ASSOCIATION OF METROPOLITAN WATER AGENCIES

Implications of Climate Change for Urban Water Utilities

HIGHLIGHTS

The scientific consensus supports a view that: 1) global warming is already happening; 2) it is likely to accelerate over the next several decades; 3) it is possible to meaningfully mitigate climate change through greenhouse gas (GHG) emissions reductions; and 4) it will get worse until we can stabilize the situation through mitigation. The leading edge of some impacts on water suppliers may be apparent today, but the larger part is yet to come, spread over the rest of the present century and continuing for centuries beyond.

The broad range of impacts that could be produced by climate change on water suppliers is staggering.

Increasing Evaporation and Precipitation

One of the simplest ways to envision the effect of global warming on water resources is to follow the logic of what happens when water is heated; global warming will basically accelerate the pace of the hydrologic cycle. Warmer temperatures will cause water to evaporate more readily and cause the total amount of precipitation to increase at a global level. Forecasts of the amount of precipitation vary greatly from one region to another. Areas in the high latitudes and some wet tropics are generally expected to see increased precipitation, while dry regions in the mid-latitudes and the dry tropics are generally expected to see decreases in total precipitation. Warmer temperatures imply that areas subject to drought may see more extensive drought and heat wave events while, at the other extreme, areas accustomed to snowfall will see warmer winters. Warmer and shorter winters are already implicated in the reduction in the amount of water stored as ice in glaciers, and in seasonal snowpacks. The shorter cold season means that the spring melt can arrive much earlier and have significant implications for streamflows available downstream in late summer and early fall.

Rising Sea Level

With warmer temperatures, the oceans expand (because water expands in volume when heated) and glaciers and ice sheets melt, causing sea level to rise.

Terrestrial and Aquatic Ecosystems

Changes in basic climate variables such as temperature, rainfall, seasonal patterns, runoff characteristics and recharge patterns of both ground and surface waters can produce significant baseline changes in both terrestrial and aquatic ecosystems.

There are many situations across the country where in-stream flow requirements have been, or are being, negotiated to provide sufficient cold water to sustain fish species during summer/drought periods. In estuarine settings, the goal is to provide critical levels of freshwater inflow to maintain tolerable salinity levels during summer/drought periods.

Water Contamination

Increased frequency and intensity of rainfall is one of the most immediate effects of global warming that is already apparent in streamflow records from the last several decades. The expectation is that more severe storms will produce more severe flooding. This will inevitably result in additional water pollution from a large variety of sources. Chief among these are wastewater treatment, storage, and conveyance systems. Preliminary work by EPA has confirmed that, for the most part, wastewater treatment plants and combined sewer overflow control programs have been designed on the basis of the historic hydrologic record, taking no account of prospective changes in flow conditions due to climate change. As a result, it is conceivable that water suppliers will face a continually increased influent challenge from sewage overflows producing high concentrations of disease-causing *Giardia*, *Cryptosporidium* and coliforms, which drinking water utilities eliminate through disinfection practices.

Responses To Climate Change

Many water utilities have begun to respond to the impacts of climate change through vulnerability analyses and long-term planning. Vulnerability analyses attempt to obtain a better analytical assessment of the possibility that current water resource development and facility plans could be disrupted by near-term (20-50 year) manifestations of climate change processes. Long-term resource planning adopts the broadest possible strategic view of how a utility can plan to cope with climate change over the longer term, taking into account environmental, socioeconomic and engineering factors.

In addition, utilities are responding through adoption of measures to help mitigate the onset of climate change by reducing energy consumption that contributes to the production of GHGs.