical cycling (e.g. air-quality regulation and CO_2-buffering)	Food (e.g. edible plants and animals)
Climate Regulation (e.g. buffering extremes)	Raw materials (e.g. thatch, fabrics)
Water regulation (e.g. flood protection)	Fuel and energy (renewable energy resources)
Water supply (filtering & storage)	Fodder and fertiliser (e.g. krill, litter)
Soil retention (e.g. erosion control)	Medicinal resources (e.g. drugs, models, test organisms)
Soil formation & maintenance of fertility	Genetic resources (e.g. for crop resistance)
Bio-energy fixation	Ornamental resources (e.g. aquarium fish, souvenirs)
Nutrient cycling (i.e. maintenance of the availability of essential nutrients)	4. INFORMATION FUNCTIONS *Providing opportunities for reflection, spiritual enrichment and cognitive development*
Waste treatment (e.g. water purification)	Aesthetic information (e.g. valued scenery)
Biological control (e.g. pest control and pollination)	Recreation and (eco-) tourism
2. HABITAT FUNCTIONS *Providing refugia to wild plants and animals (and native people) in order to maintain biological and genetic diversity*	Cultural & artistic inspiration (i.e. nature as a motive and source of inspiration for human culture and art)
Refugium function (for resident & migratory species)	Spiritual and historic information (based on ethical considerations and heritage values)
Nursery function (reproduction habitat for harvestable species)	Scientific educational information (i.e. nature as a natural field laboratory and reference area)

Ecosystem functions depend on the health and integrity of ecosystems and are intimately linked to social stability and economic security. Environmental degradation inevitably leads to a decline in social and economic security. Loss of social and economic security, in turn, causes environmental degradation, initiating a downward spiral of environmental degradation, poverty and social disruption (IUCN 2000). Maintaining the functions of freshwater ecosystems provides direct and indirect benefits to people and their social and economic security (Soussan et al. 2000). This mutual dependence between people and ecosystems should be the departure point for establishing water security in the future.

3.2 Ecosystem-based management of water resources

Water needs to be conceived as an integral part of ecosystems and a limited natural resource. It needs to be managed in an integrated manner taking an ecosytem-based approach within river or drainage basins. The focus of all stakeholders should be to maintain and restore ecosystem functioning within both catchments and the connected coastal and marine ecosystems (UNCED 1992, Frissel and Bayles 1996, IUCN 2000). Ecosystem-based management of catchment addresses not only the issues of natural resources conservation and management, pollution control and sustainable agriculture, but also the concerns of governments, local populations, and their expert advisors (Lal 2000). Through democratic, participatory planning and management, the ecosystem-based approach to water management sets out an alternative to conventional top-down and sectoral approaches that failed to produce the desired results and often lead to further environmental degradation.

The ecosystem-based management of water resources is an integrated approach. Rather then using the resource base to produce a dominant good or service, such as drinking water, fish or hydropower, it defines an integrated strategy that realises trade-offs between different uses. The approach is not primarily aimed at maximising commodity production, but focuses on maintaining ecosystem functions, sustainable production and safeguarding future options and production potential (Holling et al. 1998, Pirot et al. 2000, WRI et al. 2000). Ecosystem-based management of water resources does not strive to fulfil all production needs and it does not consider water as the only environmental service that is managed. Instead, it establishes a management regime that mimics natural processes and productivity and considers all goods and services to be on equal footing with water delivery. In practise this means, amongst other things, establishing an ‘Environmental Reserve’ to allow for water allocations to maintain downstream ecosystems. In South Africa, the recent water law incorporates this concept and puts it at the same level as the allocation of water for basic human needs. An ecosystem-based approach thus strives for maintaining biodiversity and conservation of land and water resources and includes environmental monetary values in determining the cost effectiveness of sustainable interventions.

4. RE-INVENTING WATER GOVERNANCE

4.1 A rights and risk approach to water development

A discussion on water development options cannot take place without considering the wider debate on equitable and sustainable development. The corresponding framework of internationally accepted norms and standards, as given in the Universal Declaration of Human Rights, UN Declaration on the Right to Development and the Rio Declaration on Environment and Development, have to be taken into account. In its recent report, the World Commission on Dams took guidance from these standards in defining its five core values: equity, efficiency, participatory decision-making, sustainability, and accountability. When applying these values to water resources development schemes, the WCD considers negotiated outcomes, based on the recognition of rights and the assessment of risks, the best basis for achieving favourable development results (WCD 2000).

Considerable experience with negotiated agreements based on rights and risks exists. Successful agreements need a legal and procedural framework to enable a free and informed negotiated process, which includes mechanisms of arbitration, resource and appeal (Stedman et al. 2000, WCD 2000). Participation in negotiations needs to be open to those who possess rights or entitlements and to those who take or bear risks. The planning and decision-making process has to be transparent, with full access to relevant information, has to identify and empower stakeholders and should guarantee their adequate participation in decision-making. It should seek the broadest reasonable consensus and ensure demonstrable public acceptance. This requires all parties to enter negotiations in good faith. The negotiated outcomes do not replace government decision-making, but emphasise the role of government to plan and enable development (WCD 2000).

The success of the decision-making process is demonstrated both in the process used and in its outcomes. Criteria to determine whether a process has been successful include fairness, wise decisions, efficiency and stability (WCD 2000). A negotiated decision-making process based on the recognition of rights and the assessment of risks will lead to greater clarity, certainty and legitimacy for subsequent steps in decision-making and implementation.

4.2 Building water coalitions

For a long time, water management was mainly regarded as a technical solution to well-defined problems. Solutions were typically ‘technocratic’, i.e. oriented towards hydraulic infrastructure development to improve availability of water or protection against floods (Alan 2000). Over the years, a gradual shift occurred from this hydraulic mission paradigm to an environmental and water politics paradigm (Alan 2000). Water planning and management is more and more conceived as a socio-political process in which various actors hold different perceptions of what the problem ‘really’ is. From this perspective, water conflicts are often hidden in the definition of the problem and the aspects of reality that are included or left out of the discussion. In order to participate in the water debate and define water policies, it is therefore essential to analyse the water discourse: understanding the ways in which problems are represented, differences are played out and social alliances develop.

A remarkable metamorphosis of the water management community is taking place today with this shift to a ‘water politics paradigm’. With the acceptance of Integrated Water Resources Management as the new metaphor, coalitions are now emerging at local, national, regional and global levels. For example, the work of the WCD generated collaborations between widely differing stakeholders (WCD 2000). The Global Water Partnership is developing new ways of collaboration, especially at the regional level, between water institutions that were hitherto disconnected (GWP 2001). Water coalitions are also set up at national, river basin and local levels to address water management issues. Water boards, watershed committees and water parliaments are amongst the mechanisms that are increasingly used (Mostert 1998, Mostert 1999). In the United States, Australia, India, and South Africa, for example, many localised activities of multi-stakeholder groups have been set up. All ‘water coalitions’ entail new working relationships between governments, agencies, societal groups, and businesses that replace or complement former modes of operation. They can be seen as demonstrations of the acceptance of water as a political issue and the willingness to establish structural institutional changes.

5. ECOLOGIAL MODERNIZATION OF WATER MANAGEMENT

5.1 Investing in ecological modernisation

Many policy makers and water managers today are aware of the structural character of the water management problem. They are more attentive to nature conservation and the environmental dimension of the water dilemma and assume that existing political, economic and social institutions can internalise the care for water resources and the environment. A key element of this belief builds on ‘ecological modernisation’ (Hajer 1996). Within ecological modernisation, the protection of water resources and the environment is believed to be a ‘positive-sum game’. Economic growth can be reconciled with the improved management and protection of water resources through a utilitarian logic: pollution prevention and nature conservation pays!

Ecological modernisation derives its legitimacy from its scientific definition of problems and its monetary approach to implement solutions. An ecological modernisation strategy typically involves the application of new techniques such as tradable user and pollution rights, removal of perverse incentives, and resource and emission taxes (Spulber and Sabbaghi 1998). For example, in Costa Rica water companies are paying local communities between USD 10 and 40 per hectare per year for conservation of upper-watershed forests that are essential for water services. Thus, instead of applying a ‘react-and-cure’ formula, policies and interventions within the ecological modernisation era are oriented towards ‘anticipate-and-prevent’ and ‘strategize-and-invest’. In that sense, industry and society become oriented towards eliminating waste from production and establishing feedback and accountability that supports and strengthens restorative behaviour (Hawken 1993).

5.2 Limiting free water

Water can no longer be seen as a free and unlimited good within the framework of ecological modernisation. So far, most discussions on ‘full cost pricing’ have focused on the payment of water delivery to households and farmers and not on the recovery of costs for the maintenance of ecosystems as service providers (ACC / ISGWR 1992; WWC 2000). This maintenance has however costs that are generally ignored when setting the price of water or electricity from hydropower (Penman et al. 2000). The EU Water Framework Directive is an example of a new policy that provides for cost recovery as an adequate incentive for efficient water use (EU 2000). Cost recovery of environmental maintenance needs much wider attention for its incorporation into tariff schemes if water management is to become sustainable.

With the increasing emphasis on cost recovery of human and environmental services, safety nets for the poor need to be established. Governments have an essential role to play in providing these safety nets (WWC 2000). Subsidies for the water security of the poorest should not be based on payment to service providers, but to individual households. There is a growing experience with these types of safety nets. In South Africa, local government have started to implement a ‘free basic water’ policy that entails an allocation of 6 000 litres of free water per household per month to alleviate poverty (DWAF 2001). The policy is paid by an extra levee on large individual consumers. In Chile, a government-administered ‘water-stamp’ programme is operational, whereby poor people are eligible for stamps to pay their water tax (WWC 2000). Improved water payment schemes can ensure that the poverty – degradation dilemma is addressed and delivery of water services to the poor is improved, while the resource base is maintained and restored.

6. CONCLUSIONS

Even though an absolute physical ‘world water shortage’ does not exist, limits to the development of the world’s water resources are becoming apparent. Watersheds, rivers, lakes and wetlands are at an alarming level of degradation. Today we are faced with a worldwide water dilemma between further water resources development and environmental protection.

The maintenance of ecosystems is vital for the delivery of water. To establish ‘water security’, protect ecosystems and establish sustainable water use practices, societies need to adopt an ecosystem-based approach to water management. Essential for establishing ecosystem-based management is the recognition of rights and the assessment of risks as the basis for planning and management. This will require us to establish water coalitions: multi-stakeholders groups with a shared vision to deal with the water dilemma at different levels.

To establish an ecosystem approach we equally need to work towards an ‘ecological modernisation’ of society in which the protection of water resources and the environment are part of a ‘positive-sum game’. Instead of applying a ‘react-and-cure’ formula, policies and interventions should be oriented towards ‘anticipate-and-prevent’ and ‘strategize-and-invest’. Payment for water services need to include the costs of maintaining the resource whilst protecting the poor through direct subsidies.

Solving the water dilemma requires us to act immediately and rethink the way we manage our waters and reconcile competing needs. No ‘quick fix’ will proof to deliver the results required. We need to look for new partnerships and innovating financing to bridge the divide.

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