Community-level effects of fragmentation of the afromontane grassland in the escarpment region of Mpumalanga, South Africa

by

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ABSTRACT

Habitat fragmentation of the afromontane grassland of the escarpment region of

Mpumalanga, South Africa

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Large scale afforestation, resulting habitat destruction and fragmentation of the afromontane grassland in the Drakensberg escarpment of Mpumalanga, South Africa, has lead to the necessity of describing the flora and fauna aspects of the remaining grassland fragments, allowing forestry companies to mitigate the effects of afforestation on the biodiversity of these fragments and for initiating a management program for the remaining grassland. This study aims, firstly, to determine if any marked human-induced disturbance to the plant communities in the grassland fragments has occurred. I do this by comparing the plant communities of eighteen fragments with those of six control plots outside of the plantations with no marked disturbance to the grassland, by determining whether the plant assemblages in the fragments can be assigned to any of the natural and intact plant communities that Matthews (1993) described from a large-scale survey of undisturbed mountain areas and by ascertaining the presence of any known intruder plant species within the fragments. I also compare the faunal biodiversity in grassland fragments within afforested areas to that of control plots in undisturbed grassland and determine to which degree the Coleoptera, Orthoptera, Lepidoptera and bird communities reflect

recognized plant communities, and are restricted to specific plant communities. Secondly, the study aims to compare the habitat specificity (degree of stenotopy) of the different taxonomic groups and trophic levels of animals and to make recommendations for the conservation of the Afromontane grassland fauna in the remaining grassland fragments in afforested areas. Thirdly, I aim to quantify the effect of several environmental characteristics (slope, rainfall, geology, etc) on the faunal community structure of the grassland fragments, to quantify the effects of degree of isolation on species richness, species diversity and assemblage structure of plants, insects and birds in grassland remnants and to test for the effects of edges on the extant insect biodiversity in the grassland fragments inside plantations. Lastly, the study aims to quantify the effects of fragment size on species richness, species diversity and assemblage structure of plants, insects and birds and to rank the grassland fragments in an order of conservation importance using factors such as biodiversity and uniqueness of the floral community.

The results indicate that afforestation and habitat fragmentation have not significantly impacted on the flora of the grassland fragments. Fragments are still identifiable as natural communities, described by previous workers during provincial-scale surveys. Also, no obvious invader – or disturbed plant communities are discernible even though some of the fragments have been isolated for as long as 40 years and the plant communities of conservation importance described by previous workers coincide with the important communities recognized in this study. Rare and endangered plant species, as well as species endemic to the region, are more frequently found on the scarce Black Reef quartzite of the region, which is more evident to the Northern part of the study area. Two plant communities are of particular conservation importance, not only as a result of their geological base, but also because of the high risk associated with the few grassland examples left of these communities. The high levels of habitat specificity of many of the taxonomic and trophic faunal groups indicate that many of the invertebrate taxa are probably endemic to the region, and that the plant endemicity encountered in the Afromontane grasslands is reflected by a similar degree of animal endemicity. The similarity in faunal assemblages and diversity

between isolated fragments and large areas of grassland emphasizes the conservation importance of the fragments, even when smaller than 5 Ha in extent. Fragments therefore have a high conservation importance, since they represent natural grassland areas and are sometimes the only representative of a particular plant community remaining in the area. I detected no significant edge effects on the faunal communities 10, 20 and 50 metres from the edge of the plantation. Birds (and probably other vertebrates in these grasslands) are affected by fragment size, while invertebrates are much less affected and plants do not show any measurable effect of fragment size. Fragments in the wetter northern part of the study area, characterized by high levels of plant endemicity, have a higher conservation importance as judged by faunal biodiversity. Experimental management involving grazing, mechanical cutting, grazing and burning is needed to derive an efficient management plan, so that the grassland biodiversity can be conserved in a planned way. Such work will also allow empirical testing the efficiency of the indicator species suggested in this study.

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