

## Status of a re-introduced population of threatened Arabian sand gazelles in SW Saudi Arabia: management lessons from an aridland re-introduction

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### Introduction

The Arabian sand gazelle (*Gazella subgutturosa marica*), locally known as *reem* was historically distributed throughout Asia, from Palestine and the Arabian Peninsula to the Gobi desert and northern China and due to illegal hunting and habitat loss, the population has declined throughout its range. The majority of historical records are from the north of Saudi Arabia, mostly from gravel plains and black lava deserts to the north and west of the Nafud desert. Due to this decline, a national captive-breeding program was started by the Saudi Wildlife Authority at its King Khalid Wildlife Research Center near Riyadh and produced sand gazelles to re-introduce them to the wild with the objectives to establish a free-ranging, self-sustaining population in Mahazat as-Sayd Reserve. National Wildlife Research Center based in Taif has been managing the re-introduction in Mahazat since the first release and historically *reem* was distributed in the Mahazat area and the habitat was suitable for re-introduction. Mahazat is 2,224 km<sup>2</sup> fenced area and is a special Nature Reserve established in 1988 to re-introduce Arabian oryx, sand gazelle, Houbara bustard and red-necked ostrich. IUCN Red List currently lists this species as 'Vulnerable' (A2ad) with declining population in the range and Appendix II of CMS.

### Goals

- Goal 1: To re-establish wild and self-sustaining populations of sand gazelle in Saudi Arabia.
- Goal 2: Studying the most suitable habitats and establish protected areas in which vegetation can recover.
- Goal 3: Managing the re-introduction of the herds in the protected areas.



*Reem* in Mahazat © M. Zafar-ul Islam, NWRC

- Goal 4: Re-introducing in suitable habitats.
- Goal 5: Studying the ecology and biology of the sand gazelle in the protected area.

## Success indicators

- Indicator 1: Healthy and self-sustaining sand gazelle population in Mahazat as-Sayd Protected Area.
- Indicator 2: The captive herd at KKWRC is maintained for re-introduction programs for other protected areas.
- Indicator 3: The re-introduction of sand gazelle in Mahazat for more than 20 years, which now has a significant self-sustaining population is considered to be a success.
- Indicator 4: Productivity by wild sand gazelles is high.
- Indicator 5: Society and government supports re-introduction and Mahazat has been suggested as a destination for national and international tourists.

## Project Summary

**Feasibility:** Sand gazelles were previously occurred in Mahazat area (22°15'N - 41°40'E), which is tract of open desert steppe habitat of tropical and arid climate with gentle topography in southwest of Saudi Arabia c.150 km northeast of Taif. Historically the species had been extirpated, primarily by excessive hunting. After the identification the area as wildlife reserve with fencing and proper protection from livestock grazing, within five years the recovery of the vegetation increased the chances of re-introduction of *Reem* in the area as compared to areas outside the Reserve, which was overgrazed and disturbed. The local community was taken in confidence during the process and Saudi Wildlife Authority got full support both from civil society and the Government for the re-introduction of native wildlife. *Reem* were obtained from KKWRC and Al Sudairy Gazelle Research Center in Al Qasim. All the translocated gazelles are believed to have been born in captivity at these centres, while the origin are not well known.

**Implementation:** *Reem* were captured just before dark and put in individual crates constructed of plywood and measuring 100 cm x 36 cm x 90 cm. Crates could be opened from both ends and had 30 - 40 ventilation holes of 1 cm diameter. Animals were transported the 800 km to Mahazat at night by truck. Upon arrival at the Reserve the gazelles were placed in four quarantine enclosures identical in size (40 m x 30 m) and features to those at the KKWRC. Shade, food and an automatic water point were provided in each enclosure. All animals were tested for tuberculosis, vaccinated against rabies, foot and mouth disease, rinderpest, and pasteurellosis, marked with either eartags, marker collars, or radio transmitters, and placed in quarantine pens. Within 2 - 3 months they were transferred to a 25 ha pre-release enclosure, where they were held for 10 - 14 months prior to release.

**Post-release monitoring:** Between May 1991 and February 1994, five groups of animals were released from the pre-release enclosure into wild when the vegetation condition was favorable and calves had been weaned. All animals were softly released by opening gates of pre-release enclosure and animals were

allowed to leave of their own, while water was provided outside of the enclosure for a week. All animals, which were radio-tagged were monitored twice a week by ground telemetry and at least once a fortnight by aerial telemetry using Maule aircraft and date, time, location, activity, habitat and group compositions were observed (Haque & Smith, 1996). Post release dispersal of *reem* have been recorded from the intensive monitoring programs. After the release the productivity by wild gazelles recorded high. Initially, all seven radio-tagged females gave birth to calves within one year of release and similarly other females have produced calves. We used Distance Sampling techniques to estimate population size on 14 pre-defined transect lines in Mahazat. Mortalities are recorded by random search and animal's skulls are cut whenever dead animal is found and systematically kept. Mortalities were recorded high during drought like periods.

**Table 1. A total of 135 (58 males:77 females) sand gazelles were translocated in Mahazat**

Date	Male	Female	Source
Feb 1990	10	14	KKWRC
Feb 1991	11	17	KKWRC
June 1991	14	8	Qassim
May 1992	6	17	KKWRC
June 1993	17	21	KKWRC

Sand gazelle are known to move long distances in search of more favorable areas during stressful conditions where food is available (Islam *et al.*, 2010a). The fenced reserve blocks the movement of the gazelle and they finally die near the fence. Most of the dead gazelles were found mainly under big green *Acacia tortilis* or *Maerua crassifolia* trees, which were typical shading places for ungulates at Mahazat during summer months. Then more dead gazelles were found in the vicinity of the external Mahazat fence especially southern and south-north and north-western parts of the Reserve.

**Table 2. Population and mortalities of sand gazelles in Mahazat**

Year(s)	Annual Population (between 1991 - 2010)	Mortality (between 1991 - 2010)
1991 - 2010	66, 120, 220, 300, 450, 413, 812, 856, 1034, 1104, 1245, 1683, 700, 800, 1537, 1200, 800, 654, 583 and 352	13, 12, 3, 5, 0, 9, 0, 31, 939, 644, 8, 0, 77, 21, 77, 679, 302, 151, 41 and 259

Since the Sand gazelle lives in extremely hot arid environment, it was possible to carry out studies on thermal biology or adaptive heterothermy and from the studies it was found that body temperature and activity patterns, implanted miniature temperature data loggers into the abdominal cavity, and activity data



Regular monitoring in Mahazat as-Sayd Reserve

loggers under the flank skin in free-ranging sand gazelles, which envisaged that the body temperature of gazelle dropped mainly in the day. During these studies activity levels of gazelle showed a biphasic or crepuscular rhythm during the warm wet season but shifted to a more nocturnal rhythm during the hot dry season. Gazelles seek shade during the heat of the day and activity was attenuated over daylight hours during the hot dry

months compared to the warm wet months. Therefore, Arabian ungulates employ both adaptive heterothermy and cathemerality to survive the extreme, hyper-arid conditions of Arabian deserts (Ostrowski & Williams, 2006). Studies related to its habitat use, feeding ecology, range and space use, group composition have been carried out in Mahazat.

To curtail the mass mortality of gazelles during the drought like or stressful periods, a Strategy and Action Plan was prepared in 2008 (Islam *et al.*, 2010b) that suggests to manage the animal numbers in compliance with carrying capacity that means capture and translocate surplus animals to other reserves.

## Major difficulties faced

- Maintaining long-term regular monitoring.
- Lack of skills for mass capture techniques for sand gazelle.
- Lack of management plans dealing with the transferring surplus animals.
- No study on the genetic diversity of gazelle in released sites has been done in recent years.

## Major lessons learned

- When wide-ranging species are confined to restricted areas, even if such areas are large, it is essential that an effective population management plan is in place BEFORE any re-introduction is carried out and that the plan is properly implemented. If this is not done, large-scale mortalities will occur.
- Prior to any transplantation, range conditions in the release area have to be improved and the area protected from livestock exploitation. Once pasture conditions show adequate signs of improvement and the site is adequately protected, re-introduction of the animals can be contemplated.
- The time of release should coincide with suitable vegetation conditions.

- Keeping the animals in pre-release enclosures within the re-introduction site to get them acclimatized to the natural environment and provide minimal amount of food and water.
- Regulate tourism in re-introduction areas as this can lead to increased habitat degradation.
- A public-awareness program should in place to inform citizens of the biological and historic significance of the sand gazelle in the society.

**Success of project**

Highly Successful	Successful	Partially Successful	Failure
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**Reason(s) for success/failure:**

- The sand gazelle was locally extinct in the southwestern Saudi Arabia and now have self-sustaining populations through the captive-breeding and re-introduction programs.
- The population of sand gazelle withstood the drought without further supplemental re-introduction support.

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