

**CLIMATE VARIABILITY AND ADAPTATION IN AGRO-PASTORAL  
PRODUCTION SYSTEMS OF SOUTHERN ZAMBIA**

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## ABSTRACT

Climate variability and change which manifests itself through increase in temperature and frequent occurrence of floods and droughts is increasing agro-pastoralists vulnerability and inability to sustain their sources of livelihood, hence their need for coping adaptive strategies. This study was undertaken in the drylands of Choma District in Southern Zambia to generate information to aid in coming up with sustainable coping strategies as an adaptation to climate variability. The objectives of the study were to: Determine the extent of climate variability and the agro-pastoralists coping strategies in extreme weather conditions; Identify the livestock feeding strategies employed by agro-pastoralists as an adaptation in extreme weather conditions; Evaluate preferred local fodder tree/browse productivity for high dry season biomass yield by coppicing at different levels; and Determine the nutritive quality of the preferred browse species using *in-vitro* digestion in order to ascertain the most appropriate stage of feeding to animals. Semi-structured interviews and focused group discussions were used to capture primary data. Secondary data was also collected. Effects of coppicing on the preferred drought tolerant browse tree was conducted. The treatments were percent removal of the stems at 25, 50 and 75% replicated three times. After one year, measurements on the number of shoot re-growth and biomass yield were done. A survey was also conducted to determine intensity of harvesting of the preferred browse tree by the agro-pastoralists. *In-vitro* dry matter digestibility trials of leaves of the preferred browse tree at four different post-sprouting stages were conducted to determine their nutritional quality as dry season feed for ruminants. Data sets were subjected to descriptive trend analysis, and analysis of variance as appropriate. The study revealed that there has been an increase of 1.0 °C in the average annual temperatures over the previous five decades. Variability in the amount of annual rainfall received has increased by 33% over the same period while there was a general decline in average annual rainfall received. Most of the agro-pastoralists are coping with these extreme weather conditions through sale of livestock and harvest of forest products, which can pose a threat to sustainable use of the forest resources in the long run. The major livestock feeding strategies during extreme weather conditions were upland grazing and browse utilization

and 17 browse species were identified by the agro-pastoralists as being important. Coppicing of the highly preferred browse *Julbernardia globiflora* showed that browse trees subjected to higher coppicing intensity had significantly less number of new shoots and dry matter yield ( $P < 0.05$ ). Leaves from the early stage of leaf sprouting gave the best nutritive quality with significantly higher crude protein and *in-vitro* digestibility levels compared to the other sprouting stages ( $P < 0.05$ ). There is need to enhance some of these adaptive strategies to ensure survival in view of anticipated increase in frequency, intensity and magnitude of extreme weather conditions. Harvesting of forest products should be done sustainably to reduce pressure on the forest and avoid de-forestation. Deliberate effort should be made to capacity build the agro-pastoralists on how to plant and manage browse species such as *Julbernardia globiflora* that are adaptable in extreme weather conditions for productive use of the browse species for improved animal feeding and enhanced food security. Also agro-pastoralists should be able to take up management and feed conservation measures for their animals.