LCLUC Abstract

Climate and Human Impacts on Water Resources in Africa

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The availability of fresh water is one of the most critical environmental issues of our time [Postel *et al.*, 1996]. This is particularly true in Africa where large portions of the continent are arid or semi-arid and the precipitation is highly variable. Additionally, large changes in land cover/land use and water management practices have taken place during the last 50 years including: removal of water from river systems for irrigation and consumption, degradation of forage land by over-grazing, deforestation, replacing natural ecosystems with mono-cultures, and construction of dams. The relatively large population and delicate ecosystems therefore, depend on water resources that vary greatly due to climate fluctuations and human induced changes. With increasing population and development we can expect that the pressures on existing water supplies in Africa and the vulnerability of the populations dependent upon these resources will continue to grow. Therefore, it is crucial that we improve our understanding of the variability of terrestrial hydrologic systems in Africa, and how human activities may affect those resources.

Our goal is to simultaneously quantify the relative impacts of the three major determinants of the observed changes in terrestrial hydrology in Africa since 1950: (1) climate variability, (2) land use/land cover change, and (3) water management practices.

We will concentrate our efforts in four regions in semi-arid and arid Africa: (1) the Niger River and its interior delta, (2) the Lake Chad/Chari River system in north-central Africa, (3) the Sudd marshlands of the Nile, and (4) the Okavango River and its interior delta in southern AfricaWe have chosen these four regions because:

- *water resources are limited and highly variable*
- *population and development pressures are already large and increasing*
- *land use and land cover changes have been significant*
- *current or suggested future water management schemes are large in relation to the water resources and have international implications*

Our project will link satellite- and census-derived land cover and land use history, satellite observations of surface water level and area, comprehensive regional ecosystem and hydrology models, and ground based observations. This combination of data and models enables us to clearly assess the individual relative impacts of humans and climate variability on water resource availability since 1950 in our four study regions.