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# Systemic analysis of desertification processes taking place in the Limpopo river basin

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Desertification and land degradation are phenomena that ranks among the greatest environmental challenges of our time. Desertification is a global issue, with serious implications worldwide for biodiversity, socio-economic stability and sustainable development.
Biophysical indicators of land degradation and desertification, like Net Primary Productivity (NPP) and Total Ecosystem Respiration (Reco) were provided by remote sensing technology (MODIS). The study aims to evaluate the dynamical changes of NPP and Reco in the Limpopo river basin, a Southern African region that includes, Botswana, Mozambique, South Africa and Zimbabwe, during the time period 2001-2010. In particular, the relations between NPP, Reco, environmental, physiological and land use parameters have been widely investigated through the application of a new and powerful statistical classifier, the Random Forest Analysis (RFA), and a general non-linear model, the Response Surface Regression Model (GRM).
RFA highlighted that Temperature is one of the most important predictors affecting NPP and Reco in the Limpopo river basin. Conversely, other environmental parameters like, Precipitation, Evapotranspiration and Vegetation cover rarely influence NPP and Reco.
Our results provide information on desertification and land degradation phenomena and a first step for identifying practices to mitigate their negative impacts. However, it must be taken into account that NPP and Reco depend by a multitude of factors (e.g. human activities, socio-economic policies) and can vary in relation to spatial and temporal scale. In order to achieve a better understanding of land degradation and desertification processes, land use and socio-economic variables should be considered.