# Seabirds and failing food supplies

The Benguela upwelling, which bathes the west coast of southern Africa in cool Antarctic water, is a productive yet highly dynamic marine ecosystem. Despite decades of intensive research, it has proved an extremely difficult system to understand, and nearly impossible to forecast. Nonetheless, conspicuous top predators such as seabirds have proven to be valuable ecosystem indicators, with the health of seabird populations reflecting processes occurring lower in the food-chain. However, the actual link between seabird population parameters and prey availability remained unresolved because of a lack of detailed knowledge of the behaviour of seabirds at sea. Pioneer work using some of the first data-loggers on African Penguins *Spheniscus demersus* was initiated at the Fitztitute by Rory Wilson and colleagues in the early 1980s, but few investigations of Benguela seabird foraging behaviour have been conducted since then.

This has changed during the past five years as a result of a collaborative French–South African research programme, led by David Grémillet from the French National Science Research Centre and Peter Ryan from the Fitztitute: this programme has attracted numerous foreign and local collaborators and students. Taking advantage of recent developments in microchip technology, the team has used an array of miniaturised electronic devices to track the fine-scale movements of Cape Gannets *Morus capensis*, African Penguins, and Cape Cormorants *Phalacrocorax capensis* during their voyages at sea. The tags, which are deployed for periods ranging from a few hours to 10 months, record the position of birds, measure their dive depth, vertical and horizontal acceleration, heart rate and body temperature, as well as environmental parameters such as sea and air temperatures.

The main focus of the study was Cape Gannets, with more than 450 devices deployed on birds at five of the six gannet colonies in South Africa and Namibia

*David Grémillet (right) and Giacomo Dell'Omo tape a GPS recorder to a gannet's tail.*

(the latter in collaboration with colleagues from the UK). Using such detailed information, the team gained precise knowledge of the Cape Gannet's foraging niche.

A major achievement was to define colony-specific foraging areas – these extend up to 250 kilometres from the breeding sites – and to assess the home ranges of non-breeding Cape Gannets wintering in the southern Benguela. It was also discovered just how hard Cape Gannets work to feed their chicks with energy-rich sardines and anchovies, sometimes flying 1 000 kilometres and performing 150 of their spectacular plunge-dives in less than two days.

Since 2002 a dramatic climate- and/or fishery-driven ecosystem shift has been occurring in the southern Benguela, with numbers of sardines and anchovies on the west coast plummeting. Within the framework of Lorien Pichegru's PhD, the team monitored the impact of this shift on Cape Gannets breeding at Malgas Island, Saldanha Bay. In the past five years, the birds have gradually increased their foraging efforts and have also resorted to feeding on fishery wastes. Chicks fed such poor-quality food seldom survive, and the breeding success of Cape Gannets at these colonies has decreased dramatically.

African Penguins are equally threatened by natural and man-made environmental changes: their population decreased by 95 per cent in the 20th century. To ensure that the remaining birds have access to sufficient food, there are plans to close off areas around their breeding colonies to fisheries.

In collaboration with Samantha Petersen of BirdLife South Africa, the team conducted the first-ever GPS-tracking study of penguins, and demonstrated that the birds from the Boulders colony at Simonstown feed exclusively within False Bay. GPS tracking has subsequently been conducted at the three largest South African penguin colonies and it is this detailed home-range data that will provide the scientific basis for the design of Marine Protected Areas around key colonies. □

Visit the FitzPatrick website: *http://www.fitzpatrick.uct.ac.za*

Percy FitzPatrick Institute of African Ornithology (a DST/NRF Centre of Excellence), University of Cape Town, Rondebosch 7701, Cape Town, South Africa. Tel. (021) 650 3290; fax (021) 650 3295; e-mail *birds@botzoo.uct.ac.za*