



Aerial view of Rondevlei in the Wilderness National Park showing the triangular study site in the centre with gum trees and a pine plantation on either side. The natural vegetation occurring in the area is a mixture of dune fynbos and dune thicket. Photo: Nicholas Cole.



Out of the dead land

Alien infested land is not necessarily wasteland

by Tineke Kraaij, Scientific Services, South African National Parks

The presence of alien plant infestations on land identified for development is often successfully used as a justification for the re-zoning of land for development (usually residential). The broad assumption is that alien-invaded land equals wasteland in that it has little or no value in terms of biodiversity, ecology, agriculture or recreation. But is this rationale valid?

The negative impacts of plantation forestry and alien plant invasions on the indigenous fynbos vegetation of the Cape Floristic Region have often been documented. Large-scale reductions in species richness and alteration of various ecosystem processes have been ascribed to alien plant infestations in the Fynbos Biome. Among these are changes in plant biomass and litter, soil characteristics, hydrology, fire regimes and sediment dynamics.

As part of the research programme of South African National Parks, a group of us studied the effect of alien plant infestations on biodiversity*. We wanted to know if the negative impacts of alien plants on the indigenous flora were lasting or if they were reversible. The study area was at Rondevlei within the Wilderness National Park, which is one of several protected areas along the Western Cape's Garden Route that aims to conserve biodiversity and ecosystem functioning amidst a plethora of human influences. In coastal lowland with high tourism potential and intense land-use pressures, information on the value and potential for recovery of disturbed land is essential for sound land-use decision making. Furthermore, for conservation management and planning purposes it is imperative to understand the ability of vegetation to recover after different forms of disturbance or transformation.

We investigated natural (unaided) recovery of a 40 ha site that had been under pine trees *Pinus radiata* for approximately forty years. The pine plantation was felled in 1997, six years after incorporation into the Wilderness National



TOP RIGHT: Basterboegoe *Agathosma ovata* growing on the 40 ha study site that had been under pines for approximately forty years. Photo: Geoff McIlleron: Firefly Images.

ABOVE: Bloukanol *Aristea ensifolia* re-appeared on the Rondevlei site after a forty year old pine forest was removed. Photo: Geoff McIlleron: Firefly Images.

Park. The site has not been burnt since, and minimal follow-up clearing of alien plants has been done. The natural vegetation occurring in the area is a mixture of dune fynbos and dune thicket. The site is partly surrounded by private plantations (mostly pines and gums), a railway line and roads. The regenerating vegetation has been surveyed at one, three and six years of age.

An amazing total of 192 indigenous plant species has been recorded from the Rondevlei site since the pine plantation was cleared. Species diversity has increased with veld age, with 123, 131 and 136 species recorded one, three and six years after the clearing. The richness of the recovering vegetation is astounding, considering that the number of species recorded at Rondevlei exceeds the 158 species recorded from a much larger area (880 ha) of similar but undisturbed habitat in the nearby Goukamma Nature Reserve. Density of species recorded at Rondevlei further compares favourably with general species-area relationships established for floras of the south-eastern Cape Floristic Region, according to which an area the size of the study site is expected to harbour only 124 species.

The regenerating vegetation at Rondevlei progressed from alien plants, herbaceous and bulbous plants, to graminoids (grasses, sedges and restios) and ultimately shrubs and trees. The structural changes that occurred in the Rondevlei vegetation conformed to post-disturbance successional trends reported for mountain and lowland fynbos. Among the geophytes were four species of orchid, whilst the graminoids constituted thirteen grass species, thirteen species of Cyperaceae and seven species of Restionaceae. Among the herbs and small shrubs were several aromatic plants, including eight species of *Helichrysum* and two buchus (*Agathosma*). Other conspicuous shrubs were three *Erica* species and typical dune thicket species such as *Rhus* (six species), *Metalasia*, milkwood, candlewood and cheesewood.

Other studies[#] that investigated the effects of disturbance on vegetation composition, showed that fire resulted in a 65% similarity between pre- and post-disturbance vegetation, whereas bush cutting resulted in a 35% similarity. In comparison, there was a 43% similarity between the vegetation at Goukamma (representative of pre-disturbance state) and the regenerating vegetation at Rondevlei (post-distur-



ABOVE: Ghaukum or suurvy *Carpobrotus deliciosus*. An amazing total of 192 indigenous plant species has been recorded from the Rondevlei site since the pine plantation was cleared.



LEFT: Forest num-num or lemoenbessieboom *Carissa bispinosa*. Surveys indicated that six years after the pine plantation was felled, the regenerated vegetation at Rondevlei could be regarded as species-rich, and as such, can contribute to the conservation of biodiversity and the maintenance of ecosystem processes.

BELOW: The Rondevlei study shows us that indigenous fynbos vegetation exhibits a remarkable potential for regeneration, as this candelabra flower or Maartblom *Brunsvigia orientalis* that re-appeared after the pines were cleared illustrates.

Photos: Geoff McIlleron: Firefly Images.





ABOVE LEFT: Bobbejaankool *Othonna parviflora*.

ABOVE RIGHT: Christmas berry *Chironia baccifera* growing at the Rondevlei study site, where the number of species recorded after only six years post clearing exceeds the 158 species recorded from a much larger area of similar but undisturbed habitat in the nearby Goukamma Nature Reserve.

LEFT: When alien-infested land is developed, especially in coastal lowland with high tourism potential and intense land-use pressures, we sacrifice some of our amazing biodiversity, as is illustrated by this beautiful wild sweet pea *Podalyria cuneifolia* that appeared in the regenerating fynbos of the study site.

Photos: Geoff McIlleron: Firefly Images.

bance state). This is significant considering that the disturbance at Rondevlei persisted for forty years and consisted of virtually complete replacement of indigenous flora by alien trees, as opposed to once-off and more natural disturbances pertaining to the other studies.

The Rondevlei example thus showed that indigenous fynbos vegetation exhibits a remarkable potential for regeneration – despite a prolonged period of afforestation and alien infestation, minimum management input and being partly surrounded by disturbances. Surveys indicated that six years after the pine plantation was felled, the regenerated vegetation at Rondevlei could be regarded as species-rich and

representative of the lowland fynbos vegetation of the area, and thus contributes to the conservation of biodiversity and the maintenance of ecosystem processes.

These results strongly counter the argument frequently used to motivate for developments, that old plantations and alien-infested land are worthless ecosystems with little or no potential to conserve biodiversity. Landowners as well as authorities handling development applications should carefully re-think the value they attach to alien-infested land. There should be a proper realisation of the opportunity that is lost for good when alien-infested land is developed – lost opportunities to

explore our beautiful fynbos' ability to surprise us! 🌱

Cowling, R.M. & Pierce, S.M. (1988). Secondary succession in coastal dune fynbos: variation due to site and disturbance. *Vegetatio* 76: 131-139, and Hoffman, M.T., Moll, E.J. & Boucher, C. (1987). Post-fire succession at Pella, a South African lowland fynbos site. *South African Journal of Botany* 53: 370-374.

Acknowledgements

* Co-workers were Francine Rubin, Beate Sachse and Suzaan Kritzingler.

The South African National Biodiversity Institute (Pretoria Herbarium) is thanked for plant identifications.