



# Understanding what drives the pressures on water

## PART 1

### Chapter

- 2 Demographic, economic and social drivers
- 3 Technological innovation
- 4 Policies, laws and finance
- 5 Climate change and possible futures

### Chapters 2-5

#### Coordinator

Tim Kasten  
(UNEP) with the  
support of Thomas  
Chiramba (UNEP)

#### Facilitator

Richard Connor





The amount of freshwater on Earth is finite, but its distribution has varied considerably, driven mainly by natural cycles of freezing and thawing and fluctuations in precipitation, water runoff patterns and evapotranspiration levels.

That situation has changed, however. Alongside natural causes are new and continuing human activities that have become primary ‘drivers’ of the pressures affecting our planet’s water systems. These pressures are most often related to human development and economic growth. Our requirements for water to meet our fundamental needs and our collective pursuit of higher living standards, coupled with the need for water to sustain our planet’s fragile ecosystems, make water unique among our planet’s natural resources.

Chapters 2-5 describe these water drivers and their interactions as they relate to the sustainability of water resources and systems. They also examine how to make reasonable predictions about the future. Such forecasts are relevant for policy-making directed to water resources and for development activities, investment planning and other activities generally considered to be outside the domain of the water sector – or ‘outside the water box’.

Part 1 examines the processes behind the rising pressures on our water supplies, identify the ones most likely to have the greatest impact on the world’s water resources in the coming decades and describe the context within which water will be managed. These chapters describe what we know about the current situation and recent trends and forecast possible futures related to processes that we refer to as drivers of change and define as:

a set of fundamental processes that are external to the water sector and that directly or indirectly co-determine the evolution of the water system in terms of the quality, quantity and spatial distribution of the resource.

At the turn of the century the World Water Vision exercise of the World Water Council – the first and largest international effort to develop global water scenarios – identified a series of ‘driving forces’ that ‘represent key factors, trends or processes which influence the situation, focal issues or decisions, and actually propel the system forward and determine the story’s outcome’.<sup>1</sup> Using this definition, the Vision team selected major drivers and organized them into six clusters: demographic, economic, technological,



social, governance and environmental. This part of the Report draws on these clusters, with the exception of the environment, which is defined as a use and is covered extensively in part 2. To this list we have added climate change, discussed in chapter 5 and throughout the Report. This part of the Report also describes many of the complex links between the drivers, which can cause both positive and negative feedback impacts.

In describing drivers ‘external to the water sector’, we have sought to identify key forces or processes of change over which water sector users, managers and decision-makers have little direct influence. Thus, water use sectors (agriculture, energy, domestic and industrial) are not drivers even though they have a major impact on the resource because they are not external to the water sector. The drivers of agriculture – and its demand for water – are such fundamental processes as population growth, changes in dietary preferences as living standards rise, and increasing demand for non-food agricultural products such as bioenergy. The drivers of change are the demographic, economic and social forces that, in combination, exert pressures on the agriculture sector. This leads to an evolution in agriculture practices, which can also be

influenced by technological innovation and agricultural and trade policies, all of which eventually affect the quality and quantity of water.

These drivers should not be considered in isolation of related socioeconomic or political factors and other drivers. Many natural links influence how drivers affect changes, directly and indirectly. Water properties are governed by biological, chemical and physical laws that define the quantity and quality of water resources and that are linked in various ways. Temperature, a physical factor, can affect the metabolism of aquatic organisms, a biological process. The excessive biological production (such as excessive algal growth) associated with increased temperature can degrade water quality, a chemical property.

Superimposed on these natural processes are human activities that exacerbate these processes, disrupting the natural balance of water systems. The growth of algae or aquatic plants in a lake, for example, is stimulated by excessive nutrients and minerals washed into the lake as a result of human activities, accelerating natural growth processes to levels that can cause water quality degradation and interfere with beneficial water uses.



Drivers are thus the forces and processes generated by human activities. Consider governments' efforts to improve citizens' livelihoods and standards of living by increasing economic growth. Economic growth is affected by a wide range of policy decisions, from international trade to education and public health, while the potential rate of economic growth can be affected by demographic variables such as population distribution (local workforce availability) and social characteristics (workforce capacity) and by the availability of new technologies. Economic activity also requires adequate quantities of natural resources, including freshwater. And water availability is directly subject to the impacts of climate change, which can exert additional pressures on other drivers.

A rising standard of living is typically accompanied by increased consumption and production of goods, along with rising demands for water-related household services and water resources to facilitate economic growth and related activities. Rising demand for meat and fish in urbanized and emerging market economies, for example, has increased fishery activities and livestock

production, generally a water-intensive activity. The feedback loop of degraded water quality from livestock feedlot runoff can diminish fish production or alter its quality. There is also sociological evidence that urbanization shifts fishing pressures from natural water systems to artificial systems. Thus, urbanization and globalization, with changes in diets and lifestyles, are strong drivers of water use, even though decisions made outside the water sector are driving them.

The result is a continuously increasing demand for finite water resources for which there are no substitutes. When water resources of acceptable quality can no longer be provided in sustainable quantities to meet such demands, aquatic ecosystems can be overexploited as each sector or user group tries to satisfy its own water needs at the expense of others. The ultimate loser is the sustainability of the exploited aquatic ecosystems and the organisms (including humans) dependent on them for survival and well-being.

#### Note

1. Gallopín and Rijsberman 2000, p. 18.