Historical reconstruction of guano production on the Namibian islands 1843–1895

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This paper presents data on guano production on the Namibian islands from 1843 to 1895, reconstructed from the nineteenth-century customs records of the Cape Colony and United Kingdom. As the latter was the primary market for Namibian guano during this period, the data series can be considered to encompass the global production on the islands. Interpretation of the records as a proxy index for fish stock abundance is complicated by the interplay of cultural and environmental factors in influencing annual production. When compared with rainfall records from the Royal Observatory in Cape Town (1846–1895), the guano data are suggestive of a relationship between guano production and environment, but firm conclusions must await better proxy records, perhaps based on fish scales in seafloor sediments off the Namibian coast.

The Benguela upwelling system off the west coast of southern Africa supports large populations of shoaling pelagic fishes that are fed upon by several of the region's abundant seabird species. The seabirds breed at islands and on specially constructed platforms, where the guano they produce has formed the basis of an industry that has persisted for more than 150 years.[1] The region is one of only two worldwide where seabird guano continues to be harvested annually on a commercial basis, the other being Peru.[2] Records of guano harvests have value in providing proxy indices of fish stock abundance that give useful insight into fluctuations in the abundance of the fish stocks on which the birds prey.[3] For pelagic fish stocks, it is often difficult to separate the effects of fishing and the environment on trends in abundance.[4] Proxy records of abundance that pre-date the onset of commercial purse-seine fisheries are therefore of particular value. The southern African purse-seine fisheries that exploit pelagic fishes began in earnest after the Second World War.[5] Records of collections of seabird guano are available for many of the southern African seabird breeding localities from 1896.[1,3,4] For Namibia, this paper extends the record back to the mid-nineteenth century. The pelagic fish populations off Namibia and South Africa are relatively discrete.[4]

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A brief history of the Namibian islands in the nineteenth century

The prolific bird life and huge guano caps of the Namibian islands were known well before the nineteenth century,[6] but the first published and hence widely disseminated account was that of the American mariner, Benjamin Morrell.[7] He reconnoitered the southwest African coast in 1828 in search of seal 'jackets' and made passing mention of an island 'literally covered with jackass-penguins and gannets [and] bird's manure to the depth of twenty-five feet'.[8] By the early 1840s his observations, circulated in an account of the voyage published in the United States, had acquired new significance in the context of British "high farming's" hunger for fertilizer and the Peruvian government's conversion of its guano islands into a state monopoly.[9] It was brought to the attention of Liverpool merchants, eager to profit from the burgeoning domestic demand by undercutting the Peruvian monopoly's attempts at price fixing. They despatched vessels in search of Morrell's island at the end of 1842. The arrival of the first consignment of guano from Ichaboe Island to Britain in July 1843 touched off the African guano rush that lasted until 1845 and stripped the accumulated deposits of millennia, more than 330 000 tons, from the offshore islands between Saldanha and Walvis bays.[10]

In the south, the then Cape Colony imposed a leasehold system on the islands within its territorial waters, but Ichaboe Island and its 'little dependencies' north of the Orange River were in 'no man's land'. There the British navy imposed order in 1844 and Liverpool merchants retained speculative interests until the end of the decade.[11] The latter's shares in Ichaboe Island passed to three Cape Town merchants in the 1850s, who set about exploiting the islands to produce an annual guano crop. Their success, coupled with a rising demand for guano in Mauritius, led to mounting challenges to their tenure in the late 1850s from rival colonial traders, the revenue-hungry Cape Colony and the United States.[12] These threats prompted the incumbents to seek annexation by the imperial (British) government, which was granted in 1861 and confirmed in 1868. By the latter date the firm of De Pass, Spence and Company had bought out the two other shareholders (Granger and Thomson, Watson & Co.) in Ichaboe Island and received a 27-year lease on all the islands 'between the two civilized boundaries' which lasted until 30 June 1895.[13]

Guano production was hostage to both environmental and market forces. Heavy rain during the breeding season or the disappearance of the sardine or pilchard (*Sardinops ocellata*) and anchovy (*Engraulis capensis*) shoals from the immediate vicinity of the islands could severely deplete or entirely destroy the season's crop. The harvesting and distribution of the crop was in turn governed by price and quality. Guano from Ichaboe Island was widely held to be of superior quality owing to the island's massive gannet (*Morus capensis*) colony, but instead of being sold in pure form it was routinely mixed with inferior guano from other islands, fossil deposits from the mainland at Hottentots Bay and even, according to critics, generous amounts of sand. The result was a product that failed to find a market in the United Kingdom, where scientific analysis was the norm by the end of the 1840s, and was sold instead to the less sophisticated sugar planters of Mauritius.[14] By the end of the 1850s, however, the Mauritian market had become equally quality conscious and the practice of admixing was discontinued in favour of supplying a better quality product. This trend was reinforced by the granting of a 27-year monopoly over the islands to De Pass Spence and Company in 1869, and the steady improvement in guano prices in the United Kingdom in the 1870s.

Reconstructing nineteenth-century Namibian guano production

The total quantity of guano produced in South Africa is known from 1896 onwards, when all the islands passed from private into state hands and annual reports were produced detailing each island's harvest. Production during the

half century of private leasehold, however, is unknown owing to the dearth of public records.

The chief South African source of nineteenth-century guano production is the Cape Colony *Blue Book/Statistical Register*,[15] which records both the quantity of guano exported from the colony (from 1850 onwards) and the quantity imported into the colony from Namibia (1857–1886). These are only partial measures of annual production, the exports not reflecting the guano sold to farmers in the colony and the imports eliding the amount exported from the Namibian islands to places other than the Cape Colony.

We cannot reconstruct Cape domestic consumption of guano from the islands in Cape territorial waters, because it left no permanent customs trace. The same is not true of guano production on the Namibian islands, which can in theory be completely reconstructed because the guano originated in a colonial 'no man's land' until the mid-1880s and thus all had to pass through customs in order to reach markets. Provided all the markets can be identified, the global production of the Namibian islands can be reconstructed from diverse customs records for the half century prior to 1896.

The single most important market for South African guano in the nineteenth century was the United Kingdom (Fig. 1). The British customs recorded African guano imports between 1844 and 1894 as originating from two sources: the one was the 'Colonial Territory of the Cape of Good Hope' or 'British Possessions in South Africa viz. Cape of Good Hope'. The other was the 'Coast [of Africa] from [the] Rio Volta to the [Colonial Territory of] the Cape of Good Hope', or simply the 'Western Coast of Africa, not particularly designated'.[16] The former can be read as guano originating from the islands in the Cape Colony's territorial waters until 1880 (see below) and the latter as guano derived from the Namibian islands.

The years 1844–45 have been excluded as they represented the removal of the ancient guano caps and are therefore useless as indicators of annual variation in guano production. The rush rendered the islands clean slates, however, on which subsequent variations in this proxy of pelagic fish abundance in the Benguela upwelling system could be recorded. The Namibian data in Fig. 2 are nevertheless incomplete, and need to be amended in three further respects before analysis.

The first and most obvious modification is the addition of the Cape Colony's import figures. The second and less obvious omission is that of the Mauritian trade, embedded in the Cape Colony's export figures as re-exports (guano of 'Other Produce and Manufacture'). The assumption made here is that this guano was of Namibian origin in the absence of other regional sources and unlikelihood of imports from further afield. The Mauritian trade flourished briefly before the planters began subjecting South African guano to the same scientific analysis as in Britain, and discovered that they were recipients of a heavily adulterated fertilizer.[17] In addition to Mauritius, small quantities of Namibian guano were re-exported to other regional markets.

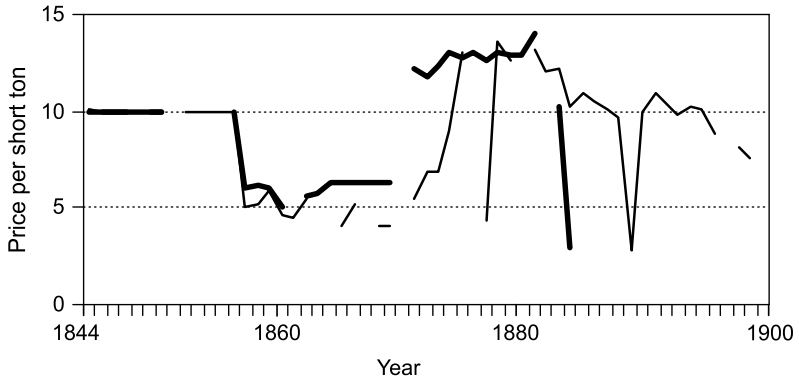

Fig. 1. United Kingdom guano imports. Average price per short ton (£/2000 lb): 1844–1899. Thick line represents imports from Namibia, the thin line shows imports from the Cape Colony; 1 short ton = 907 kg.

The third adjustment is necessitated by the changing status of the Namibian islands and Damaraland/Great Namaqualand as 'no man's land'. The Namibian islands were transferred from the British government to the Cape Colony in 1874 over the protests of De Pass, Spence and Company, but this had no immediate discernible effect on how either British or Cape customs recorded Namibian guano. The Cape parliament, as De Pass feared, gradually asserted its authority over the Namibian islands and ultimately voted for their transfer to the Department of Agriculture in 1889 to provide western Cape farmers with subsidized fertilizer.[18] The German claim to the territory 'between the two civilized boundaries' in the early 1880s[19] reinforced the shift in customs practice reflected in the way both the British and Cape authorities recorded Namibian guano movements.

After 1880, British guano imports from the 'Western Coast of Africa, not particularly designated' show a marked decline, with several years in which no imports were recorded, before stopping completely after 1891. Cape guano imports from Namibia also peter out after 1880, with only the value of guano imported recorded for 1884–86, after which all records cease. What appears to have happened is that British customs started recording the Namibian guano as originating from 'British Possessions in South Africa viz Cape of Good Hope' after 1880.

This is supported by British customs records, which logged significantly more guano imported from the Cape Colony after 1880 than Cape customs officials recorded leaving the colony (Fig. 3). The difference, it is reasonable to suppose, is the Namibian 'crop' now entered as originating from a British source to emphasize British suzerainty against German ambitions towards the islands. An earlier surplus on British customs figures for the period 1846–56 can be disregarded as it

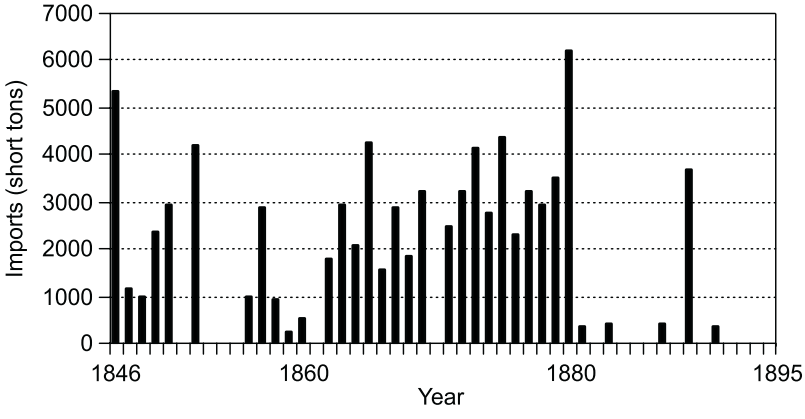

Fig. 2. United Kingdom guano imports from the west coast of Africa: 1846–1895.

does not reflect hidden Namibian exports, but was rather the period before the Cape customs started to enumerate its own guano exports.

Interpreting reconstructed Namibian guano production 1844–1895

Any consideration of environmental forcing of the Namibian data needs first to take account of the cultural factors conditioning the annual guano crop over the period from 1844 to 1894 (Fig. 4). Prior to 1868, the uncertain status of the islands and hence the tenure of their incumbents invited raids and harassment by competitors, especially during periods of high guano prices.[12] During these conflicts the seabird colonies were severely disturbed, with probable large displacement of birds from their breeding colonies.[19] The switchback nature of Namibian guano production from 1844 to 1867 reflects, in part at least, this extraneous human variable. Conversely, guano harvesting during the De Pass tenure of the islands after 1868 was shaped primarily by price considerations. Thus the increase in production after 1870 may have been conditioned as much by market as by environmental forces. Lastly, the decade after 1883 was once again characterized by increased levels of human disruption of the islands associated with German colonization, requiring due caution when analysing the significant decline in output from this date.[20] Additionally, as pointed out by Ross and Randall,[21] the mixing of sand with guano would inflate the apparent yield of guano.

Thus, unlike the post-1895 guano production data, which were not market driven and hence more accurately reflect variations in the Benguela upwelling system, the production data from the 1844–1894 period need to be interpreted with caution. One possible way of filtering the cultural from the environmental signal is to compare the Namibian guano data with rainfall figures. Heavy rain may wash guano into the sea, thereby reducing the yield.[21] Along the Namibian coast heavy rain is often related to the so-called Benguela Niños, when warm water is advected along the Namibian shelf from farther north in the tropical eastern Atlantic Ocean.[22] Greatly reduced yields of guano and fish off Namibia may indicate such events. Should depressions in guano and fish production consistently match periods of high rainfall, this would provide confidence that the record reflected natural rather than human factors.

Nineteenth-century rainfall data for

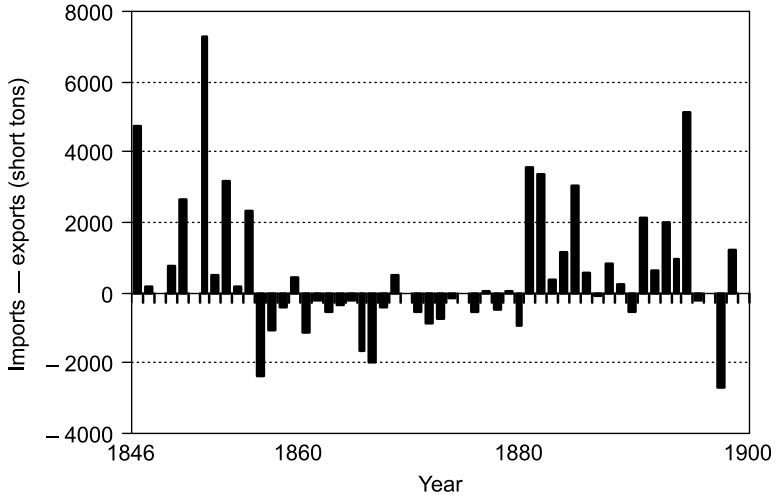

Fig. 3. United Kingdom guano imports from Cape Colony less Cape Colony guano exports: 1846–1899.

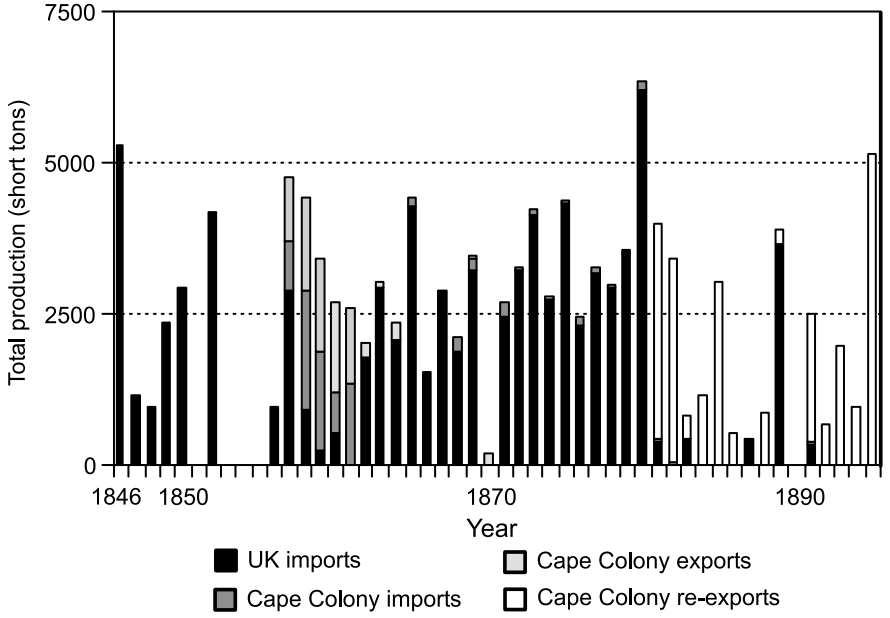

Fig. 4. Total Namibian guano production: 1846–1895.

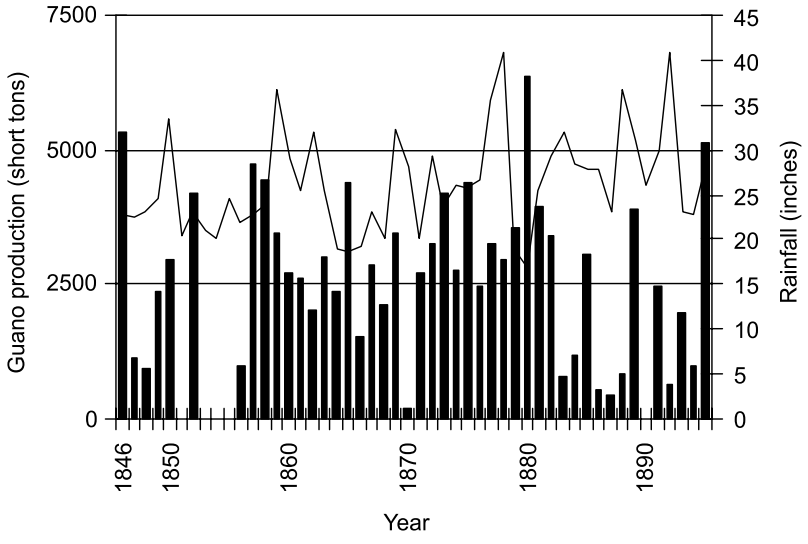

Fig. 5. Namibian guano production (bars) and rainfall recorded at the Royal Observatory, Cape Town (continuous line): 1846–1895.

southern Africa are scarce and unreliable and attempts to substitute them with qualitative data are unhelpful for present purposes.[23] The longest extant rainfall series for the region is that from the Royal Observatory in Cape Town,[24] which, coincidentally, began just prior to the great African guano rush in 1841 (Fig. 5).[25]

There is, however, no direct relationship between rainfall in the southwestern Cape, much of which is frontal, and in Namibia,[26] so the Royal Observatory data are a poor proxy. As they are the only data available, however, we show them and the adjusted Namibian guano record in Fig. 5. Although there was a tendency for the guano yield to decrease in years of higher rainfall, the disparate regions of the two data series preclude any conclusion regarding causality. Whereas the guano record is useful in extending the Namibian production record back into the 1800s, considerable care must therefore be taken in interpreting it. In future, proxy records such as the occurrence of fish scales in seafloor sediments off Namibia[27] may become available to assist in such interpretation.

We thank Ian Phimister and Caroline Howell for excavating the PRO data and the History of Marine Animal Populations (HMAP) for funding the research. The HMAP is the historical component of the 'Census of Marine Life' (CoML) programme (www.coml.org). The HMAP was initiated in the autumn of 1999 and is based on the approach outlined in ref. 28.

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Forthcoming meetings

Global change and regional sustainability in South Africa. MTN Sciencenter, Century City, Cape Town, 27 29 October 2003. A national symposium under the aegis of the South African Scientific Committee on Global Change with the support of the NRF and endorsement by ICSU. Full details about themes, symposium venue, registration and submissions are available at http://www.nrf.ac.za/saeon/globalchange.htm. Enquiries: saglobalchange@nrf.ac.za

The SASCGC also invites short submissions (not more than a few paragraphs) summarizing active research from anyone involved in global change research in South Africa for inclusion in the committee's report to the internal board of ICSU. Please mail these submissions to masela@nrf.ac.za

International Coelacanth Conference. East London Museum and East London Health Resource Centre, 28 31 October 2003. Organized by the South African Institute for Aquatic Biodiversity, the East London Museum, Rhodes University and the University of Fort Hare, the conference will focus on the latest research results and future prospects. Papers and posters are invited on such topics as coelacanth behaviour and ecology, conservation and management, environmental education and public awareness, and underwater exploration. Further information is available from Melanie Darlow, Programmes Office, SAIAB, Private Bag 1015, Grahamstown 6140. Tel. (046) 603 5830; fax: (046) 622 2403; e mail: m.darlow@ru.ac.za; http://www.saiab.ru.ac.za/coelacanth

African neutron diffraction meeting. Centurion, 21 22 August 2003. Organized by the neutron diffraction group at NECSA (South African Nuclear Energy Corporation), the aim of the meeting is to introduce the research and industrial communities to the latest developments in the use of neutron diffraction techniques in the investigation and characterization of materials. Prominent speakers from the European Crystallographic Association, who will be in South Africa to participate in the ECA meeting taking place in Durban from 24 29 August, will give talks on their activities. Further information is available from Andrew Venter, Group head: Neutron diffraction at the Safari 1 research reactor, NECSA [tel. (012) 305 5038; e mail: amventer@aec.co.za].