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Climate Change : Natural Disasters

Water Cycle: Changing Gear

Part 2: The Water Flows Faster - Accelarated Evaporation and Solutions

Dry land emerges from the shallow waters of the Ticino river under the "Boats Bridge" in northern Italy in the summer of 2005. Accelerated infiltration and evaporation increase the risk of droughts (Photo: Reuters)

Infiltration

When rain falls, rivers rise. Rainwater runs off the land, infiltrates underground, or is absorbed by plants and the soil. Much of it emerges later as springs and supplies river systems. If rising temperatures create a more arid climate, and drier ground, less water will be absorbed or run off because more of it will be evaporated by the sun where it falls.

The reduction of runoff could be “the most serious impact of global warming on the water environment,” suggests the Global Water Partnership. In sub-Saharan Africa, the Mediterranean region, South Asia, and Australia stream flows are expected to decline by more than 50 percent.

At the other extreme, areas that experience more intense rainfall will see their ground saturated faster, leading to increased runoff into rivers and streams which could be beneficial if managed properly, but could also lead to damaging floods and landslides. There is also a danger that excess water could cause water tables to reach levels where they will infiltrate soils that are salty or contain polluting pesticides or industrial waste. This degraded water from these shallow aquifers may then drain into the river network.

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Evaporation

The hotter it gets, the more moisture is evaporated from plants and the soil, from lakes and rivers, and from man-made reservoirs. For some areas of the world, this will mean increasing aridity and even

desertification. Increased aridity also means a greater chance of devastating wildfires, as has been shown in recent years in the southwestern United States, which is rapidly heading towards Dust Bowl conditions as drought takes hold.

In polar and mountainous regions, rising temperatures will mean faster melting of glaciers and snowfields. When snow and ice is transformed into water, it becomes more susceptible to evaporation, and thus increasing the disappearance of these natural reservoirs. The effect in the long-term could be increased drought, because many areas, such as the heavily-populated Ganges river plain in India, rely on glaciers for their water supply.

Already, the UNEP reports that roughly one sixth of the world's population is experiencing lower water runoff from major mountain ranges. Greater evaporation under higher temperatures could also lead to an increase in the concentration of dissolved salts in rainwater, increasing the salinity of the water that then enters the water cycle.

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Solutions

All these potential changes to the water cycle require responses, preferably in advance, from every sector of society. For example, in wet areas, farmers will need structures to protect soil from erosion by excessive rainfall and runoff. Preventing deforestation of river valley hillsides is one simple way to 'climate proof' a water basin. Dikes, levees, drainage canals and improved sewer systems can also help manage increased rainfall.

In dry areas, they will need to address the issue of water storage, groundwater management, and the efficiency of irrigation systems. Kenya, one of those sub-Saharan countries faced with water scarcity, has shifted its agricultural economy away from thirsty cereal crops towards intensive, water-efficient cultivation of vegetables and flowers for export. The profit allows the country to import water-intensive foodstuffs to feed the population without depleting its own water supplies.

Many other countries are also adopting similar water efficiency strategies, illustrating a common view among climate scientists: If climate change mitigation is about reducing greenhouse gases, then climate change adaptation is about saving water.

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