

THE PLIGHT OF BEES IN SOUTH AFRICAN SEMI-DESERTS

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Habitat

South African's vegetation is divided into seven biomes; Forest, Grassland, Thicket, Savanna. Those that have high plant diversity with many endemics are the Nama-Karoo, Succulent-Karoo and the Fynbos, and they are mostly semi-arid to arid. The Succulent-Karoo occupies the interior and receives rain in summer. The Nama-Karoo lies along the west coast, and receives mostly winter rain. The annual rainfall in both areas is generally less than 500 mm per annum. The Succulent-Karoo and Fynbos are partly mountainous, which affects precipitation. Moisture comes mostly from the south-west, and the summits of some mountains are moist throughout the year.

The Fynbos comprises a separate floral kingdom. It is the smallest floral kingdom, the only one that occurs entirely in one country and it has the greatest plant biodiversity per unit area. Because of the nature of the size and great diversity, many plants are highly localized.

Early agriculture (prior to 1652) appears to have been mostly pastoral, and those herders do not appear to have significantly altered the vegetation (Gess, 2001). In the Fynbos the predominant vegetation has been altered by cultivation of most of the arable land and by urban development. Largely, only the mountains remain undeveloped, but many are threatened by alien invasive species.

The Nama-Karoo and Succulent-Karoo are in better condition. There has been less urban development and agriculture is largely pastoral, but here too the vegetation has changed since the arrival of European farmers in the early eighteenth century. Indigenous antelope apparently formed vast herds that moved great distances, which allowed sufficient time for grazed plants to recover. By the end of the nineteenth century the vast herds of naturally occurring grazing and browsing mammals had been drastically reduced and stock farming increased. The introduction of boreholes made it possible to graze stock throughout the region on a year-round basis. Farm fences were erected in the early twentieth century, and large-scale change in the vegetation followed. Unfortunately, these changes are inadequately documented (Gess, 2001).

The Importance of Pollination

The conservation of a species will not result from protection of habitat alone. Reproduction and dispersal are essential, and pollination is fundamental to these two processes for most plants. The Karoo originally comprised more grasses, which are wind pollinated. The replacement rate of Karoo grasses is, however, slower than that of indigenous pioneer plants that belong to other plant families. Most of these pioneers are

insect pollinated. The Karoo has consequently become dependant on insect pollinators because of intensive pastoral farming. Ironically, the farming practices that have led to a dependence on pollinators are, in-turn, detrimental to the insects that they depend on for pollination.

The Vulnerability of Pollination

Although many animal species pollinate plants, insects remain the most important group of pollinators. Bees are apparently the most important guild of insect pollinators, and it is estimated that over 500 species, representing six families occur in the Karoo and the Fynbos. They have diverse behaviours ranging from pollen collectors, solitary and social species, to cleptoparasitic and social parasites; ground nesters and those that build nests from wax, mud and/or resin above ground. Bee nesting sites are not necessarily situated near their food resources. Other groups of pollinators are also diverse and just as important to ecosystem function because many plants have unique pollinator attractants.

Aspects of agricultural land use that adversely affect the diversity of insect pollinators in the Karoo are:

- Excessive stocking.
- Selective grazing and browsing.
- Trampling by stock.
- Water pollution by stock.
- Impoundment of water.
- Canalizing of water.
- Replacement of natural vegetation by cultivated pastures.
- Replacement of natural vegetation by crop plants.
- Insecticides.
- Alien invasive species.
- Bush clearing.
- Removal of dry wood.

(Gess, 2001)

Some pollinators visit flowers of a large number of different plant species, and this is known as polylecty. Others visit only a few plant species. This is known as oligolecty. Similarly, some plant species are pollinated by many different pollinator species, whereas in others there are only a few floral visitors that are effective pollinators. Co-evolution between plants and their pollinators has resulted in plants with specialized floral structures being pollinated only by a few oligolectic species. However, some species of a complement of pollinators of a generalized plant may be oligolectic, and specialized plants may have polylectic pollinators.

The relationship between plants and their pollinators is complex and sensitive to certain land-use practice, both on small and on a large-scale levels, as many pollinator species fly several kilometers to forage.

Pollination as an Essential Ecosystem Service

Pollination is an essential ecosystem service. Pollinators are the entities that transfer the pollen. For the maintenance of a service, the abundance of the organisms that provide the benefit must be above a critical minimum level, which probably differs between ecosystems. The conservation of pollinators, as with other groups of organisms that provide essential ecosystem services, consequently differs from traditional conservation activities in that both abundance and diversity must be preserved.

Conclusion

Pollinators, as organisms that provide an essential ecosystem service, are important in both agricultural lands, cultivated and pastoral, and natural areas. The diversity and abundance of pollinators must be conserved for them to be an effective service provider in these areas. Further, the habitats in which they provide their service are not necessarily the areas in which they nest.

Reference

Gess, S. 2001. The Karoo, its insect pollinators and the perils which they face. [http://ecoport.org/EP.exe\\$EAFull?ID=35](http://ecoport.org/EP.exe$EAFull?ID=35).