

# Chapter 47

## Monitoring seabirds in the BCLME: monitoring objectives, priorities and recommendations

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### INTRODUCTION

The Benguela Current Large Marine Ecosystem (BCLME) supports large populations of a rich assemblage of marine resources, including a number of seabird species, which, as top predators, form a key component of this system. The dynamics of the Benguela ecosystem, and particularly that of the northern Benguela, are complex, characterised by substantial variability at various temporal and spatial scales (Roux 2003, Shillington *et al.* 2006), and therefore difficult to manage. The population sizes of many resources are substantially smaller now than they were half a century ago, and the system has been stressed through a combination of overexploitation of resources and natural environmental variability (Roux 2003, Van der Lingen *et al.* 2006). Seabirds are highly adapted to the environment they live in and therefore particularly sensitive to ecosystem changes (e.g. Croxall 1992). They are therefore particularly useful as indicators of ecosystem status and performance and managers of marine ecosystems are beginning to recognize the need to include information from seabirds to aid in management.

The national fisheries agencies of the three nations bordering the BCLME, the Instituto Nacional Investigação Pesqueira in Angola, the Ministry of Fisheries and Marine Resources in Namibia and Marine & Coastal Management in South Africa, together with relevant other national ministries and conservation agencies, are responsible for the management of their living marine resources, including seabirds. All three countries have adopted, or are in the process of adopting, an Ecosystem Approach to Fisheries (EAF) in order to sustain the health of the Benguela ecosystem in conjunction with the responsible use of its marine resources for current and future generations using a precautionary approach. Although objectives for ecosystem monitoring programmes designed within the framework of an EAF approach are likely to be governed by the needs and priorities of each country, an integrated approach to what are common goals in the region as a whole is essential for the sound management of the Benguela Current system, to avoid conflicting national interests.

The management objectives and priorities of each country are furthermore influenced by national and international policy obligations. These include the:

- Sea Fisheries Act of 1992; Angola
- The Marine Resources Act (No. 27 of 2000); Namibia
- Parks and Wildlife Management Bill 2001 (Specially Protected Birds) (under review); Namibia
- The Marine Living Resources Act (No. 18 of 1998); South Africa
- Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem (2001); Namibia, South Africa
- FAO Code of Conduct for Responsible Fisheries; Angola, Namibia, South Africa

Memberships, agreements and policies specific to seabirds in the regions include:

- The Convention on Biological Diversity; Angola, Namibia, South Africa
- Convention on Wetlands of International Importance (Ramsar Convention); Namibia, South Africa
- The African-Eurasian Migratory Waterbird Agreement (AEWA); South Africa
- Bonn Convention on Migratory Species (CMS); Angola, Namibia, South Africa
- International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (by the FAO); Angola, Namibia, South Africa
- National Plan of Action – Seabirds; Namibia (draft), South Africa
- National Biodiversity Strategy and Action Plan; Angola
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR); Namibia, South Africa
- The Sea Birds and Seals Protection Act (No. 46 of 1973); South Africa

The creation of the Benguela Current Commission will be tasked to address the need to implement and sustain an ecosystem-based management approach in the BCLME and

to fulfill the international obligations and undertakings of the three countries of the Benguela. This includes the implementation of a regional monitoring effort of land-breeding seabirds. This report aims to provide guidelines for the implementation of national or region-wide monitoring programmes on seabirds breeding in the BCLME.

## MONITORING OBJECTIVES

Seabird monitoring programmes should address the following key monitoring objectives:

1. The **conservation** of seabirds, as an integral component of marine biodiversity, including the impact of fisheries on seabird abundance and distribution
2. Seabirds as indicators of **ecosystem health**
3. Seabirds as **resource** indicators (i.e. indicators of prey abundance and distribution)
4. Seabirds as indicators of **ecosystem functioning**; this includes:
  - the modeling of food chain dynamics
  - relationships between upwelling variability, Benguela Niño events and recruitment / resource production
  - changes in trophic interactions through alternate pathways of energy flow, e.g. changes in and replacement of prey species
  - trophic controls
  - regime shifts, involving sudden pervasive long-term changes in ecosystem state (Cury & Shannon 2004)
5. Using an understanding of ecosystem functioning, including the response of seabirds to the dynamics of their food supply, to allow **forecasting**, i.e. the development of a predictive approach to anticipate the response of ecosystem change, and to allow the timely implementation of mitigating management strategies

## MONITORING PRIORITIES AND RECOMMENDATIONS

Reliable time series obtained from monitoring key aspects of the ecosystem are essential for understanding the processes driving the system and how any changes affect various aspects of the system. In order to meet the key objectives set out above, seabird monitoring programmes need to focus on collecting appropriate time series data to gain information on:

- the variability in seabird abundance, distribution and other biological parameters, such as breeding performance and body condition indices to assess population trends and conservation status of individual species as well as to assess the usefulness of using these parameters as indices of ecosystem health (e.g. du Toit *et al.* 2003, Underhill and Crawford 2005)
- the diet, foraging behaviour and ecology of seabirds, particularly those feeding on commercially important prey species to gain information on the abundance and distribution of prey resources, to detect changes in the diet and in trophic flows and to establish food requirements of seabirds (e.g. Furness 2006, Trites *et al.* 2006)
- predator/prey and competition interaction effects on ecosystem structure and functioning and its effect on fisheries (e.g. Drapeau *et al.* 2004)
- foraging and breeding habitat degradation, particularly through fishery, mining, coastal development and guano

harvesting activities, and the success of mitigation strategies and habitat rehabilitation measures (e.g. Braby *et al.* 2001, Kemper 2006)

- the incidence of oiling, and other forms of pollution (harmful algal blooms, chemical, plastic etc.) and the success of implementing mitigating strategies and rehabilitation measures (e.g. Nel & Whittington 2003)
- the extent of seabird bycatch in the longline and trawl fisheries and the success of implementing mitigation strategies (e.g. Ryan & Boix-Hinzen 1998)

Monitoring programmes should be coordinated nationally (or preferably across the entire region) and monitoring data need to be collected using consistent methodologies (Boyd *et al.* 2006). The methods used to monitor various aspects of seabird biology, demography and ecology in the BCLME are generally well established (see Kemper *et al.* 2007). Data collected through seabird monitoring programmes cannot be interpreted in isolation. They need to be linked to other (meaningful) time series or indices to allow:

- the analysis and correct interpretation of trends
- the identification of factors underlying trends
- the provision of additional baseline data for the modeling of complex interactions
- the development of relevant indices useful for the improved management activities in the system
- the risk analysis of the likely effects of different management strategies on ecosystem structure and functioning.

Finally, the design of any monitoring programme, and the choice of species, locality and variables to be investigated will, in part, be dictated by the feasibility of the programme in terms of financial cost (e.g. equipment, time and manpower), cost to the seabird species under investigation (e.g. the degree of disturbance), study site accessibility and the likely quality and usefulness of data obtained.

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