

June 2, 2010

EARTH'S WATER

The surface area of planet earth is approximately 510 million square kilometers. Of this, 70.8% is water and 29.2% is land. This prevalence of water was dramatically captured in the famous "blue marble" photograph taken by Apollo 17 astronauts on the last lunar mission in 1972. While the photograph gives the impression of a planet with plenty of water to go around—we are literally surrounded by the stuff—it is all quite illusory.

The earth's water is a story of managing maddening scarcity in the face of apparently abundant supply. This paradox results from the fact that water comes in various forms, with most of it being either unfit for use or inaccessible. The earth is estimated to hold almost 1.4 billion cubic kilometers of water (see the chart below). This is equivalent to a cube of water about 1,100 kilometers long, 1,100 kilometers wide, and 1,100 kilometers tall. But 97.5% of this vast expanse is saltwater. Only 2.5% is freshwater (Gleick 1996).

What is more, of the 2.5% of water that is fresh, 70% of it is trapped as ice or permanent snow within the polar caps, mountain glaciers, or permafrost. That leaves less than 1.0% of all the water on earth remaining, of which the bulk is groundwater of varying quality that may or may not be readily accessible depending on local conditions. Only 0.001% of all the water on earth is fresh surface water found in lakes, ponds, rivers, streams, and swamps, and even much of that water is located away from where it is needed or found flowing in the opposite direction. A small amount of remaining freshwater exists as vapour in the atmosphere, as soil moisture, or within plant and animal biota (Gleick 1996).

Across history, human beings have always had to grapple with the physical and geographical scarcity of freshwater, and even today, we are not always succeeding. Across the globe, the World Health Organization estimates that 3.6 million people die every year from water-related disease (Pruss-Ustun et al. 2008) and almost 900 million people live in a state of "water stress" lacking ready access to a safe supply of freshwater (World Health Organization 2008). This means that 1 in 8 of the world's 6.8 billion people do not have access to clean, safe, and secure water. According to the 2006 UN Human Development Report, some 1.4 billion people live in river basins where current patterns of water use exceed sustainable levels (Hadjigeorgalis 2008).

This backgrounder is part of "From H₂O: Turning Alberta's Water Headache to Opportunity," a forthcoming research paper by Casey Vander Ploeg identifying Alberta's water challenges and opening discussion on possible solutions.

Canada West Foundation is the only think tank dedicated to being the objective, nonpartisan voice for issues of vital concern to Western Canadians.

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Some of the problem here relates to very real concerns with water scarcity in certain parts of the world. However, many also maintain that the larger problem is fueled less by scarcity and more by improper water governance, fragmented decision-making, outdated and ineffective water policies, and a lack of rational water resources management. All of that will have to change quickly, because if the current situation represents a very real challenge, then the future could very well represent a full-blown crisis. While the world's population grew three-fold in the 20th century, our use of renewable water resources has grown six-fold (World Water Council 2010). For the past 100 years, water demand and water use has outpaced population growth two to one. Current demographic trends indicate a global population of 8 billion by 2025 and 9 billion by 2050, and much of that growth is expected to occur in already water-short areas (United Nations 2008).

Global population growth will result in increased demand for water across all sectors, whether that be expanding irrigated agriculture, increasing industrial production, or satisfying the thirst of rapidly expanding urban areas. At least one thing is certain—existing water sources and the earth's natural ecosystems will be subjected to even more pressure, and competition for scarce water resources is certain to intensify. And, all of this carries serious consequences for the global environment, especially considering the threat of climate change.

If the demand for food is to be met in 2025, an additional 2,000 cubic kilometers of water will need to be put into irrigation. By 2050, food production could require an additional 3,800 cubic kilometers of water—close to all the freshwater presently being withdrawn from the surface of the earth. In the minds of many, the earth will simply not make it to 9 billion people—there is not enough water (Sandford 2010).

All of this has fuelled growing international concern and debate about the state of the global water supply and the future of that water supply. The consensus is that pressure on the world's water supply is rapidly escalating, and with it, the very real prospect that water will be the biggest political issue and public policy concern of the 21st century.

For the average Albertan, a water crisis in northern Africa, the Middle East, Pakistan, India, southeast Asia and even Australia is so far removed as to have little relevance. But this is not so. The global water challenge is certainly finding clear expression much closer to home. In August 2006, the Alberta government

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stopped issuing new water licenses across most of the South Saskatchewan River Basin (SSRB). When the river is closed, you know that the limit has been reached. International water modeling shows much of the American midwest and southwest as being highly stressed, and the Canadian prairies—especially southern Alberta—showing up stressed as well. In many ways, Alberta has already joined the much larger global water concern. ■

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