

Hydrology and Water Resources

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Editorial

Carbon dioxide and other trace gas concentrations in the atmosphere are increasing, causing climatic changes with significant implications for the hydrologic balance and water resources. These "greenhouse gases" are projected to disrupt the radioactive balance of the atmosphere, producing temperature rises and changes in a variety of other climatic variables. Recent hydrological research clearly shows that the so-called "greenhouse effect" will influence the timing and quantity of runoff and soil moisture, as well as altering lake levels and water quality. These changes increase the likelihood of environmental and socioeconomic disruptions, and they have significant consequences for future water resource planning and management. This study examines current studies on the effects of climate change on the hydrologic cycle and water resources, as well as the consequences of such changes for future water planning and management.

Concerns about global climatic changes due by rising levels of carbon dioxide and other trace gases in the atmosphere have grown in recent years. Knowledge of atmospheric dynamics and global climate: the system has improved. These gases, primarily carbon, CO₂ (carbon dioxide), N₂O (nitrous oxide), CH₄ (methane), and CFCs (chlorofluorocarbons) disrupt the thermal balance of the environment. Earth by trapping long-wave radiation that would otherwise be emitted otherwise is lost to space through the Earth's atmosphere. This effect, informally known as the greenhouse effect, attracted broad public attention in 1988 after a succession of exceptionally warm years were attributed to growing greenhouse gas concentrations. Despite recent advances in our understanding of atmospheric dynamics and large-scale climatic processes, the climatic consequences of greenhouse gases remain

poorly understood. One of the most significant repercussions of future climate change will be changes in regional hydrologic cycles, which will have an impact on the quantity and quality of regional water resources.

Nonetheless, their repercussions are poorly understood. Recent hydrological research clearly shows that probable climatic changes produced by increases in atmospheric trace gas concentrations will modify the timing and volume of runoff and soil moisture, change lake levels and groundwater availability, and have an impact on water quality. Such a scenario increases the likelihood of catastrophic environmental and socioeconomic disruptions, and it has far-reaching consequences for future water resource planning and management. Much of the early literature on climatic change concentrated on society's potential to influence local climatic conditions rather than the effects of climatic changes on society. When attention was finally turned to anthropogenic climatic changes, such as greenhouse warming, very little of the early research considered potential impacts on water resources; instead, most research focused on the implications of higher temperatures and altered precipitation patterns for agricultural production and ocean levels.

This neglect of water resources was caused by three factors: an early emphasis on large-scale computer simulations of the climate, uncertainty about how future precipitation patterns would be affected by climatic changes, and doubts about appropriate hydrological methods for evaluating future (and uncertain) climatic changes. The effects of greenhouse warming on precipitation, runoff and soil moisture throughout significant portions of the United States (U.S) is observed, using the Goddard Institute for Space Studies (GISS) model, that while major hydrologic changes can occur, the hydrologic output from GCMs was not sufficiently accurate to define future conditions in specific watersheds, as projected under a doubled CO₂ climate.

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