Application of forage monitoring technology to track drought occurrences : Experiences from Eastern Africa

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Key words : pastoralist , livestock , drought , early warning , forage , forecast

Introduction Increasing frequency of drought occurrences is threatening livelihoods of pastoral communities in eastern Africa . Chances of drought occurring in parts of the Greater Horn of Africa have increased from a probability of one in six years to one in three years for areas affected . With the declining capacity of traditional coping mechanisms , new innovations are required for monitoring and communicating the emergence of drought conditions in good time . Rainfall and forage availability are early indicators of drought . The Livestock Early Warning System (LEWS) project has developed a forage monitoring system to assess emerging forage supply as an indicator of drought in Eastern Africa region . Tracking forage availability and having ability to predict the future forage conditions are useful tools that can be used to put in place contingency measures aimed at mitigating the emerging drought conditions .

Materials and methods The automated LEWS system is derived from a combination of biophysical models , information communication technologies and spatial analysis tools to monitor the standing crop of forage available to grazing animals using geo-referenced sites (Stuth et al . , 2005) . The model output is compiled for each dekad and processed to produce spatially-explicit forage maps . Ground verification of accuracy of maps is carried out by clipping vegetation at the monitoring points and comparing with model results .

Results The LEWS forage monitoring system generates site products which includes standing crop (kg/ha) , percent forage deviations and 30 , 60 and 90-day forage forecasts (http ://glews .tamu .edu/africa) . Decadal forage map complements the point based data . Forecasts are updated monthly and advisories are constructed from the resulting analysis for multiple levels of decision making . Between 2001 and 2006 , available forage and weather data showed that the LEWS model tracked the forage situation on the ground very well . The forecasts issued in September 2005 before the expected November-December short rains , had warned of emerging forage scarcity and subsequently deteriorating animal condition . This forecast tracked very well with the realized rainfall and forage conditions . The areas forecasted to have severe forage deviations (drought) were in northern , southern and parts of coastal Kenya ; southern and northern Ethiopia ; and parts of northern Tanzania . The drought had devastating effects on pastoral livelihoods following substantial livestock mortalities from November 2005 through March 2006 . In Kenya , average livestock mortality was 16 .2% for cattle , 12 .5% for goats , 20 .5% for sheep and 11 .4% for camels in affected areas . In Tanzania , livestock mortalities were 1 .7% for cattle , 1 .4% for goats and 3 .8% for sheep . When the drought ended in April 2006 , availability of water , pasture and browse improved markedly , but pastoral food security remained precarious . During the drought cattle prices in all markets decreased significantly (http ://links .tamu .edu ; LINKS , 2006) . Due to the weakening pastoralists' terms of trade for cereals , malnutrition rates rose among the chronically food insecure population . This scenario strengthens the case for providing timely flow of early warning information to livestock producers to guide making better decisions to move and market livestock during both normal and distress periods , so as to minimize the risk of having their livelihood assets decimated .

Conclusions The aim of the LEWS system is to offer decision makers sufficient lead time to make rational decisions and if used in a timely way , could enhance capacity to respond to threats of droughts . Efforts are being made to strengthen the use of early warning information and broaden the coverage of dissemination particularly among pastoral communities to enhance their capacity to plan for and respond appropriately to emerging drought conditions .

Acknowledgement The LEWS project is most grateful to the United States Agency for International Development for funding this research through the Global Livestock Collaborative Research Support Program . Special thanks go to all the institutions and individuals who participated in this work .

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