Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07350, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07350
EGU General Assembly 2008

Changing rainfall and discharge patterns in the northern Limpopo Basin, Zimbabwe

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Rainfall in south-eastern Africa is temporally and spatially intermittent and its variability is strongly influenced by the coupled ocean-atmosphere El Niño - Southern Oscillation phenomenon (ENSO). General circulation models developed with the IPCC SRES scenarios suggest that annual rainfall in south-eastern Africa will decline further under the impact of global warming. These changing regional and global trends in climate and discharge are likely to have a strong influence on water resource availability, and increase livelihood risk. It is therefore important to characterise such trends. Information can be obtained by examining and comparing the rainfall and runoff records at different locations within a basin. In this study, trends in various parameters of temperature (4 stations), rainfall (10 stations) and discharge (16 stations) from the northern part of the Limpopo Basin, Zimbabwe, were analysed, using the Spearman rank test and the Pettitt test.

It was determined that rainfall and discharge in the study area are declining, notably since 1980, both in terms of total annual water available for storage (declines in annual rainfall, annual unit runoff) and in terms of the frequency of water availability (declines in number of rainy days, increases in dryspells, increases in days without flow). The declining rainfall trend may be due to the increased incidence and severity of positive ENSO events and/or to changes associated with global warming. Dis-

charge has been reduced by the declining rainfall input, but also by declining runoff generation in headwater catchments, likely due to impoundments in small dams and increased abstractions for crop production, especially in the north and east of the study area. As rainfall continues to decline, it is likely that a multiplier effect will be felt on discharge.

Increasing food shortages are a likely consequence of such declining water resource availability. Unfortunately, many proposed strategies to address hunger in southern Africa are water intensive, notably in proposals from the Millennium Project and have already been shown to result in water use conflicts. Declining water resource availability will also further stress urban water supplies in the study area, notably those of Zimbabwe's second largest city of Bulawayo, which already experiences chronic water shortages.