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Assessment of the Spatio-Temporal Distribution of Pteridium aquilinum (Bracken Fern) Invasion on the Grassland Plateau in Nyika National Park

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Abstract : Knowledge about the spatio-temporal distribution of invasive plants in protected areas provides a base from which hypotheses explaining proliferation of plant invasions can be made alongside development of relevant invasive plant monitoring programs. The aim of this study was to investigate the spatio-temporal distribution of bracken fern on the grassland plateau of Nyika National Park over the past 30 years (1986-2016) as well as to determine the current extent of the invasion. Remote sensing, machine learning, and statistical modelling techniques (object-based image analysis, image classification and linear regression analysis) in geographical information systems were used to determine both the spatial and temporal distribution of bracken fern in the study area. Results have revealed that bracken fern has been increasing coverage on the Nyika plateau at an estimated annual rate of 87.3 hectares since 1986. This translates to an estimated net increase of 2,573.1 hectares, which was recorded from 1,788.1 hectares (1986) to 4,361.9 hectares (2016). As of 2017 bracken fern covered 20,940.7 hectares, approximately 14.3% of the entire grassland plateau. Additionally, it was observed that the fern was distributed most densely around Chelinda camp (on the central plateau) as well as in forest verges and roadsides across the plateau. Based on these results it is recommended that Ecological Niche Modelling approaches be employed to (i) isolate the most important factors influencing bracken fern proliferation as well as (ii) identify and prioritize areas requiring immediate control interventions so as to minimize bracken fern proliferation in Nyika National Park.

Keywords : bracken fern, image classification, Landsat-8, Nyika National Park, spatio-temporal distribution
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