**2. Water**
**How can everyone have sufficient clean water without conflict?**

About 700 million people face water scarcity today (defined as fewer than 1,000 cubic meters per person per year), which could grow to 3 billion by 2025 due to climate change, population growth, and increasing demand for water per capita. Water stress (1,000–1,700 cubic meters per person per year) could affect half the countries by 2025 and 75% of the world's population by 2050. Water tables are falling on every continent; one in ten of the world’s major rivers fail to reach the sea for part of each year; agricultural land is becoming brackish; groundwater aquifers are being polluted; and urbanization is increasing water demands on aging water infrastructures. FAO estimates that water for agriculture needs to increase 60% to feed an additional two billion people by 2030. Unless major political and technological changes occur, conflicts over tradeoffs among agricultural, urban, and ecological uses of water are inevitable, along with mass migrations and wars. However, water-sharing agreements have been reached even among people in conflict and have led to cooperation in other areas.

Agriculture already accounts for 70% of human usage of fresh water, but it needs even more to feed growing populations with increasing incomes. Some 30% of global cereal production could be lost in current production regions due to water scarcity, yet new areas in Russia and Canada could open due to climate change. China and Saudi Arabia have started buying land in other countries to grow crops. Cooling systems for energy production require large amounts of water. Energy demand may increase 50% in 20 years, coupled with increased food demands, dramatic changes in water management will be required. Global demand for meat may increase by 50% by 2025 and double by 2050, further accelerating the demand for water per capita. Nature also needs sufficient water to be viable to support all life. Increasing water supply reduces conflict over distribution. Breakthroughs in desalination, like pressurization of seawater to produce vapor jets, filtration via carbon nanotubes, and reverse osmosis, are needed along with less costly pollution treatment and better water catchments. Future demand for fresh water could be reduced by saltwater agriculture on coastlines, producing meat without growing animals, increasing vegetarianism, and reuse of treated water.

Development planning should integrated the lessons learned from producing more food with less water via drip irrigation and precision agriculture, rainwater collection and irrigation, watershed management, selective introduction of water pricing, and replication of successful community-scale projects around the world. Plans should also help convert degraded or abandoned farmlands to forest or grasslands; invest in household sanitation, reforestation, water storage, and treatment of industrial effluents in multipurpose water schemes; and construct eco-friendly dams, pipelines, and aqueducts to move water from areas of abundance to scarcity. Just as it has become popular to calculate someone’s carbon footprint, people could calculate their “water footprint.”

Access to clean water and basic sanitation should become human rights. About 80% of diseases in the developing world are water-related; most are due to poor management of human excreta. Some 1.8 million people die every year due to diarrhea, of whom 90% are children under the age of five. Over a billion people still lack access to clean water and about 2.6 billion people lack adequate sanitation. OECD estimates $10 billion is needed annually to 2015 to meet the MDGs for water and sanitation. Water and sanitation investments return an average of eight times in productivity gains and costs savings.

Challenge 2 will be addressed seriously when the number of people without clean water and those suffering from water-borne diseases diminishes by half from their peaks and when the percentage of water used in agriculture drops for five years in a row.

**Regional Considerations**

**Africa:** Sub-Saharan Africa loses 5% of its GDP annually due to the lack of safe water and basic sanitation. If trends continue, this region will not meet the MDG target on water until 2040 and the one on sanitation until 2076. Up to 250 million Africans could live in water-stressed areas by 2010. Population growth and climate change could cut water per person in the Middle East and North Africa in half by 2050. Few African governments spend more than 0.5% of GDP on water and sanitation. With one-third of the world’s major international water basins, Africa uses less than 6% of its renewable water resources. Since the majority of Africa depends on rain-fed agriculture, upgrading rain-fed systems and improving agricultural productivity will immediately improve millions of lives. Algeria is constructing 13 desalination plants to be completed by 2010.

**Asia and Oceania:** More than 70% of China’s waterways and 90% of its groundwater are contaminated; 33% of China’s river and lake water is unfit for even industrial use. The water situation in China is expected to continue to get worse for the next 7–10 years under the best of conditions. Nearly 70% of China’s GDP comes from flood-prone areas, causing China to lose nearly 2% of GDP annually due to floods since the 1990s.With only 8% of the world’s fresh water, China has to meet the needs of 22% of the world’s population. The northern areas produce 45% of national GDP but contain less than 20% of China’s water; projects are under way to transport water from the south to the north. Forced migration due to water shortages has begun in China, and India should be next. Glacier-fed rivers shrinking due to climate change have implications for India-Pakistan-China relations. The Yangtze, Mekong, Salween, Ganges, and Indus are among the 10 most polluted rivers in the world. India feeds 17% of the world's people on less than 5% of the world's water and 3% of its farmland. India’s urban water demand is expected to double and industrial demand to triple by 2025. Diarrhea causes some 450,000 deaths annually in India. Saltwater intrusion into Bangladeshi coastal rivers reaches 100 miles inland and will increase with climate change. Glaciers that supply water in Central Asia have shrunk by 33% over the past 60 years.

**Europe:** About 15% of the EU population has been affected by water scarcity. Over 80% of the original floodplain area along the Danube and its main tributaries has been lost as a result of dams, pollution, and climate change. The European Water directive requires basin-level planning of water resources. Transboundary issues for the Rhine and Danube need resolution. The Belgian government recognizes water as a human right, and its development aid will focus on water. Water utilities in Germany pay farmers to switch to organic operations because it costs less than removing farm chemicals from water supplies. Russia could supply fresh water to China and Middle Asia.

**Latin America:** The region has 24,400 cubic meters of water per capita; the world averages 7,000 cubic meters per capita. Latin America has 28% of the world’s water, yet 50–80 million of the region’s 554 million people have no access to safe drinking water and 125 million lack sanitation services. Glaciers in Peru could disappear in 25 years, risking the country’s water security. The World Bank set up a $33-million fund for Andean countries for adaptation to rapid glacier retreat. Water crises will occur in megacities within a generation unless new water supplies are generated, lessons from both successful and unsuccessful approaches to privatization are applied, and legislation is updated for more reliable, transparent, and consistent integrated water resources management. Water and sanitation problems cost the region an estimated $29 billion a year. Transboundary surface and groundwater aquifers will have to be shared. About 60% of the region’s water is used for irrigation.

**North America:** Lake Mead, which supplies water and electricity to Las Vegas, could dry up by 2021. At least 36 states in the U.S. are expected to face water shortages within the next four years. Each kilowatt-hour of electricity in the U.S. requires about 25 gallons of water for cooling, making power plants the second largest water consumer in the country (39% of all water withdrawals) after agriculture. Western Canada’s tar sands consume an estimated 20–45m3 of water per megawatt-hour, nearly 10 times that for conventional oil extraction. Canada is mapping its underground water supplies to help policymakers prevent water shortages. Over the past five years, municipal water rates have increased by an average of 27% in the U.S. and 58% in Canada. Water could become a class problem; poor people will be the first victims in free market distribution. Government agricultural water subsidies should be changed to encourage conservation. The U.S. agricultural sector lost $4 billion for the last two years due to water shortages. Some $68 billion will be needed over the next 20 years just to restore and maintain existing utility assets in the U.S. The U.S. Congress has amended the Water for the Poor Act to bring water and sanitation to 100 million people around the world by the year 2015 if passed.