Down on the Farm

Fruitful benefits for biodiversity

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Farmers and farming often bear the brunt of criticism from environmentalists concerned with the depletion of natural resources in general and the loss of biodiversity in particular. Although some of this criticism may be warranted, there are many farmers who are equally concerned about the impacts of their activities on biodiversity and the environment, and some actually do something constructive about it.

In October 1992, a group of conservation-minded apple farmers from Elgin in the Western Cape commissioned the African Gamebird Research, Education and Development Trust (AGRED) to investigate the conservation implications of deciduous fruit farming on birds and insects in general, and gamebirds in particular. AGRED, in turn, asked the Gamebird Research Programme at the University of Cape Town's FitzPatrick Institute (Fitztitute) to undertake the research necessary to answer four key questions:

- Can deciduous fruit farming cause local extinctions of indigenous bird species or favour pest species, for example introduced species such as the European Starling?
- What are the impacts of farming activities, such as the use of pesticides, on insect and bird diversity, especially on gamebirds like the Helmeted Guineafowl and Cape Francolin?
- What limits the carrying capacity of the orchard systems and the annual productivity of gamebirds, and does their presence on farms indicate the presence of a range of other birds?
- How can farming practices be modified to promote biodiversity, with a minimum (or no) trade-off to fruit production?

Research has shown that waterbird species have exploited the numerous suitably landscaped irrigation dams in the Elgin/Grabouw region.

Over the following four years, these questions were answered by the Fitztitute's Dr Rob Little (now Director of Conservation at the WWF-SA), a team of BSc Honours, Technikon and MSc students, and Sue Peall of the Department of National Health.

Bird diversity

There are conflicting results on the impacts of farming on biodiversity. The bad news is that six bird species (Grey-wing Francolin, Cape Rock Thrush, Stonechat, Victorin's Warbler, Grey-backed Cisticola and Orange-breasted Sunbird) apparently no longer occur on fruit farms and are confined to mountain fynbos (the predominant natural vegetation type) in conservation areas. Furthermore, the orchards themselves are visited regularly by only three species (Cape Turtle Dove, Cape White-eye and Cape Canary) and gamebird numbers appear to have declined on many of the farms during the past decade.

The good news is that despite the absence of the six fynbos species and the small number of species that actually occur within orchards, the overall bird species diversity of the Elgin district has increased considerably. Indeed, at 116 species, this diversity is four times that of local, pristine mountain fynbos (29), and the influx of 'new' species is due entirely to deciduous fruit farming. How can this be so?

The majority of the 'new' species in the Elgin district are waterbirds which have exploited the numerous suitably landscaped irrigation dams. The balance are bush birds which thrive in patches of scrub, natural vegetation and gardens. Even patches dominated by alien plants which are sprayed routinely with pesticides are colonized by bush birds. What is even better news is that none of the indigenous birds has become a major pest and the European Starling does not occur at unduly high densities.

With regard to farm dams, other good news is that 44 of the 52 waterbirds which the *Atlas of Birds of the South-western Cape* indicates could occur on these artificial aquatic habitats were observed by Rob Little and the students.

Impacts of pesticides

Sue Peall's investigations reveal mixed results. Pesticide residues in those Helmeted Guineafowl confined to heavily sprayed orchards suggest that the potential direct threats of these chemicals to bird populations are low. There were no detectable residues of chlorpyrifos and azinphos-methyl, the tell-tale chemicals of heavily used pesticides.

On the negative side, all the guineafowl sampled had detectable residues of DDE and DDD, as well as endosulfan, an insecticide used to control woolly aphid (a major insect pest). Higher than recommended levels of endosulfan were also found in the water sampled from

The Orange-breasted Sunbird – one of the six fynbos species that apparently no longer occur on fruit farms.

Numbers of Cape Francolin (left) and Helmeted Guineafowl (right) have declined on farms because the amount of scrub vegetation available to them has decreased.

farm dams. The presence of DDE and DDD in the guineafowl is not unexpected because these are the most frequently detected breakdown products of DDT, which can persist at very low levels in the environment, even 20 years after its use was banned. The presence of endosulfan, on the other hand, is a matter of some concern which the farmers need to address. More mixed news is that the use of pesticides also has reduced the diversity of non-target insects on fruit farms. Preliminary research comparing insect communities occurring in sprayed and unsprayed orchards and those occurring in fynbos indicated that species diversity was richest in fynbos (221 species), with 152 and 106 species being recorded in the unsprayed and sprayed orchards respectively. Nevertheless, fruit farms harbour nearly 70 per cent of the insect diversity of natural vegetation, and there is no evidence at this stage of any species being lost from the district.

The importance of refugia

The critical features of a deciduous fruit farm that need to be managed to promote biodiversity are scrub patches and irrigation dams. It became clear from the study that Helmeted Guineafowl and Cape Francolin populations in particular have declined on farms because they are limited by the availability and landscaping of patches of scrub vegetation. Furthermore, the presence of Cape Francolin in a scrub patch indicates its suitability for a healthy scrub bird community, since a patch inhabited by francolin tends to have another 20 or so bush bird species present.

The suitability of a scrub patch depends on its size (big is better), shape (sausage-shape preferred to round or square) and proximity to other patches (the closer the better). In other words, they should be 'stepping stones' not more than, say, 100 metres apart, since our radio-tracking studies of Cape Francolin indicate that these birds will stray no further than this into open areas. The patches should be sausage-shaped because most bush birds seem to prefer the edge of scrub patches, not their interiors.

The ideal farm dam should be as large as possible to accommodate more individual waterbirds; have a gently sloping, exposed beach and a shallow margin (the preferred foraging habitat for wading birds); have some of its surface covered with aquatic vegetation (the preferred feeding habitat for birds such as coots and moorhens); have an island with open areas for roosting ducks and larger waders, and vegetated areas planted with trees for heron and egret roosts; and be surrounded by a range of vegetation types, including reedbeds for warblers, weavers, and so on.

It is clear that the key to conserving birds in the deciduous fruit farming areas of the Western Cape requires conservation planning, including ecosystem and landscape modification/protection, on a district-wide scale – planning on the scale of an individual farm will simply not be enough. The placement, size and landscaping, as well as the connection of fragmented natural and artificial habitats, within the matrix of transformed habitats are essential elements in any conservation plan. □

List of species mentioned in the text, in the order in which they occur

European Starling *Sturnus vulgaris*
Helmeted Guineafowl *Numida meleagris*
Cape Francolin *Francolinus capensis*
Grey-wing Francolin *Francolinus africanus*
Cape Rock Thrush *Monticola rupestris*
Stonechat *Saxicola torquata*
Victorin's Warbler *Bradypterus victorini*
Grey-backed Cisticola *Camaroptera brevicauda*
Orange-breasted Sunbird *Nectarinia violacea*
Cape Turtle Dove *Streptopelia capicola*
Cape White-eye *Zosterops pallidus*
Cape Canary *Serinus canicollis*
Egyptian Goose *Alopochen aegyptiacus*
Red-knobbed Coot *Fulica cristata*

With sensitive conservation planning, farm dams can provide ideal habitat for waterbirds such as Egyptian Geese (above) ***and Red-knobbed Coots*** (below).