Integration of Multispectral and ancillary data for mapping *Seriphium plumosum* in a mountainous terrain using ensemble algorithms.

Mokubung, C\(^1\); Adelabu, S*; Adam, E\(^3\); Peerbhay, K\(^3\)

1. *Department of Geography, University of the Free State, QwaQwa Campus, Private Bag X13, 9866 Phuthaditjhaba, South Africa*
2. *School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand, Johannesburg, South Africa*
3. *Institute of Commercial Forestry Research, Pietermaritzburg, South Africa*

*Corresponding Author: adelabusa@ufs.ac.za*

**Abstract**

Information on species diversification in high altitude remains generally low. Yet information on these diversification could provide important and effective procedures for managing mountainous environment. While conventional methods could be used to map the distribution of species, most have been found to be costly, labour intensive and time consuming. The advent of remote sensing provides better way of assessing the diversity of species in difficult terrains. However, mapping is complicated by the complex spatial distribution of species which, in response to steep topographic gradients, harsh edaphic conditions and variable fire histories, typically forms a complex mosaic of different species dominants and age classes, each with unique successional responses to fire and canopy characteristics (e.g. moisture content, biomass, fuel load). With the emergence of very high spatial and spectral resolution data set, the resolution gap that existed between remote-sensing data set and aerial photographs has decreased. The decrease in resolution gap has allowed accurate discrimination of different species especially in mountainous terrain. In this study we investigate the possibility of using Worldview-2 and Spot-7 imagery integrated with digital elevation model (DEM) to map the distribution of *Seriphium plumosum* (slangbos) an indigenous encroaching species in a mountainous region. Additionally, we test the capabilities of Support Vector Machine (SVM) and Stochastic Gradient Boosting (SGB) to check if high spatial resolution multispectral wavebands of SPOT-7 and Worldview-2 placed across strategic portions of the spectrum could automatically detect and map slangbos within a mountainous area. Results from the study indicates that SGB provides the highest accuracy with both Worldview-2 and SPOT-7 at 63% and 56% respectively. However, integration of DEM improve the accuracy to 83.13% and 79.52% for Worldview-2 and SPOT-7 respectively. The research demonstrate the potential of SGB and DEM integrated with Worldview-2 and SPOT-7 imageries for mapping and detecting species in mountainous region.