

# Chapter I

## The Scope of Water Problems: Quality, Quantity and Beyond

### Summary:

*Water shortages and water-quality issues are global, not simply local. Emergence of these issues is a matter of “when,” not “if.” There is a need to both conserve and clean the world’s water supplies. Solutions need to be based on site-specific determinants and have long-term considerations.*

A child races along a long ribbon of pristine beach having played the day before chasing friends through sprinklers in her yard. Her diet consists of fine and refined foods as well as soft drinks, milk and the occasional imported, exotic fruit drink. With the turn of a tap she sees what seems to be an unlimited quantity of

clean water rapidly flowing into the sink, shower or tub and then down the drain. She shows no trace of concern for where the water comes from or where it’s going. The cost of getting the fresh water to her and purifying her wastewater never enters her mind.

### Is there really a water-shortage problem?

In many parts of the developed world, parents may be less informed about water issues than their children because of relatively new efforts in many schools to increase water-conservation awareness.

At the same time, water is all but unavailable in an increasing number of developed and developing countries alike. Now is the time to question what has caused water



INCREASING POPULATION



INDUSTRIALIZATION AND POLLUTION

*The problems and solutions associated with increasing population, pollution and a diminishing supply of usable water cannot be viewed in isolation.*

*Industrialization, urbanization, economic expansion, land use, development and even preservation all can contribute to the potential for a global water crisis.*



LAND USE AND URBANIZATION



ECONOMIC EXPANSION

shortages and why. We can also begin to ask what can be done to improve the situation for now and the future. The supply, source and use patterns of water are factors that can be easily identified and understood. Other aspects of water, however, are not recognized, understood or even considered. For example, it is universally agreed that water is in fact a limited but naturally recycling resource. We generally accept that 97 percent of the world's water lies in the oceans and seas and 2 percent is

locked up as glacial ice, leaving only 1 percent available for human use. With only minor fluctuations, these percentages have remained unchanged for eons.

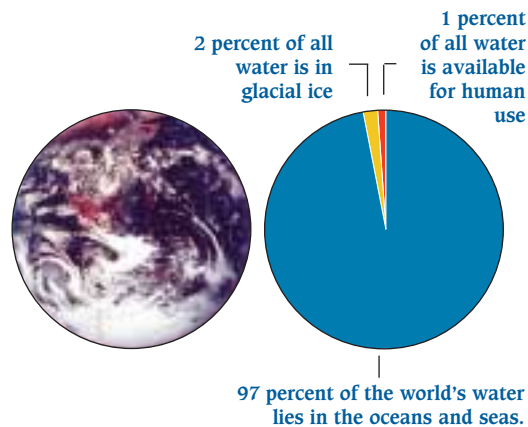
Conversely, human demand for water has risen at remarkable rates as a result of both increasing population and water use. Exacerbating the situation is the fact that the 1 percent of available water is being spoiled by various forms of pollution, thus reducing its use for our consumption.

In 1999, *The Futurist* magazine, in its top-10 forecasts, listed the belief of leading scientists, researchers and scholars that "water scarcity could threaten 1 billion people by 2025."

While not front-page news, the *Financial Times* of London reported an alarming array of little-understood water-related facts in January 1992:

- 80 percent of all diseases and 33 percent of deaths in developing countries are linked to inadequate water quantity and quality.
- Less than 2 percent of the 2 million tons of human excrement produced daily in cities around the world is treated, with the rest discharged into watercourses.

- The rate of pollution from industry and domestic consumers long ago surpassed the threshold of nature's recovery process, with alarming consequences for the natural environment and the health of city dwellers.



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- By the end of the 1990s, world water demand including requirements for waste dilution was expected to reach 18,700 cubic kilometers (4.9 quadrillion gallons) annually. This is almost half of the total global runoff. *Facing Water Scarcity* author Sandra Postel wrote as early as 1992 that 232 million people in 26 countries were living in water-scarce areas. She noted that Africa has the largest number of countries in which water is scarce, and she projected that by 2010 the number of Africans living in these countries would climb to 400 million, some 37 percent of the continent's projected population. More recently, Postel suggested, "The number of people living in water-stressed countries is projected to climb from 70 million to 3 billion by 2025."

Postel also reported that nine Middle Eastern countries face water-shortage conditions, and because the region shares many rivers, political tensions over water rights could worsen.

A future war over water is a very distinct possibility, according to Klaus Toepfer, director-general of the United Nations Environment Program. In a January 2000 interview published in the journal *Environment, Science and*

*Technology* he said, “Everybody knows that we have an increase in population, but we do not have a corresponding increase in drinking water, so the result in the regional dimension is conflict.”

### Reasons for Various Degrees of Water-Shortage Crises

Water-shortage crises don't happen only in low-rainfall or developing countries but in locations such as London, England; Melbourne, Australia; Seattle, Washington; and Reno, Nevada. All of these cities have faced various degrees of water shortages resulting in bans or restrictions on water use.



LONDON



MELBOURNE

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SEATTLE



RENO

*Water shortages don't happen only in low-rainfall or developing countries but in locations such as London, Melbourne, Seattle, and Reno*

agree that at least 10 percent to 15 percent of all treated water becomes “unaccounted for” in usage including fire-fighting. As necessary a water use as that is, it nevertheless causes a tremendous quantity of water to be lost between the treatment plant and the water meter.

Environmental water uses also are receiving greater attention and being given a higher priority for water allocation. Fish and wildlife preservation, as well as water-related sports activities such as boating and rafting, have in many instances required greater stream inflows than was previously considered necessary.

These types of shortages arise for a wide range of reasons, not all of which are based on an actual shortage of water. In some cases development simply outpaces infrastructure. Homes and commercial structures are built, but local water service can't keep up because of supply, treatment capacity or quantity of pipe and pumping stations.

In other cases environmental concerns, regulations or legal decisions restrict the amount of water that can be used to serve an area's population.

Weather also creates water shortages when drought or insufficient snowfall accumulation fails to replenish reservoirs or when flooding contaminates supply.

Mechanical and structural shortcomings also cause water shortages. A main pump or pipe breaks, and water temporarily stops flowing into homes and businesses. In older systems more than 50 percent of treated water can be lost through major leaks.

Public water-supply system administrators widely

While this decreases the amount of water available for human consumption, it also helps to maintain the viability of natural areas, numerous species and recreational activities. As a result, another set of competing water needs arises.

### Pollution is Another Very Significant Water-related Concern

For much of human history, people have chosen to live and work near easily accessible water to satisfy their daily consumption as well as agricultural and transportation needs. Today, development continues to be most prevalent near waterways, but with that comes a cost: water pollution. As noted earlier, more than 98 percent of the 2 million tons of human excrement produced daily in cities around the world is not treated but simply discharged into watercourses.

Industrial, commercial, agricultural and residential pollutants, as well as silt, also contaminate our groundwater and waterways directly and indirectly. Once water becomes contaminated, it may be impossible to purify or the cost too staggering to undertake — thus further



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reducing the available supply.

But the problems and solutions associated with increasing population, pollution and a diminishing supply of usable water cannot be viewed in isolation. Industrialization, urbanization, economic expansion, land use, development and even preservation all can contribute to the potential for a global water crisis.

### **No Simple or One-Size-Fits-All Solutions**

Thus we need to be brave enough to ask serious questions about past and current water-policy solutions and even seemingly unrelated issues. It is commonly recognized that we can no longer afford to continue to pollute the air and water. But have we done enough to filter waters naturally before they run into streams or infiltrate groundwater sources?

We also need to think about how much of the globe we can cover with asphalt, cement and roofing materials,

which impede the natural flow and recharging of our water supply and create energy-intensive heat islands. Further, what are the environmental and water-quality costs associated with reducing or eliminating water used on landscapes in the name of conservation? And we must consider how wise it is to engineer a system that rushes rainwater and snowmelt to the oceans rather than into or across areas where they can be useful.

Clearly there are no simple or one-size-fits-all solutions. But perhaps new thinking on the part of water-policy decision-makers, scientists, technicians and even the general public can reveal how we can use the world's 1 percent supply of fresh water more wisely so that future populations, regardless of numbers, can live comfortably. Perhaps we can even develop ways to increase the 1 percent figure without harming the environment. 💧



*We need to think about how much of the globe we can cover with asphalt, cement and roofing materials, which impede the natural flow and recharging of our water supply and create energy-intensive heat islands. Photo: some communities are helping to alleviate heat islands with landscaping.*