How do Cape Gannets view the marine environment?

By Andréa Thiébault, Ralf Mullers, Peter Ryan, Pierre Pistorius and Yann Tremblay


Photo by Andréa Thiébault

What's happening offshore? This is one of the fundamental questions ecologists and conservation biologists ask when they see a seabird parent leaving its hungry chick to search for food in the vast surrounding ocean. The spatial separation between breeding and foraging in seabirds raises questions about their ability to find food, which is crucial to chick survival and population dynamics. During a time when oceans are under increasing human pressure, the question of what is happening offshore in terms of ocean utilization by various marine predators (including humans) becomes important if we are to protect wildlife and maintain biodiversity.

The Cape Gannet (*Morus capensis*) is a colonial species, breeding at six offshore islands. Five of these colonies are located on the west coast of Namibia and South-Africa, with the largest colony at Bird Island (Nelson Mandela Bay) being the only one along the south coast of South Africa. Cape Gannets forage in the Agulhas Current system and the Benguela upwelling system, two rich and bio-diverse marine ecosystems that stretch from the south-eastern coast of South Africa through Namibia to southern Angola. This is one of the most productive marine ecosystems in the world, sustaining important fisheries and providing foraging areas for many resident and migrant seabirds. Environmental changes and their consequences on these systems have long been visible although their mechanisms are not fully understood. Major shifts in the distributions of species in the region have been documented. Anchovies, sardines, rock lobsters and many seabirds have moved southward and/or eastward, suggesting large scale bottom-up forcing. In combination with the top-down impacts of the fishing industry, it represents a major disturbance to these marine systems.

Like most marine top predators, Cape Gannets have extensive foraging distributions, and studies of their foraging patterns are mostly done through indirect observations. For example, miniaturised GPS-recorders can be deployed on breeding birds that are easy to capture, and these then record foraging positions and movement of the individuals equipped, and provide valuable information on foraging duration and feeding distribution. Using these techniques, we know that Cape Gannets routinely travel 250 to 700 kilometres (up to 25 to 200 km away from their breeding colony) during foraging trips lasting 8 to 38 hours in order to feed their chicks. Especially along the west coast, it is now clear that they often have to resort to feeding on energy-poor fishing boat discards, and this negatively impacts on chick survival. This is thought to be largely a result of their prey resources having been reduced by the fishing industry.

To better understand how Cape Gannets interact with the marine environment and fisheries, a project was initiated in 2010 through an international collaboration involving researchers from the Nelson Mandela Metropolitan University (NMMU), the University of Cape Town

(UCT) and the French Institute for Research and Development (IRD) under permit by the South African National Parks (SANParks). Using new technological advances in instrumentation allowing for remote capturing of foraging data, the project aims to study behavioural processes related to foraging mechanisms in Cape Gannets.


Photo by Andréa Thiébault

Through the deployment of GPS-recorders, coupled with micro-cameras, the capacity to interpret tracking data by providing geo-referenced images is considerably enhanced. The *in-situ* foraging environment surrounding the bird can literally be visualized. It is anticipated that key moments in a foraging trip will be observed and interpreted, and this will help to understand what triggers key decisions such as changes in flight direction or the decision to stay or leave a foraging site. In addition, interactions with other predators, including fishermen, will be observed. Inter- and intra-specific interactions during the search phase of foraging trips, as well as multi-species aggregations while feeding can be studied. Moreover, cameras provide quantitative information regarding frequency of interaction with fishing vessels and related decisional mechanisms involved.

During the past December, devices were deployed on breeding Cape Gannets. This first fieldwork session was successful as the recorded images confirmed expectations. Images obtained are yet to be analysed, but they already show intra- and inter-specific interactions of equipped birds while foraging as well as interactions with fishing vessels; this potentially leading to them becoming unintentional fisheries by-catch.

By the end of the project, we hope to be able to provide insights on the mechanisms that Cape Gannets use to find their prey and means of interactions with other marine predators and the fisheries industry. This project will focus on answering the following questions:

- How often do Cape Gannets forage in groups?
- When joining feeding aggregations, what is the species composition of these aggregations?
- How large are the prey fields targeted by the birds?
- How often do breeding Cape Gannets visit fishing boats for food?
- How long do they stay associated with a fishing boat?
- What are the detection distances of the various clues used to locate prey (feeding aggregations, other predators, boats, etc.)?

Answers to these questions will then be used to model the movement patterns of Cape Gannets and to study how these predators utilise the marine environment. The model would be used to test different scenarios for environmental management: the establishment of marine protected areas at different locations and of different sizes, as well as the impact of fisheries management on seabird populations. We thus aim to provide a useful tool to help improve/revise ongoing conservation measures in the region.

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