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The effect of accessibility and value addition on the costs of controlling invasive alien plants in South Africa: A three-species system dynamics model in the fynbos and grassland biomes

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Abstract

We developed a two-biome (grasslands and fynbos) system dynamics model simulating invasions of three invasive alien plant species – black wattle (*Acacia mearnsii*) and two pine species (*Pinus patula* and *Pinus pinaster*) – and some of the consequences. The model considers three components: invasion dynamics; revenue from the sale of woody products derived from clearing invasive alien plants; and a coefficient that models the effect of increased accessibility to invaded areas. The model shows that increasing the returns on value added products (VAPs) from invasive alien plants (IAPs) by between 70% and 130% results in positive nett present values (NPVs) of R2.7 million for *P. patula*, R151.7 million for *P. pinaster* and R115.9 million for *A. mearnsii* (1996 base year). At the same time, the invasion of these species is reduced dramatically by 2025. The results show that there is much scope, and indeed a clear requirement, for improved returns on investment from harvesting these species through increasing the returns from VAPs. However, accessibility to invaded areas would need to be increased for positive nett gains in water yields and other returns to be maximised.