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PREVIEW

**TESTING FARMERS' PERCEPTIONS OF CLIMATE VARIABILITY WITH
METEOROLOGICAL DATA: BURKINA FASO AND THE SULPHUR SPRINGS
VALLEY, ARIZONA**

by

Colin Thor West

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A Thesis Submitted to the Faculty of the

DEPARTMENT OF ANTHROPOLOGY

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DEDICATION

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ABSTRACT

This thesis tests perceptions of climate variability with actual rainfall data. It also compares the perceptions of agriculturists in Burkina Faso, West Africa with those of agriculturists in the Sulphur Springs Valley, Southeastern Arizona. This study contests claims by other researchers that farmers' perceptions of climate change are shaped by events rather than variation in climate. The analyses demonstrate that people in both regions are able to detect variations in climate on time-scales of at least a decade. Both groups of farmers key into intra-annual variation that is related to seasonality. That perceptions are based on seasons is due to the fact that seasonality shapes the vulnerability of farming to climate in both regions. This thesis adds perceptions to the analytical field of climate vulnerability studies and points out that the atmospheric phenomena behind the variability farmers perceive merits scientific investigation.

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CHAPTER 1. TESTING PERCEPTIONS OF CLIMATE VARIABILITY AMONG FARMERS

A problem persists within anthropology's unique ability to engage in interdisciplinary studies: ethnographic methods are rarely able to convince our colleagues in the physical or natural sciences. Ethnography may do a good job of representing the perspectives of those we study but often fails to mesh with the scientific data we must also analyze.

This thesis takes a step toward reconciling ethnography and scientific discourse.

Numerous social scientists are now engaged in understanding the human dimensions of environmental change. Anthropologists in particular have made important contributions to studies of social vulnerability to climate change and variability. The specific goal of this thesis is to test perceptions of climate variability using meteorological data. The hope is that this testing provides a template for others to use in order to track long term dynamics between oscillations in rainfall and the ways in which humans view these changes.

But why is this important? On the one hand, "climate vulnerability" remains a poorly defined field of study, being mostly the domain of geographers. Anthropologists can provide a more dynamic toolkit for these studies and can bring the point of view of groups affected by climate to the analytical table. Critics within the ranks of climate related social science too often state that the nature of vulnerability lies as much within the realm of social networks and institutions as it does on the physical phenomena themselves (Glantz 1987). The veracity of this assertion is undeniable but the links between human conceptualizations of vulnerability and scientific criteria for

vulnerability are disconnected. Anthropologists have begun to successfully bridge the intellectual gap that divides social and physical science perspectives on environmental change. In their book *Misreading the African Landscape: Society and Ecology in a Forest-Savannah Mosaic* (1996) James Fairhead and Melissa Leach take to task the prevailing opinion that deforestation was taking place at an unprecedented rate throughout West Africa. The authors used satellite imagery, aerial photographs and ethnography to show that the forested areas were in fact expanding. These spatial models of vegetation change corroborated the prevalent view among villagers that their landscape was becoming more, not less, forested. In a similar sense, this analysis takes the views of local farmers and tests them using rainfall information.

Questions concerning local and scientific perspectives ultimately revolve around issues of scale in terms of both time and space. Bryant *et al.* (1999) suggests that farmers in Canada key into recent climatic events rather than multi-year precipitation trends when they are asked about climate change. Similar studies of water managers in the United Kingdom demonstrate that they perceive that regional rainfall is becoming more intense but the authors were unable to test the accuracy of these statements using rainfall records (Subak 2000). Researchers in the African Sudano-Sahel indicate that farmers practicing subsistence agriculture express strong concerns regarding climate change and that these perceptions are based on longer-term observations (Roncoli *et al.* 2000; Ovuka and Lindqvist 2000). Thus, it appears that perceptions of rainfall variability in developed countries differ from those of people in developing countries. Farmers in industrialized North America perceive that climate is changing through

individual events whereas subsistence farmers in Africa detect longer-term rainfall trends.

This paper tests the temporal scale of specific perceptions of agriculturists in both the developed- and developing-world contexts. It contends that seasonal rainfall variability as seen by farmers in both the Sulphur Springs Valley and Burkina Faso correspond to ten-year time frames. Thus, when people talk about their observations of local climate variability they are indeed speaking in terms of “climate” rather than “events.” This conclusion increases the value of research on future climate change because it suggests that people can detect climate variability. Hence, stakeholders may be able to take advantage of long-term climate predictions.

1.1 Addressing Gaps in Climate Vulnerability Literature

Anthropologists have studied human-climate interactions since at least E.E. Evans-Pritchard’s *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People* (1940). In this work, Evans-Pritchard lists seven characteristics of the Nuer environment including rainfall and droughts and then states: “These characteristics interact with one another and compose an environmental system which directly conditions Nuer life and influences their social structure. The determination is of so varied and complex a nature that we do not attempt to summarize its full significance . . .” (1940:55). With the severe droughts that hit the Sahel between 1968 and 1972, social scientists began analyzing the more direct relationships between droughts and livelihoods. A seminal work is Franke and Chasin’s *Seeds of Famine:*

Ecological Destruction and the Development Dilemma in the West African Sahel

(1980). The authors conclude that famines are the result of colonial policies and institutional deficiencies rather than the magnitude of a meteorological event such as drought itself.

Also in the 1980's, social scientists began looking at "seasonality" rather than long-term means or annual totals for understanding vulnerability (Sahn 1989). Farmers in Africa understand how the local climate operates year-to-year and their farming practices are well adapted to the possibility that either drought, adequate or even over-abundant rain will occur in any given year (McCann 1999). It is inter-annual variability and changes in seasonal expectations that catch farmers off guard. For farmers in Burkina Faso, the timing of the commencement of the rains, their duration and their distribution are the key variables in agricultural decision-making not the total rainfall (Roncoli *et al.* 2000). Furthermore, Reardon and Matlon point out that rural Burkinabé households are more food insecure at certain periods within a year (1989). During the 1984-1985 drought, poor families suffered most acutely during the rainy season because this is the time when the household store of grain is lowest, market prices are highest and labor demands are highest. While climatologists and meteorologists commonly state that this part of Africa has only two seasons – wet and dry – the authors state that their informants talked in terms of four seasons: the harvest, the cold, the hot and the rainy (Reardon and Matlon 1989:121-122). In Bonam, villagers also associate different meteorological phenomena with certain phases of the moon (Roncoli *et al.* 1999:10).