CLIMATE CHANGE AND AGROPASTORAL SUSTAINABILITY IN THE SHASHE/LIMPOPO RIVER BASIN FROM AD 900

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A thesis submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy

Johannesburg, 2005
DECLARATION

I declare that this thesis is my own unaided work unless otherwise acknowledged. It is being submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination in any other university.

______________________________

G. Smith

14th day of April, 2005
ABSTRACT

This thesis investigates agropastoral production and ecological conditions under which complex socio-political systems in the Shashe/Limpopo River Basin, southern Africa, periodically expanded and declined between ~AD 900 and 1700. Environmental reconstruction for this period, derived from multi-stable isotope analysis of modern and archaeological fauna from the area, demonstrate that agropastoral settlement and changes in their social, economic and political complexity were less driven by climate than previously had been assumed. Rather, at a relatively short-term climatic scale, these cultural events took place even as precipitation and temperature appeared to have fluctuated above and below the modern seasonal mean of ~350mm and ~22°C, conditions presently considered to be marginal for agropastoral production. Alternative to a climate driven model for settlement, ethnographies of traditional southern African agropastoral systems provide a comparative basis for understanding the range of environmental and social parameters that past agropastoralists in the Shashe/Limpopo River Basin may have employed to sustain population growth and intensify socio-political complexity in the face of short- and long-term climatic variability.

Over a long-term climatic scale, the $\delta^{15}N$ and $\delta^{18}O$ values from Bos taurus and Ovis/Capra indicate that the initial settlement by Zhizo agropastoralists people, between AD 900 and 1010, took place under semi-arid conditions that were similar to, or only marginally wetter, than the present. This thesis suggests that the Zhizo settlement and their ‘capital’ site of Schroda were motivated by broader cultural factors, such as trade networks, and not solely by climate conducive for agriculture. As documented ethnographically, crops and livestock herds could have been sustained by taking advantage of various geographical features of the river basin, such as planting near outcrops where dammed water keep soils moist even in dry periods and using browse and crop fodder to offset diminished grazing lands. Results for sites dating between AD 1010 to 1415, support previous interpretations that the Leopard’s Kopje A and B cultural period ‘capitals’ of K2 and Mapungubwe, respectively, rose to prominence under a trend towards increased available moisture. The additional moisture would have facilitated the greater
floodplain settlement recorded between AD 1010 and 129, which was most likely a response to increased population pressures of the capitals and the need to extend cultivated lands. This spatial shift was accompanied by an apparent greater management of livestock. The preliminary $^{87}\text{Sr}/^{86}\text{Sr}$ data, together with intra-annual $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ values, from $B. \text{taurus}$ and $Ovis/\text{Capra}$ indicates a geographical expansion of herd management took place with the transition from K2 to Mapungubwe. This thesis proposes that to sustain population and socio-political growth in the face of short-and long-term climatic variability, livestock management would need to be politically coordinated. Maintaining large-scale herds outside the river basin would have allowed for expansion of crop production onto previous river basin pasturelands, while extending territories or networks.

Further, the $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ data indicates that the period of increased available moisture extended beyond the abandonment of Mapungubwe at AD 1290. Previous assumptions that link this event to the negative agricultural impact of a cool dry trend starting at ~AD 1300, as extrapolated from sub-continental scale climatic sequence, must be re-assessed. The isotopic data from Moloko/Khami cultural period sites suggest that drier conditions did not develop in the area until after ~AD 1450. Their initial settlement in the area during this drier period needs to be re-considered, as does the entire sequence from ~AD 900 onward, in terms of agropastoral production strategies within shifting natural, economic and political environments.
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