

Low Flow and Drought Hydrology: Research and Management Needs

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Abstract. Decreasing low flows caused by development in humid areas will threaten ecosystems during dry seasons with or without climate change. This widespread problem is currently unfolding in the southeastern United States, which serves as a case study for the paper. It is a creeping problem, which is disguised behind three false beliefs. First, people believe water is abundant in humid areas. This is not true during dry seasons, when ecosystems are vulnerable to low flows, especially along unregulated smaller headwaters streams. Second, it is thought that water management programs—such as water withdrawal limits, water quality permitting, instream flow requirements, drought plans, and low flow augmentation—solve low flow problems. In fact, these programs are flawed, and some of them do not exist. Third, it is thought that research is low priority, and that professionals have enough data and knowledge about low flows and their impacts to take action. In fact, much is not known, and neither system designers nor regulators have adequate guidance about risk factors.

The first part of the paper will demonstrate that water is not abundant during dry periods by reviewing recent southeastern droughts, such as the 1986 regional drought and the current drought that is especially serious in Florida. Low flow data will be presented to illustrate how, during dry seasons, streamflows become low enough to threaten ecosystems and future possibilities for water development.

Next, the paper will review water management programs that focus on water withdrawal permits, water quality controls, instream flow requirements, drought plans, and low flow augmentation. This review will show that these programs, which are mostly uncoordinated, are not addressing the low flow problem.

Finally, the paper will outline programs of research and action needed by participants in the water industry, including regulators. This part of the paper will stress how, during the rapid growth of the 1990s and deregulated business environment, little attention has been given to the low flow problem and it will illustrate how, given the lack of attention and investment in water management infrastructure, the nation has much catching up to do.

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