Seasonal forecasts for the Limpopo Province in estimating deviations from grazing capacity

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ABSTRACT:

Application of seasonal forecasts in agriculture has significant potential and realized utility. Other sectors that may also benefit from using seasonal forecasts include (but are not limited to) health, hydrology, water, and energy. This paper shows that seasonal forecast model data, satellite Pour l'Observation de la Terre (SPOT), dry matter productivity (DMP) data (proxy of grass biomass) along with other sets of data are effectively used to estimate grazing capacity (GC) over a 12-year test period (1998/1999–2009/2010) in Limpopo Province. GC comprises a vital consideration in agricultural activities, particularly for a province in South Africa like Limpopo, due to its varying climate. The Limpopo Province capitalizes on subsistence farming, including livestock and crop production. Grazing should thus be regulated in order to conserve grass, shrubs, and trees, thereby ensuring sustainability of rangelands. In a statistical downscaling model, the predictor is the 850 geopotential height fields of a coupled ocean–atmosphere general circulation (CGCM) over Southern Africa to predict seasonal DMP values. This model shows that the midsummer rainfall totals are important predictors for the November through April (NDJFMA) DMP (as well as grazing capacity) growing season. Forecast verification is conducted using the relative operating characteristics (ROC) and reliability diagrams. The CGCM model shows skill in discriminating high and low DMP (GC) seasons in the Limpopo Province, as well as reliability in the probabilistic forecasts. This paper demonstrates the

development of a tailored forecast, an avenue that should be explored in enhancing relevance of forecasts in agricultural production.