1
Overview

1.1 Introduction

The International Conference on Water and the Environment, held in Dublin, Ireland, from 26–31 January, 1992, was the most all-embracing conference dealing with global water management issues since the United Nations Water Conference held in Mar del Plata, Argentina in 1977 (United Nations, 1977). Its purpose was to examine current priority issues in the freshwater field and, drawing on expert opinion from a very wide array of nations, institutions and organizations, to recommend the action necessary to alleviate problems. These recommendations were initially taken to the fourth Preparatory Committee for the United Nations Conference on Environment and Development held at the United Nations in New York in March 1992. From there they went to the Earth Summit itself in Rio de Janeiro, Brazil in June 1992 where many of the recommendations were incorporated into the Agenda 21 document, a blueprint for action into the twenty-first century.

The purpose of this book is to enlarge upon and explain the two main documents produced at Dublin, the Dublin Statement and the Report of the Conference (International Conference on Water and the Environment, 1992). The Dublin Statement is reproduced in its entirety in Annex 1, and much of the substance of the Report of the Conference is found embedded in the texts of individual chapters of this book.

A theme fundamental to current thinking is that environmental issues in general, and water issues in particular, should not be considered in isolation. To be properly appreciated they must be viewed in as broad a context as possible. This means that water must be examined not only in its role as essential to all life systems on Planet Earth, but also in its role as indispensable to most human activity and thus to socio-economic development. A holistic approach to management of resources and to development issues is now regarded as essential.

Clearly, individual human beings and agglomerations of people living in villages, towns, regions and nation states find themselves in very different circum-
Overview

stances. The circumstances in Bangladesh, where the populace is often threatened by flood and the press of a very high population density, contrast with the almost permanent drought situation of most of sub-Saharan Africa, with its extensive areas of sparse population. Both these situations contrast with the much higher living standards and the far greater security found in the countries of the developed world.

Global realities are constantly and often dramatically changing (see UN–DIESA, World Economic Survey, 1991(a)). World population continues to grow at an alarming rate and at quite different rates in different parts of the globe. The balance of political, military and economic power is in a continuous state of flux. There have been spectacular changes in the recent past in the former Soviet Union and the countries of eastern Europe, leading to a very sudden alteration in geo-political realities. The slower changes in economic power are of fundamental importance too. The rise and relative decline of the USA during the twentieth century has been remarkable. Similarly, the post World War II emergence of Japan and Germany as major economic powers has greatly affected international economic activity. The more recent industrial growth of countries in south east Asia changes the scene once again.

Another fundamental reality is the wide disparity in the consumption patterns between developed and developing countries. Developed countries may be characterized by excessive over-consumption. With few exceptions, people in the highly industrialized economies exhibit profligate and wasteful consumption habits which, in the long run, cannot be sustained. These habits contrast remarkably with the much lower per-capita consumption in the developing world.

There is a need also for a certain historical perspective in order to understand the process leading to ICWE (the International Conference on Water and the Environment) and UNCED (the United Nations Conference on Environment and Development). In the last few decades there has been a quite dramatic and significant change in the philosophy of management. These recent developments in management policy should be examined in order to give the perspective necessary for better understanding.

Thus, this chapter attempts to set the scene by introducing a number of important themes as well as describing the process culminating in ICWE and UNCED.

1.2 The global scene – the overall setting

The purpose of this section is to set water issues in a very wide global context. Water is intimately linked with all aspects of the natural environment and with most human activities. It is therefore relevant to mention some of the more important settings.
1.2.1 The physical setting

Water plays a central role in natural processes at and near to the surface of the Earth, in the atmosphere immediately above the surface and in the soils and rocks immediately below the surface. The quantities of water and the length of residence time of water at any place at or near to the surface is the result of the interaction of climate and the characteristics of the surface.

The climate zones, shown in Figure 1, set the broad pattern for water availability in space and time. Of crucial importance are the total quantities of water available and their variability through time. In any one place or region, variability and reliability are very important. In the mid latitudes there are broad regions where there is relatively little variability from one season to another and where the annual precipitation amounts exhibit relatively small differences from year to year. This contrasts with many arid areas, mostly in the sub-tropics, where there are great differences in precipitation from season to season and where, too, there are often cycles of drought and relative abundance of precipitation over long time periods.

It is now well established that there is a strong likelihood of an overall global warming which is expected to result in significant changes in water resource availability, although detailed regional predictions are at present vague and extremely difficult to determine. It should be noted, however, that while slow, long-term change will almost certainly be of importance, the effects of such change are, for the most part, relatively insignificant compared with the importance of the variability (and hence the unreliability) of existing water supplies. As far as the water manager is concerned, it is the unreliability of the resource which makes his or her job so difficult.

The outlines of the broad climate zones are modified regionally and locally by the general distribution of seas and land masses relative to prevailing wind directions and by the topography of those land masses. Regional and local climates can be greatly modified by the configuration of coastlines relative to rain-bearing winds. Mountain masses are of great regional importance. Their height, lateral extent and orientation greatly influence receipt of precipitation both within their confines and in adjacent regions. Mountains invariably receive far more precipitation than their surrounding areas and experience reduced evaporation; consequently they are important for their water resources. Indeed, mountain regions provide the bulk of the water resources for many major and several minor land masses.

Vegetation patterns and soils are influenced greatly by water availability, and, with topography and geology, largely determine the quantity and distribution of animal life throughout the globe.
Figure 1. World climate zones (after Strahler and Strahler, 1987, p. 544).
The global scene – the overall setting

Further modification of how water behaves once it has reached the surface is influenced by geology. The characteristics of the rocks define how quickly water will pass over or through the surface and will largely define the extent and characteristics of underground water storage. The chemical and physical character of the rocks will also help to determine soil character and resulting vegetation patterns.

The quantity, distribution and availability of resources other than water are significant in setting the global scene (World Resources Institute, 1990). Forest resources, whether tropical hardwoods or temperate softwoods, are critical to many national economies. The current debate on the depletion of this resource with ramifications both for local development and for the production of greenhouse gasses and thus climate change has highlighted the importance of this particular resource. Mineral resources are not evenly distributed worldwide, but tend rather to be locally concentrated. The fossil fuels of oil and coal are particularly significant as the basis of much of the world’s energy production. Ownership of resources and rights to the exploitation of resources are clearly of fundamental importance to the distribution of wealth and power and underlie development possibilities. In this regard water is a resource of fundamental importance.

1.2.2 The human setting

There are very many aspects to the human condition and the treatment here must of necessity be brief and focused on only a few of the more important aspects.

The characteristics of global population constitute without doubt the most important single factor in the appreciation of global realities, as described in a series of articles in Ambio (1992). According to recent estimates (UN-DIESA, 1991(b)) the global population is increasing at a rate which is threatening our existing institutions and has very fundamental implications for the very survival of human-kind. Present distribution, growth projections for 1950–2025, and regions of rapid change are shown in Figures 2 to 4. In large measure, changes are accounted for not so much by changing birth rates (which are in most regions slowly declining) but by increasing longevity, particularly in developing countries. The development and widespread availability of drugs to eradicate many of the diseases which formerly devastated populations have resulted in greatly increased life spans in many countries, which in turn mean rapid increases in overall numbers. The rate of population growth is expected to be far greater in many developing countries than in the highly industrialized countries. Within most countries, but especially within many developing countries, there is expected to be a far higher growth rate in cities than in the surrounding countryside. Migration from the rural to urban areas will be the main reason for this preferential growth. By the year 2000 it is expected that there will be some 22 ‘mega-cities’ with populations
Figure 2. World population density (after Peters, 1990, p. 130).
in excess of 10 million inhabitants, as illustrated in Figure 5. Some of these cities will have populations well in excess of 20 million people and 18 of these cities will be in less-developed countries.

The expected doubling of global population within 50 years will have far-reaching impacts on natural resources. Demands on the resource base will also increase as societies attain higher standards of living. At present the average individual in western Europe or north America consumes some 30–40 times as much as the average person in the least-developed world. If and when living standards rise in other parts of the world so, too, will demands for natural resources. Clearly, such patterns of consumption cannot be sustained forever. Lifestyles and expectations must change towards a more acceptable distribution of wealth.

Race, religion and political creed are highly variable elements and account for many of the very different ways in which societies conduct their affairs. They are the basis for many of the disagreements and misunderstandings between nations and individuals. Religious beliefs can greatly affect the way in which a society regards its natural resources. Religion, political creed, laws and systems of governance determine the ways open to nations for defining courses of action to solve problems.

The global distribution of wealth and power is highly non-uniform. Disparities between countries are very great indeed. The contrasts in material wealth enjoyed
Figure 5. Population of world mega-cities. (After UNCHS-HABITAT/WHO/IBRD/UNDP/UNICEF, 1991.)

by the inhabitants of the developed nations compared with the people in the less-developed countries, is very large. Material wealth and power are closely correlated. The power of large corporations and the control of financial institutions lies almost completely within the more-developed countries. The flow of natural resources is largely from the less-developed to the more-developed countries, thus perpetuating and accentuating these disparities.

There is also disparity in wealth and power within most countries. In all highly developed countries and in the majority of less-developed nations, material wealth and much power is concentrated in the hands of relatively few individuals. This situation is unlikely to change as personal greed and the greed of individual nations, or societies, counteracts any tendency towards a more equitable distribution of wealth and power.

Wars are often the result of disparities in wealth or power. Seemingly an integral part of the history of humankind, wars are currently taking place in several dozen localities on the globe, while more insidious disturbances exist in others which threaten established governments. Clearly, wars are tremendously disruptive, destructive and expensive. Arms production is incredibly costly and the global cost, estimated to be of about US$1.6 million per minute, at the present time, is
Overview

truly devastating to the betterment of the world’s poor. Needless to say, environmental and developmental concerns clearly become totally forgotten in the midst of warfare.

The global military and political balance of power can change very quickly. The collapse of the former Soviet Union took place over a remarkably short period of time. Its repercussions within its former boundaries, in eastern Europe and around the globe, are enormous. New political and economic realities are difficult to assess, reaction to them poses major new thinking for world leaders. Resource management is also affected in a very fundamental way.

This brief overview has been designed to demonstrate that problems besetting environment and water managers and decision makers must be viewed in a very wide-ranging context. Far more than ever in the past, managers must be able to deal with total contexts rather than with isolated problems and small sectors only.

1.3 Water as fundamental to environment and development

1.3.1 Water as the basis for life

Within the biosphere, that thin shell surrounding the globe extending up into the atmosphere, through the oceans and down some few kilometres below the Earth’s surface, water is always present. In the atmosphere it is found as vapour, as liquid droplets and as small ice particles. On the Earth’s surface it is found as snow, ice and, primarily, in liquid form. In the soil it is also found in all three forms, while in deeper aquifers it is usually only found as a liquid under pressure.

Driven by the energy from the sun, water moves through the biosphere, transporting and redistributing heat and, because many chemical substances can dissolve in water, it transports chemicals too. Almost all life forms depend on water. Life began in the oceans and without water life, as we know it on Planet Earth, would cease to exist. Water may be regarded as a lubricant transporting nutrients from one part of the system of life to another. It has been likened to a liquid mortar, holding all parts of the biosphere together.

Life prospers and declines according to the abundance of water; consequently the different life forms have become adapted to varying amounts of water. Thus, each life form, whether plant or animal, has a developed tolerance for a certain variability in the amount of water available. In times of drought, the less-tolerant species may die out, while in times of flood or super-abundance of water life may also suffer. Species have also come to tolerate a certain mix and concentration of chemicals. If the chemical mix changes, often within the medium of water, and commonly due to human activities, then tolerance limits may once again be exceeded and life will suffer. Thus all ecosystems, or groupings of life forms within a particular part of the overall environment, are vitally dependent on partic-