

## Restoring Ecosystem Balance in Arid Regions: A Case Study of a Royal Nature Reserve in the Kingdom of Saudi Arabia

**Authors :** Talal Alharigi, Kawther Alshlash, Mariska Weijerman

**Abstract :** The government of Saudi Arabia has developed an ambitious "Vision 2030", which includes a Green Initiative (i.e., the planting of 10 billion trees) and the establishment of seven Royal Reserves as protected areas that comprise 13% of the total land area. The main objective of the reserves is to restore ecosystem balance and reconnect people with nature. Two royal reserves are managed by The Imam Abdulaziz bin Mohammed Royal Reserve Development Authority, including Imam Abdulaziz bin Mohammed Royal Reserve and King Khalid Royal Reserve. The authority has developed a management plan to enhance the habitat through seed dispersal and the planting of 10 million trees, and to restock wildlife that was once abundant in these arid ecosystems (e.g., oryx, Nubian ibex, gazelles, red-necked ostrich). Expectations are that with the restoration of the native vegetation, soil condition and natural hydrologic processes will improve and lead to further enhancement of vegetation and, over time, an increase in biodiversity of flora and fauna. To evaluate the management strategies in reaching these expectations, a comprehensive monitoring and evaluation program was developed. The main objectives of this program are to (1) monitor the status and trends of indicator species, (2) improve desert ecosystem understanding, (3) assess the effects of human activities, and (4) provide science-based management recommendations. Using a random stratified survey design, a diverse suite of survey methods will be implemented, including belt and quadrant transects, camera traps, GPS tracking devices, and drones. Data will be gathered on biotic parameters (plant and animal diversity, density, and distribution) and abiotic parameters (humidity, temperature, precipitation, wind, air, soil quality, vibrations, and noise levels) to meet the goals of the monitoring program. This case study intends to provide a detailed overview of the management plan and monitoring program of two royal reserves and outlines the types of data gathered which can be made available for future research projects.

**Keywords :** camera traps, desert ecosystem, enhancement, GPS tracking, management evaluation, monitoring, planting, restocking, restoration

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