

# New Developments in the Study of Floodplains and Domestic Water Supply

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**A**mong the numerous ways in which highly diverse scientific research is deepening knowledge of human management of water resources, two recent and quite different examples are noted here because they promise to change public policy significantly. One is the systematic examination of causes and consequences of changes in methods of serving domestic needs for water in diverse environments. The other is in pioneering in appraising the value of hydrologic resources in restored ecosystems, particularly floodplains.

## Changes in Methods of Serving Domestic Water Needs

For all parts of the world, it has been common to describe the prevailing policies and diverse practices of supplying domestic water to various types of households. The literature is immense. Only in recent years, however, has systematic attention been given to describing and understanding the causes and effects of the changes currently under way. A major study from which the results are beginning to be published is *Drawers of Water II* (Thompson et al., 2001).

This study was initiated by the International Institute for Environment and Development in London under the leadership of John Thompson. He and his colleagues, with support from the U.K. Department for International Development, the Ministry of Foreign Affairs of the Netherlands, the Swedish International Development Cooperation Agency, and the Rockefeller Foundation, undertook a program of studies in Kenya, Tanzania, and Uganda in precisely the same sites where domestic water

supply was studied in 1966-1968. Those basic data were published in White, Bradley, and White (1972), henceforth referred to as *Drawers of Water I*, and the complete field data set was preserved by the U.S. Corps of Engineers in its Fort Belvoir archives. Thus, it was possible to critically examine conditions and factors affecting them in a wide variety of environments.

*Drawers of Water I* focused its field studies in three locations. The sites were located in the three East African nations primarily because they offered tremendous diversity in environmental and social conditions. Fifteen study sites had water connections in parts of communities with total populations ranging from 1,800 to 272,000 and in environments with frequencies of annual rainfall less than 50 mm ranging from 0 to 8 months per year. Nineteen study sites were without water connections (twelve rural and seven urban) and included wide variation in climate, terrain, housing density, ethnic group, and water source.

*Drawers of Water II* (Thompson et al., 2001) sought to examine in greater depth the currently prevailing conditions in the same communities along with the combination of economic and political forces that appear to account for changes over 30 years and that likely will influence future changes. Without attempting to describe the many directions in which domestic water supply has evolved in the study areas, it is worth noting that those changes included: questions as to what kinds of changes in supplies have genuinely improved the human condition, and as to which types of changes in organization and means have proved beneficial or detrimental for human well being. Why has daily per capita

consumption of water in piped households decreased? This type of issue is common in many areas. Why has the domestic water service become intermittent in other areas? Under what form of management has the quality of service continued to decline?

These are only a few of the questions emerging from review of domestic water supply programs throughout East Africa over recent decades. Because the East African study sites range from high-income urban areas to low-income rural settlements and from arid to humid environments they suggest types of user settlements found in many other parts of the world. They also illustrate how local communities can vary tremendously within only one low-income nation, and how the quality of service may in some regions be less effective under national management than when local governments have direct responsibility.

Variations in the quality of service provided individual households cast doubts on the representative character of national averages and totals in which most data on domestic water supply are reported. Unless national statistics are supplemented by detailed studies of sample communities, those statistics may be misleading indicators of community conditions; and, unless they are investigations of changes over time, it may be impossible to identify those management policies and practices most deserving attention.

## **Measuring the Benefits of Ecosystem Restoration**

When there first began to be public attention to the management of losses from floods in the United States, analysis focused almost exclusively on the control of flood waters. Estimates were made of the magnitude and distribution of floods and of the resulting damages to affected property under current or prospective land use. The Federal policies established in the Flood Control Act of 1936 encouraged estimates of the damage that might be prevented by the provision of flood control through channel improvement, levee construction, or dam construction. The critical analysis was in the estimation of benefits that would accrue from selected degrees of flood control. The estimated benefit-cost ratio was essential to judgment as to whether or not any proposed structure would be

undertaken. There was no estimate of the value to the community from the uncontrolled flooding.

In recent years, some attention turned to the environmental benefits that would result from restoration of the natural ecosystem, whether or not there had been any significant change. In effect, this would involve an estimate of the full benefits from functioning of the ecosystem. The Corps of Engineers Institute of Water Resources carried out a comprehensive study of *Improving Environmental Benefits Analysis in Ecosystem Restoration Planning*. This was directed at “the identification and assessment of alternative motives and analytical procedures for characterizing and evaluating restoration project outputs in non-monetary terms” and “to the identification and assessment of alternative plan comparison frameworks for project plans formulated at least in part to serve ecosystem restoration.”

Restoration may be sought to promote services that people value, or to promote the “naturalness” of ecosystem hydrology and geomorphology. The summary report reviews: ecological concepts underlying benefits analysis; discusses model use and development; reviews the Corps planning framework for ecosystem restoration; and reviews possible strategies for improving environmental benefits analysis. More details are given in sections on: civil works ecosystem restoration; underlying ecological concepts; models for ecosystem restoration; Corps standards for plan evaluation; possibilities for monetary evaluation of restoration; and strategies for developing improved benefits models. It is too early to judge what effect this new report will have upon the methods of new Federal studies, but it certainly will influence further thinking by scholars concerned with water management.

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