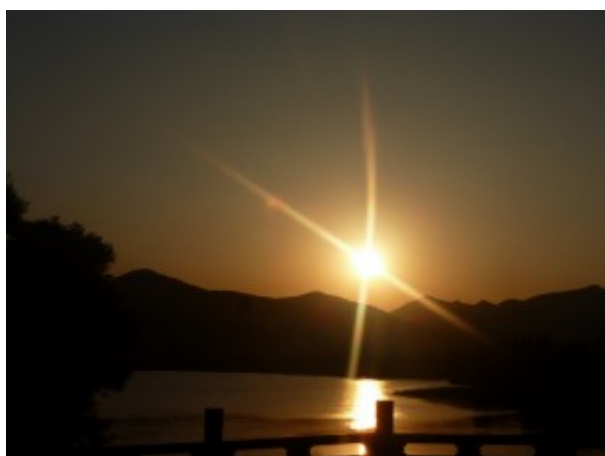


‘Water Security’ depends on knowledge and restraint

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The term water security focuses attention on factors that cause insecurity. A list of threats to water security can be developed by describing the many ways in which people use or relate to water. These relationships could be biophysical, social, cultural, economic, environmental or political. If a particular connection is important then it probably contains within it dependencies and vulnerabilities that can become sources of insecurity under particular circumstances. The environmental legacy of the water management revolution that has occurred over the past 100 years is well known. Less often discussed are the onerous responsibilities that have been created. Some of the greatest dilemmas facing contemporary water managers stem from the enormous benefits gained from the achievements of their predecessors in the recent past. These have created dependencies that it will be difficult to maintain.

Food security

The additional agricultural productivity made possible by irrigation development allowed a large increase in the world’s population over the last century. According to the United Nations Development Program, irrigated land currently provides about a third of total food supply. Without it, population could not have expanded as it has. Of even greater concern,

nearly all the additional food that will be needed to support the projected population growth in coming decades will have to come from expanding irrigation. But irrigated agriculture is already failing to keep up with demand. The area of irrigated land has increased faster than population growth for most of recent history but according to the United Nations Development Program that trend has been reversed since about 1978. Irrigated land is increasing at about one per cent a year while global population is expanding at an annual rate of about 1.6 per cent. Worse, one out of every ten hectares of irrigated land is losing productivity due to water logging and salinisation, and many irrigated regions are only maintaining production by pumping from groundwater at rates faster than the rate of recharge.¹ In the short term increased productivity will partially redress the deficit but it cannot be a long-term solution without more sustainable patterns of consumption.

Environmental security

Growing acceptance of the imperative to continually adapt to changing circumstances is part of the world-wide reassessment of the extent to which humans can control and direct complex socio-ecological systems. In western societies the loss of faith in the effectiveness of command and control systems (i.e. systems based on central planning for social and economic goals) has been paralleled by the beginnings of a similar reassessment in natural resources management. There is now more emphasis on the benefits of adapting to natural systems rather than attempting to rigidly control them. Restoration of floodplains rather than higher embankments is increasingly seen as the better way to manage flooding. Similarly it makes more sense to preserve ecosystem services such as wetlands to improve water quality rather than resort to technological substitution such as water purification.

The threat to human security posed by environmental decline and reduced access to freshwater resources has been recognized by a succession of United Nations conferences. The Mar del Plata Conference in 1977 stated that 'water accessibility and scarcity increasingly threaten four fundamental aspects of human security - food production, human health, the health of the aquatic environment and social, economic and political stability'. These themes were developed further by a United Nations commission headed by the Norwegian Prime Minister Gro Harlem Brundtland. Its findings were released in 1987 in *Our Common Future* or, as it is better known, the Brundtland report.² This document argued that a comprehensive approach to international and national security must take into account the potential impacts of unsustainable development.

After describing how environmental decline can exacerbate a wide range of social, economic and political stresses, the Brundtland report highlights the environmental component of some of the worst human welfare disasters in the preceding decade and put forward what is

now the most widely used definition of sustainable development. It proposed that the aim should be to satisfy 'the needs of the present without compromising the ability of future generations to meet their own needs'. The Brundtland formulation of the concept of sustainability requires acceptance of the reality that there can never be a stable long-term goal that can be described as the 'environmentally sustainable' target. People must maintain a state of constant alertness about the potential long-term impacts of their activities, adjusting continually to new knowledge as it comes available. Implicit is the requirement that a society should be able to generate and use new knowledge and periodically undertake a fundamental reassessment of major activities previously thought acceptable. It is not possible to make all-encompassing statements about the future needs of other people, or the long-term consequences of contemporary actions. So the Brundtland definition defines sustainability in terms of cultural capacity to adjust rather than as a set of static relations with the biophysical world that can be reached and maintained without continual reassessment.

The importance of protecting riverine environments has long been supported on aesthetic and moral grounds but economic arguments are also being put forward on their behalf. Many benefits are provided by biophysical systems that are able to maintain their capacity to function as ecological systems. Water purification for human consumers has already been mentioned. The prevention of algal blooms is another. Well-vegetated riparian areas also stabilise riverbanks and reduce erosion, protect farmland and structures such as roads and bridges, and improve conditions for fish and other forms of life. Water based environments are of great importance for tourism and recreation and have a major influence on decisions about where people will choose to live. In addition, the costs of attempting to rehabilitate areas that have been degraded are often extraordinarily high, frequently far exceeding the value of any short-term economic benefits gained from their degradation.

Environmental sustainability is not an optional extra to be sought only if it does not threaten short-term economic productivity. World-wide the consequences of not developing more sustainable water management systems that will continue to be productive, is going to be extraordinary misery for billions of people. Many are already in that condition. The Earth Summit at Rio De Janeiro in 1992, added to the momentum building for the introduction of holistic water management - integrated catchment management - that can better preserve the environment and prevent the erosion of security of supply for water as a resource underpinning economic development.

The nature of water

It has proved very difficult to properly take account of the nature of water as a multi-use

resource. Pressure to treat water entitlements as a commodity that can be owned and managed like land is strong but leads to great confusion. A comparison between the two reveals profound differences. In broad terms land stays in one place and its physical dimensions can be defined. Water, however, is like air, which is re-cycled from people to plants to other people and so on. A specific water molecule could typically progress from the atmosphere to a stream where it provides an environment for flora and fauna. At different moments it could support water sports, water a crop, become groundwater seepage that carries salt onto the property of a neighbour, or be part of a return flow to the streams that drain the landscape. Eventually it could reach an estuary where the maintenance or non-maintenance of pre-development levels of flow of fresh water into the sea has dramatic effects on fish breeding and the economic viability of coastal towns. One of the questions for society and water policy makers is: to what degree is it appropriate to give some of the users involved in this progression, but not others, property rights to the water they so briefly control?

The governments responsible for protecting the interests of their people in relation to water policy and management have not yet succeeded in establishing effective institutional processes that can protect it from continuing degradation and reduction. Some indication of why that is so difficult is provided by a list of characteristics typical of environmental issues such as sustainable water management, compiled by the policy analyst Stephen Dovers.³ He argues that they make environmental sustainability problems fundamentally different from other policy issues. They occur over much longer time scales and often cut across established administrative boundaries. Poorly defined but finite limits are common but it is difficult to take them into account within economic systems committed to reducing restraints on short-term growth. Environmental systems are frequently subject to thresholds that result in significant loss when they occur but which are hard to predict and difficult to reverse. There is great uncertainty about the likely effects of policy choices when the benefits can be very long term. Many impacts are cumulative and interact with each other and long established patterns of management can suddenly produce very different results compared with the past. Even more problematic, as the level of anthropogenic pressure grows, it is difficult to take account of ethical and moral considerations created by the conflicting demands of different sections of society.

The sheer novelty of sustainability problems makes them difficult to handle within traditional modes of management and governance. For political parties, contemporary water management creates divisions that ignore traditional party lines. Robust criteria for determining whether particular water policy issues should be treated as public or private are hard to develop and maintain. A significant underlying factor fuelling the growing crisis

is that the predictive capacity of traditional science continues to be limited. Trends and general bio-physical processes can be documented at the larger scale but it is often difficult to identify the links between particular actions and specific consequences with enough certainty to give managers, the courts, and the people who will be affected by their decisions confidence in the process or the results. The economic system has a low capacity to penalise those who are responsible for negative environmental impacts or to provide rewards to those who incur extra costs by adopting more sustainable management practices. Despite the growing interest in the so-called triple bottom line approach, accounting systems are ineffective in capturing the environmental/social costs and benefits involved. The legal system is frequently unable to penalise those people responsible for negative environmental impacts and the potential benefactors of remedial action often cannot be identified clearly enough to target the collection of costs. Ultimately, if it is to be effective water policy and management need to take account of the biophysical characteristics of water and the varying relationships that different people and interests have with it.

In 1968 Garrett Hardin published what became a famous paper in the journal *Science* titled *The Tragedy of the Commons*.⁴ There he argued that it was difficult to restrain over-exploitation of common resources such as shared pastures, fish and water. Critics subsequently nominated many examples of successful management of natural resource systems owned in common and suggested that his thesis was more applicable to open access resources which lack any effective overarching institutional framework able to control and regulate the behaviour of would-be users as a group. But knowledge is essential if an open resource is to become a well-managed common resource. Without knowledge there can be little awareness of the risks that need to be managed. For that reason it is a priority that the relationship between people and water is better understood.

References:

1. Postel, S. (1999), *Pillar of Sand: can the irrigation miracle last?* W.W. Norton, New York.
2. Bruntland, G. (Ed.) (1987), *Our common future: The World Commission on Environment and Development*, Oxford University Press, Oxford.
3. Dovers, S. (1997), 'Sustainability: demands on policy', *Journal of Public Policy*, Vol. 16, No. 3, pp. 303-318.
4. Hardin, G. (1968), 'The tragedy of the commons', *Science*, Vol. 162, No. 3859, pp. 1243-1248.

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