



## Balancing biodiversity and agriculture

Perhaps the most remarkable aspect of SABAP2 is that it allows us to detect changes in bird diversity at a scale never before imaginable. Through the incredible efforts of many dedicated citizen scientists we can collect data on the occurrence of bird species across vast areas, greatly enhancing our understanding of human impacts on southern African birds. Agriculture is one such impact that has important consequences for birds. Atlas data allows us to explore the impacts on birds across multiple species and in different landscapes.

Modern agriculture has revolutionised the planet's capacity to support humans, but it has also had a greater negative impact on biodiversity than any other human activity. Consequently, balancing the demand for food with the conservation of biodiversity is one of the most pressing issues of our time. However, the question remains: how can the trade-off between food production and biodiversity conservation best be reconciled? Two opposing strategies have been proposed as effective

above *An African Marsh Harrier in flight over wheat on the Agulhas Plain, an example of a threatened species exploiting a highly modified landscape after the almost complete removal of native fynbos and renosterveld habitats.*

ways to balance conservation and production needs: one integrates both activities in the same space (the 'land-sharing' or 'wildlife-friendly farming' option), while the other approach advocates the development of intensive agriculture in the smallest possible area and setting aside other areas for conservation (the so-called 'land-sparing' option).

Advocates of land-sparing suggest that although wildlife-friendly farming is beneficial within farmland, if it reduces agricultural yields then a larger area must be farmed to meet a given production target. The merits of each strategy are hotly debated, in part because this question is typically addressed by short-term and fine-scale field studies that ignore processes relevant to biodiversity that occur at larger scales. The challenge is to have detailed biodiversity data across appropriately large scales to test these two approaches.

This is where SABAP2 comes into its own. Researchers from the universities of Cape Town, the Witwatersrand and Cambridge are using SABAP2 data to assess how agriculture affects bird populations and ultimately to decide which strategy is better suited to the conservation of southern Africa's bird diversity. By combining SABAP2 data with agricultural land-use information, they have investigated how the amount and arrangement of farmland

within each pentad affects the occurrence of a wide variety of bird species. The analyses were conducted across three separate biomes in South Africa to determine whether bird populations respond in a consistent way across regions and therefore whether results can be extrapolated to other landscapes.

Their fascinating findings suggest that the best solution depends on the structure of the native vegetation and the type of agricultural product that is farmed. Within grasslands, for example, a greater proportion of the bird community benefits from land-sharing or wildlife-friendly farming practices, provided the land use is a mix of grazing and cereal crops. However, if the area is converted to commercial plantations with a very different structure from the original grassland habitat, fewer native birds manage to persist. Similarly, along the tropical east coast, replacing coastal forest with sugarcane has major impacts on bird communities, so land-sparing that preserves large patches of native vegetation offers a better solution.

Remarkably, conservation in agricultural landscapes is not all doom and gloom. Several endemic species, particularly in the fynbos, thrive on farmed land. Here, it is possible that agricultural production is mimicking ecological processes once carried out by megafauna that are now largely extinct in the region.

Their research highlights once again that successful conservation approaches depend on the context and that one-size-fits-all conservation strategies are not able to address the challenge of protecting biodiversity in agricultural landscapes. However, thanks to the ongoing efforts of citizen scientists we are developing an approach that can be generalised to help conservation planners, farmers and policy makers improve management decisions for effectively conserving biodiversity in production landscapes.

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