

INTRODUCTION

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“Water is the mother of the vine, The nurse and fountain of fecundity, The adorning and refresher of the world” (Charles Mackay).

“Water is life’s mater and matrix, mother and medium. There is no life without water” (Albert Szent-Gyorgyi).

Water has an overbearing influence on Mother Earth and her inhabitants. Few will doubt it is the most important substance man has ever known. Its refreshing taste is obviously unmatched by any other earthly liquid. Personally, there are times that gulping down a glass of chilled water makes me wish for a tail I could wag like a spoiled dog. For as long as I can remember, I have cherished water as being more precious than gold.

As a little boy, growing up in a small village in north-central Nigeria, I had no idea there was a tap one could simply twist and water would gush out. My entire village relied on a scattering of hand-dug wells, which were very productive during the rainy season but completely parched in the dry season. Even during the rainy season, we had to expend enormous amounts of time and energy to manually draw water from the earth. It was generally the children’s responsibility to gather water for the household—a burden that weighed heavier on girls than boys. Some unfortunate little boys like myself, whose mothers had no daughters, or daughters who were too little to help, had to wear double hats, performing both ‘girls’ and ‘boys’ tasks.

The onset of the dry season forced us to travel long distances in search of streams that still had a trickle of moisture. During these times, we prayed our families would conserve water and our quests would not take us too far. Once water was found, we would collect it in pails that we carried on our heads; the heaviness of our loads made our journeys home almost unbearable. The hardships we faced offered constant reminders

that water was a scarce resource. Every drop was worth protecting. These early experiences played a crucial role in my decision to specialize in water science.

As I read and studied, I developed a greater and greater recognition that my formative experiences with water had been widely shared by the majority of the world’s population across vast distances of time and space. Water is believed to be the only substance that has a name in every human language. I suppose whales and porpoises send sonar messages regarding water temperatures via sonar. Perhaps ants send chemical messages to their colonies when they uncover much needed supplies of the resource.

Water covers 70 percent of the earth’s surface and is buried like treasure under much of its crust. For centuries, the availability of water has influenced human settlement patterns worldwide. Many of the great ancient civilizations were anchored along large rivers; the technological and labor demands of irrigation played a crucial role in the rise of early cities. Mesopotamia, for example, was located between the Tigris and the Euphrates rivers in present-day Iraq and Turkey. Similarly, the Egyptians centered their civilization on the Nile, and the Chinese on the Yellow and Yangtze rivers. Regional geographers argue it was Europe’s numerous connecting waterways that ignited its art of shipbuilding, which eventually facilitated its colonization over the rest of the world. More recently, the discovery of a huge amount of historic climatic information stored in the earth’s oceans and

polar ice caps is helping scientists reconstruct past climates, dating back several thousand years. Similarly, dendrochronologists are now reconstructing past climates from tree rings, primarily from yearly imprints left by water in tree stems. Water, running both on and beneath the earth's surface, continually shapes the earth's crust and the evolution of all life on its surface.

Because of its unique ability to sustain life and its unparalleled destructive force, water must be adored and dreaded at the same time. According to John Bullen, "*Water is a good servant, but it is a cruel master.*" The serene characteristics of water and its beauty have inspired music and art in many societies. It is, similarly, the preferred liquid for use in special rituals and ceremonies among several world cultures. Conversely, humans have long recognized both water and its absence as ferocious destroyers. We are living witnesses to the devastating impacts of floods, hurricanes, tsunamis, and droughts—all water-related disasters.

While most of these catastrophes occur naturally, there is evidence that human activity has recently been exacerbating their impacts. And, there is growing evidence that droughts and floods have been the downfall of many civilizations. The very irrigation networks that made civilization possible in Mesopotamia probably hastened its downfall. Over the centuries, the transported water that nourished agriculture in the region also ruined its soil by depositing large amounts of salt. Scientists, environmentalists, resource planners, and policymakers are issuing increasingly strident warnings that unless we learn from the past our own global village may face water crises similar in scope to those that helped precipitate the decline of Harappa and Mohenjo Daro, ancient Mesopotamia and Rome, as well as the Anasazi of the southwestern United States.

Scientists have indicated a primary threat to the world's water resources is human activity itself. One such danger is from global warming, a phenomenon associated with human-induced emissions of greenhouse gases into the atmosphere that is changing climates throughout the world. Global warming will adversely impact the world's water resources by unleashing floods and droughts in different world regions. Such developments in turn will only exacerbate other human-created problems such as pollution, ground and surface water overexploitation, saltwater intrusion, and soil subsidence.

Taken together, these changes will exponentially intensify the problem of water scarcity that already threatens much of the world. The global distribution

of water is uneven. More than 97 percent of the earth's water is found in the oceans; its high salt content makes it unfit for most human purposes. Only 2.8 percent of the world's water is fresh, more than two-thirds of which is locked up as ice in the polar regions, thus making it unavailable for human consumption. Today, domestic and municipal purposes account for approximately 8 percent of the world's water consumption, while industry and agriculture are responsible for approximately 22 and 70 percent of all water consumption respectively. Industrialized nations use substantially more water than their developing counterparts. In the United States, for example, average domestic and municipal consumption stands at 573 liters (151 gallons) per person per day. The average daily use per person per day is 118 liters (31 gallons) in the United Kingdom, while an average of 10 liters (3 gallons) is used per person per day in Ethiopia.

The world also faces serious issues regarding water quality. As the world's population grows, industries that manufacture essential products for human use are also expanding. Effluents from these industrial sites have become important sources for both surface and groundwater pollution. For example, it is estimated that about 300-500 million tons of heavy metals, solvents, toxic sludge, and other wastes accumulate annually in freshwater. Industrial pollutants have also led to serious problems of acid

precipitation with significant adverse implications for aquatic habitats in many world regions. The increased agricultural production necessary to feed growing populations comes at a terrible cost to water quality. The use of chemical fertilizers, herbicides, insecticides, and fungicides generates substantial water contamination. The organic wastes produced by the food industry also dramatically elevate pollution loads in water. Such wastes, together with the thermal pollution generated by nuclear power stations, present formidable water quality challenges. Widespread waterborne diseases have also dramatically reduced the availability of potable water in much of the world. With competition over water resources fomenting tensions among countries throughout the world, it is clear we must develop global strategies for managing water resources.

It is crucial for us to understand the water challenges we face in our dynamically changing world. The world's human population is projected to exceed 10 billion by 2050. Industries must also meet the demand of the growing population, so too must food production and processing. In the meantime, the climate continues to change due to both natural and anthropogenic causes.

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All these problems have serious implications both for quantity and quality of our water supplies. This issue of *Proteus* is dedicated to the subject of water, not simply to highlight the technical and geopolitical issues associated with it, but to examine its cultural, spiritual, and aesthetic dimensions as well.

Much of the population of the developed world has yet to directly experience the problems of scarcity I first confronted as a young child. Many Americans and Europeans continue to view water as a ubiquitous amenity, readily accessible with a simple turn of a tap.

To this day, I am amazed at how few people recognize the value and scarcity of this precious resource. After many years of living in the United States, I am still shocked to see grown men idly

chatting in restrooms for minutes at a time while the water wastefully whirls around their perfectly clean hands. Shockingly, some even leave the restroom with the tap still running.

Soon, however, even Americans and Europeans will be forced to acknowledge the realities that much of the world's population has already accepted. Water resources are finite. Rising global demand and elevated levels of pollution are threatening supplies throughout the world. It is obvious we all must work harder in order to avert the catastrophic water crisis that threatens all our futures. I hope my Western friends will be able to appreciate the value of water before it becomes more costly than gold.