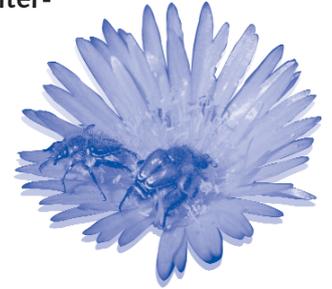




A landowner's guide to managing BIODIVERSITY IN AN AGRICULTURAL LANDSCAPE

BIODIVERSITY is the sum total of all living things on earth, from genes to species to entire ecosystems. In order to conserve biodiversity we need to look after all its components. These include functioning natural habitats, the species that occur in these habitats, and the ecological interactions between species and their environments.

The Cape Floral Region is one of the world's foremost biodiversity hotspots because of its exceptional natural diversity on the one hand and dangerously high levels of habitat destruction on the other. In our fragmented modern landscape, it is crucial that human activities are managed. This is particularly important in the highly threatened lowland renosterveld and fynbos habitats, where only tiny amounts of natural habitat are left.



What are ecological processes?

Ecological processes are the interactions between plants, animals and the non-living components of the environment like climate or rocks. These processes are crucial for maintaining healthy ecosystems and supporting the long-term persistence of biodiversity.

Healthy ecosystems in turn support human and economic well-being by providing direct benefits, such as clean water and air, and indirect benefits including crop pollination and recreational opportunities.

Some ecological processes act across the entire landscape:

- Natural fire regimes
- Seasonal migration of animals
- Nutrient cycling and water flow
- Sand movement and dune replenishment

Other processes operate at a local, site level:

- Interactions between plants and their pollinators
- The relationships between predators and prey (like the boom and bust cycle of dassie populations in response to predator pressure from caracal or leopards)
- Soil disturbance: digging and churning over by porcupines or other animals which prepares the soil for other organisms to settle or recruit here
- Mutualistic relationships between species, where both partners benefit, like ant seed dispersers in fynbos. Ants benefit from eating the nutritious seed coat produced by the plant, while the plant benefits by having its seeds dispersed by the ants that carry them underground. Loss of one partner creates problems for the other

Habitat fragmentation in an agricultural landscape

When large, continuous areas of natural habitat are broken up into disconnected fragments, many ecological processes are disrupted. The seeds of many plants cannot be dispersed into new habitats, making it difficult for them to respond to changing environments or local climates. Animals struggle to survive in small areas where food, nesting and refuge supplies are limited. These plants and animal species can become locally extinct and cause knock-on effects for other species interacting with them.

The following three concepts are important to consider when managing a fragmented landscape:

1 CORRIDORS

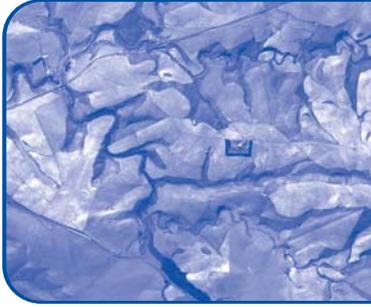
These are linear patches of natural habitat that link or connect fragmented areas, allowing species movement and ecological processes to continue. Corridors may also provide shelter, reduce water and wind erosion and enhance the aesthetic appeal of a landscape. Examples include the vegetation along river and stream banks, or natural habitat left on road-side verges. Old agricultural fields can also act as animal movement corridors, providing shelter for movement between natural vegetation pockets.

2 CONNECTIVITY

This refers to the degree to which patches of a given natural habitat are joined by corridors into a network of linkages. This affects the ease with which species can move among vegetation patches in the landscape.

3 EDGE EFFECTS

These exist where transformed areas are adjacent to natural areas. Natural habitats are sensitive to influences from surrounding cultivated areas, such as fertilizer runoff and invasion of agricultural weeds. This is especially an issue for small fragments, where much of the fragment is exposed to edge-effects.



IMPLICATIONS FOR FARM PLANNING:

Although we cannot recreate the natural landscapes of the past, we can:

- Conserve pieces of continuous natural habitat - the larger the better.
- Ensure that these areas are as circular or regularly shaped as possible. Irregular shapes tend to amplify edge-effects.
- Make sure that natural areas are well-connected by natural corridors wide enough to allow the movement of plants and animals.
- Retain natural habitat in a network, with fragments in close proximity to each other to aid connectivity. The closer the fragments, the greater the chance that the fragment will persist.

Habitat diversity - something of everything

Not only is it important to conserve large areas of uniform habitat, but also to maintain a representative portion of all the different habitat types on a particular property. This ensures the survival of species that depend on more than one habitat for different parts of their life cycle. Habitats are distinguished by slope aspect, altitude, geology and vegetation type, for example, grassland, forest, fynbos or vlei. Note that interfaces between different natural habitats, such as soil type interfaces, are not the same as edge effects, where natural habitats are adjacent to land altered by human intervention.

Special habitats

Special habitats are areas that support a variety of endemic species (that is, species specific to that area and found nowhere else) that are dependent on the unique environmental conditions of these habitats. These areas also play an important role in maintaining ecological processes. Examples include quartz, silcrete or ferricrete patches as well as wetlands, described below:

DESCRIPTION	IMPORTANCE
Quartz patches are concentrations of highly weathered silcretes, characteristic of the succulent karoo but also found in renosterveld areas. These patches are often less than one hectare in extent.	Although plant cover is low on quartz patches, they are typically rich in endemic succulents.
Silcrete outcrops develop from silica rich deposits. They tend to form prominent rocky outcrops in the landscape due to their resistance to erosion.	Because of their stony nature, silcrete outcrops are difficult or impossible to plough and therefore act as important refuges for natural vegetation.
Ferricrete patches (also known as koffiekliip or ironstone patches) are iron-dominated deposits that occur as hardpans just below the soil surface.	Due to the impervious nature of ferricrete, these areas often create seasonally wet vlei areas that support species growing only in this habitat.
Wetlands refer to areas that are temporarily or permanently covered by shallow water or have saturated (water-logged) soils. This habitat supports plants adapted for life in wet conditions. Wetlands generally include vleis, seeps, seasonal pans, marshes, bogs and fens.	Wetlands are breeding habitats for important pollinators (like solitary bees) and aquatic species (like frogs, fish, birds), for part or all of their life cycles. They also host valuable ecosystem functions relating to: <ul style="list-style-type: none"> • water quality (via filtration of toxic substances and sediment trapping) • water quantity (via recharging of aquifers and groundwater levels, reducing peak floods).



How to maintain biodiversity (in order of importance):

- 1 Conserve large and continuous areas of threatened habitat.
- 2 Conserve a full variety of habitat types, focusing on sites close to, or well-connected to, other natural areas.
- 3 Look out for special habitats deserving conservation attention, such as quartz patches and wetlands.
- 4 Consider actively restoring or allowing the natural recovery of disturbed areas that could function as corridors between natural habitats.
- 5 Where a property forms part a larger natural area, consider how to protect landscape level processes on the property.
- 6 Minimise edge effects through careful land management. Create buffer zones adjacent to natural areas, where the land is free of pesticides and invasive agricultural weeds.
- 7 Avoid runoff of fertilisers and pesticide drift into natural habitats.
- 8 Starting at the source of the invasion, clear alien plants (like black wattle and port jackson) from natural areas, especially water catchment and riverine areas.
- 9 Maintain optimal fire regimes (refer to 'Landowner's guide to Fire Management' fact sheet for more information).



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