



Effects of an exceptional drought on daily activity patterns, reproductive behaviour, and reproductive success of reintroduced Arabian oryx (*Oryx leucoryx*)

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ABSTRACT

Activity patterns, social behaviour, and reproductive success of Arabian oryx were monitored in a reintroduced population in Mahazat as-Sayd Protected Area, Saudi Arabia. During the first year of the study, precipitation was 38% lower than the long-term average, whereas rainfall in the following year resulted in precipitation that was 92.8% of the long-term average. These dramatically different rainfall conditions corresponded with distinct patterns in various environmental parameters (air and soil temperature, humidity, wind speed, solar radiation, air pressure). Daily activity patterns, the frequency of social behaviours, and foraging activity were significantly reduced during the drought period. The frequency of reproductive behaviour was significantly related to daytime, air temperature and radiation, with a pronounced reduction of reproductive activities during the drought. Monthly rates of conceptions were considerably lower during the drought. Our results substantiate the idea that extended dry periods affect the population development of Oryx, but also raise questions about habitat suitability and carrying capacity. Future management of Arabian oryx should consider extreme climatic events as factors influencing various aspects of the ecology and behaviour of this species. This aspect may become even more important in the face of climate change, including a future increase of extreme climatic events.

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1. Introduction

Captive breeding and repatriation programmes are widely used to restock wild populations (Ryder, 1986, 1987). A famous example of the reintroduction of an ungulate species that has gone extinct in the wild is the Arabian oryx (*Oryx leucoryx*). Historically, the species was found throughout the Arabian Peninsula, but was eradicated entirely in 1972 by over-hunting and poaching (Henderson, 1974). Prior to extirpation, several captive breeding programmes were initiated with the intention to re-establish the Oryx in its native habitats (Stanley Price, 1989; Talbot, 1960). The first reintroduction back into the wild was initiated in 1982 into the Arabian Oryx Sanctuary on the Jiddat al-Harasis, a 25,000 km² reserve in central Oman (Spalton et al., 1999). In Saudi Arabia, the Saudi Wildlife Commission (SWC) has engaged in an ambitious reintroduction programme with the purpose to re-establish the Arabian oryx also in the Kingdom.

In March 1990, a founder population of 17 Oryx was released into Mahazat as-Sayd Protected Area, a 2244 km² fenced reserve in west-central Saudi Arabia (Ostrowski et al., 1998). With a few subsequent additions (55 animals) from the captive world herd (Mésochina et al., 2003; Seddon et al., 2003), and from natural births (Seddon and Ismail, 2000), the population increased steadily, until in August 2002 it reached an estimated size of 160–200 individuals in Mahazat as-Sayd (Mésochina et al., 2003). Currently, the Arabian oryx population in the protected area consists of about 320 animals and appears to be viable and self-sustaining (Cunningham, 2008; Strauss, 2008). Still, such small populations are inevitably more prone to local extinction due to random (stochastic) effects or extreme climatic events (Burkey, 1989; Lande et al., 2003; Shaffer, 1981).

Placing wild animals in enclosed protected areas introduces a variety of new management issues, especially during times of drought and stress. Between 2006 and the end of 2008 the study area in Mahazat as-Sayd received below-average rainfall with only localized spring showers during April 2008 (locally 1–15 mm precipitation; Cunningham, 2009a). This period of drought resulted in high mortalities of Oryx in the reserve, with virtually no offspring being born (Islam et al., 2007, 2010).

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