Chapter 13
Hydrology and Integrated Water Resource Management for Sustainable Watershed Management in Kenya

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EXECUTIVE SUMMARY

Degradation of watersheds and diminishing water resources lead to unsustainable environmental and socio- economic development. The hydrological characteristics are desirable for sustainable water resource exploitation. Hydrological and water resources research were examined in three case watersheds in Kenya leading to the need for integrated water resources management, environmental conservation, and watershed management plans as a result of the major challenges of climate change and variability and uncoordinated watershed resource utilization. Well-managed hydro-meteorological networks at different scales of hydrological systems have been proposed to assess potential for optimal resource use and harmony involving all stakeholders for reduced water stress and future water conflicts. Updates of information and methodologies for watershed management that emphasize collaborative efforts and use of sustainable best practices would require input of various stakeholders including Water Resources Management Authority (WRMA), Basin Authorities, and National Environmental Management Authority (NEMA).

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ORGANIZATIONAL BACKGROUND

Watershed Problems and Sustainable Management Practices in Kenya

Water and other watershed resources are exploited for development and livelihoods. Most of the watersheds are however vulnerable to effects of climate variability and change, population growth and land use change. Other watersheds are in arid and semi arid land (ASAL) areas, trans-boundary or in coastal zones prone to degradation from unplanned use of resources. The impacts of climate change are noticeable in the increased frequency and intensity of floods and droughts. High intensity rainfall storms on steep slopes and high population pressure can be detrimental in the absence of coordinated land use planning. Sustainable use of natural resources in watersheds can be achieved using hydrology as the key unifying factor (Adeyole and Montasseri, 2002, Taikan *et al*; 2006, Mwangi *et al*; 2007).

Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet theirs (UNCED, 1992; UN, 2006). It includes the ability of meeting the present needs while contributing to the future generations' needs by improving the future generations' life through restoration of previous ecosystem damage while resisting to contribute to further ecosystem damage. The "interdependent and mutually reinforcing pillars" of sustainable development are economic development, social development, and environmental protection. Several studies have been carried out in support of the sustainable development at local, regional and global scales. Many countries including Kenya have set authorities or organs to oversee and ensure the diffusion and adoption of sustainable management practices and strategies. Watershed plans are a means to resolve and protect water quality problems resulting from point and non point sources (USEPA, 2008). Cooperation from grass root stakeholders is necessary for success of collaborative watershed management (Mark, 2004).

This chapter discuses efforts made in Kenya with reference to some key catchments by synthesis of observations, research and analysis for utility in watershed management. Lake Turkana, Victoria and Mount Kenya watersheds represent a diversity of climatic zones and land use/cover categories critical for hydrological studies and adoption of integrated watershed management.