

Biodiversity of Kingdom of Saudi Arabia as A Potency for Sustainable Ecotourism to Achieve The Bright Future

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Abstract

Literature study has been conducted to describe the recent status and strategy of optimization of biodiversity in Kingdom of Saudi Arabia for ecotourism. Despite of its huge oil production and oil revenue, Kingdom of Saudi Arabia has 2030 vision to diversify its revenues from many sectors including ecotourism as a major pillar of the country's economic transformation. Although most of Kingdom of Saudi Arabia covered by desert, however the kingdom is home to a unique and rich biodiversity which has been as a source for ecotourism object. The country's geographical features, which include deserts, mountain ranges, valleys, and coastal areas along both the Red Sea and the Arabian Gulf, create distinct habitats that support a variety of species, many of which are endemic. Among the most iconic animals in Saudi Arabia is the Arabian oryx (*Oryx leucoryx*), Nubian ibex (*Capra nubiana*), The Asir magpie (*Pica asirensis*). Under Vision 2030, the Kingdom has committed to significantly increasing the amount of land and marine areas for conservation including Farasan Islands Marine Protected Area, Asir National Park, Uruq Bani Ma'arid Reserve, and Sharaan Nature Reserve. To facilitate the expansion of the ecotourism sector, Saudi Arabia has introduced several important policies and reforms under Vision 2030. Through a combination of different strategies, the Kingdom is poised to achieve its ambitious tourism goals while preserving its rich cultural heritage and natural landscapes.

Keywords: Conservation, Middle east. Oil Revenue, Ecotourism

A. INTRODUCTION

Biodiversity refers to all of the types of species in one geographical region or ecosystem, including plants, animals, bacteria, and other life forms. Recently, around 1.7 million species are on record globally and approximately 15,000–18,000 new species are added each year (Ansari et al., 2022). Concerning on biodiversity, Saudi Arabia included protection of biodiversity as one of seventeen goals of sustainable development. It was included as 15th goal of sustainable development which are protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss. Saudi Arabia issued regulation related to protection of wildlife and plant areas, hunting, trafficking of wildlife species and implement 15 protected area covering about 4% of the Kingdom's total area. In coherence with vision 2030, which also

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promoting tourism including ecotourism as one of several future national revenue, biodiversity plays important role for the sustainable tourism industry. Following article will provide the information related to biodiversity, conservation, natural based tourism or ecotourism, and the regulation covering those aspect for sustainable tourism industry in Saudi Arabia.

B. LITERATURE REVIEW

Geography and Climate of Saudi Arabia

The Kingdom of Saudi Arabia occupies four-fifths of the Arabian Peninsula with an approximate area of 2,149,690 km² area (Vincent, 2008). This make the Kingdom as the tenth largest country in the world covering 1.64% of land area in the world, and 8% of the land area in the Asia. The Kingdom extends from 32°12' N latitude in the north to 16°00' N in the south. It is bounded by on the Jordanian, Iraq and Kuwait border in the North, the Yemeni and Oman border in the South, the Red Sea in the west and the Arabian Gulf and United Arab Emirates in the East. Saudi Arabia divides naturally into seven terrestrial physiographic and two marine regions, including The Tihamah, Western Highlands, Arabian Hinterland, The Cuesta region (Sedimentary Najd), Aeolian Sands: an-Nafud, Ad-Dahna, Al-Jafurah, Ar-Rub' al-Khali, As-Summan and Widyan Plateaus, Arabian Gulf coastal region, the Red Sea and the Arabian Gulf (Child and Grainger 1990). Saudi Arabia is generally an arid country with a few exceptional sub-humid regions on the south-western escarpments and is divided into three chorological units: the Saharo-Sindian, Somali-Masur, and Afro-Montane.



Figure 1. Map of Kingdom of Saudi Arabia

Selected Endemic and Specialized Flora and Fauna in Saudi Arabia

Saudi Arabia has wide diversity of flora and fauna. The Kingdom has 498 bird species, 117 mammal species, 107 reptile species, 2400 flowering plants species, 266 coral reef species, and 1230 fish species (The Arabian Sun, 2019). However, Saudi Arabia has become the second richest in plant taxa and also the highest endemism after Yemen (Ghazanfar, 2024).

Among the most iconic animals in Saudi Arabia is the Arabian oryx (*Oryx leucoryx*), a large antelope species that is well adapted to the desert conditions. The Arabian oryx, known for its striking white coat and long, straight horns, was once considered extinct in the wild due to overhunting but has since been reintroduced through a highly successful conservation program. These animals are now thriving in protected areas like the Uruq Bani Ma'arid Reserve in the Rub' al Khali desert. The oryx represents a major success in the conservation efforts of Saudi Arabia and stands as a symbol of the Kingdom's dedication to wildlife preservation (NCW, 2024).

Another important species is the Nubian ibex (*Capra nubiana*), which inhabits the mountainous regions of the Kingdom, particularly in the Asir Mountains. These animals are highly adapted to climbing steep, rocky terrain and can be found in the rugged escarpments of southwestern Saudi Arabia. The Nubian ibex is currently classified as vulnerable, and its population is under threat due to habitat loss and hunting pressures (NCW, 2024).

The Asir magpie (*Pica asirensis*) is one of the few bird species endemic to Saudi Arabia, found exclusively in the Asir region. With fewer than 100 pairs believed to be left in the wild, this bird is critically endangered, primarily due to habitat degradation and urban expansion. Conservationists are working to protect its habitat in the high-altitude juniper forests of the region, which provide the magpie with the environment it needs for nesting and foraging (NCW, 2024).

Additionally, Saudi Arabia is a critical stopover point for migratory birds. The Red Sea coast, particularly the Farasan Islands, is a hotspot for bird biodiversity, hosting species such as the sooty falcon (*Falco concolor*) and the white-eyed gull (*Larus leucophthalmus*), both of which are considered vulnerable due to declining populations. These migratory species use the Kingdom's coastal wetlands as resting and breeding grounds, making it an important location for avian biodiversity on a global scale (NCW, 2024).

The Acacia species, for example, are common in the desert regions and play an essential role in preventing soil erosion while providing shade and nutrients to other organisms. These trees are well adapted to the arid climate, with deep root systems that allow them to access groundwater (NCW, 2024).

Another significant tree species is the juniper (*Juniperus procera*), found in the high-altitude regions of the Asir Mountains. These trees are part of the only forested area in Saudi Arabia and are crucial to the ecosystem, offering habitats for various birds and animals while stabilizing the mountainous soil. Unfortunately, juniper forests are under threat due to overgrazing and climate change, leading to efforts by conservationists to restore and protect these fragile ecosystems (NCW, 2024).

Saudi Arabia's flora and fauna face several threats, including overgrazing, habitat destruction, climate change, and urbanization. In response, the government has enacted various conservation measures, including the establishment of national parks and nature reserves, to protect endangered species and their habitats. The Saudi Wildlife Authority, alongside international conservation organizations, continues to work on initiatives aimed at preserving biodiversity, such as captive breeding programs and the reintroduction of species like the Arabian oryx and sand gazelles into the wild (NCW, 2024).

Legislation and Conservation Areas in Saudi Arabia

Saudi Arabia legislation related to conservation and biodiversity was enacted. The Saudi Wildlife Authority (SWA) was established in 1986 with its task was to develop a national network of protected areas and to pursue the restoration of native endangered species (Ansari et al., 2022) The Wildlife Protected Areas Act was issued in 1995 in order to facilitate conservation activities and establish the protected areas in Saudi Arabia. SWA has identified 16 protected areas covering 86,582.4 km² and a further 22 areas planned, covering a total area of 208,356 km² or 10.42% of the Kingdom [Ansari et al., 2022; Barichievy et al., 2018]. In 1996, the Government of Saudi Arabia joined The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which regulates international trade in listed species and CITES implementing legislation (The Act on Trade in Endangered Wildlife Species and their Products 2000) was introduced in 2001 in KSA (Ansari et al., 2022). The fauna was protected from poaching and illegal trades by enacting The Wild Animals and Birds Hunting Act 1999 (Table 1). An Environmental Code 2002 has been formulated for the protection of the environment (Abuzinada et al., 2004; Aloufi et al., 2014)). Moreover, Saudi Arabia joined the Convention on Biological Diversity and made remarkable and significant progress in addressing biodiversity conservation and its related challenges (Abuzinada et al., 2004 ; Alatawi, 2022)

Table 1. Legislation regulating use and conservation of biodiversity within Saud Arabia.

No	Title	Objective(s)	Year of promulgation
1	Agricultural and veterinary quarantine regulations	To regulate the introduction of plant and animal species into Saudi Arabia and the issuing of health certificates for any importation.	1975
2	The uncultivated land act	To control and regulate land development activities.	1978
3	The forests and rangelands act	To ensure the conservation and rational exploitation of the forests and rangelands.	1979
4	The water resources conservation act	To control and regulate the use of water resources.	1980
5	The national commission for wildlife conservation and development act	To establish the National Commission for Wildlife Conservation and Development	1986
6	The fishing exploitation and protection of live aquatic resources in the territorial waters of Saudi Arabia act	To ensure the rational utilization of the live aquatic resources in the territorial waters of Saudi Arabia	1987
7	The wildlife protected areas act	To conserve and develop wildlife in the Kingdom of Saudi Arabia.	1995

8	The wild animals and birds hunting act	To regulate hunting of wild animals and birds; and to ensure the preservation of the nation's fauna by providing opportunities for wild animals and birds to breed.	1999
9	The act on trade in endangered wildlife species and their products	To regulate the trade in wildlife and wildlife products by the system of import/export permits according to the rules of the Convention on International Trade of Species (CITES)	2000
10	The environmental code	To protect the environment and conserve biodiversity in the Kingdom.	2002

Source: Convention on Biological Diversity (CBD). (2024). www.cbd.int

In 1986, The National Commission for Wildlife Conservation and Development (NCWCD) was established to conserve biological diversity and restore threatened taxa through establishing protected areas. According to the National Database on Protected Areas (2024), there are currently a total of 36 designated Protected Areas in the Kingdom. These cover 91 734 km² of terrestrial area (18.1%) and 14382 km² of marine habitat (6.45%) (NCW, 2024). The Protected Areas in Saudi Arabia are managed by different authorities, including the National Centre of Wildlife (NCW) which has under its umbrella the 10 areas (Figure 2), The National Commission for Wildlife Conservation and Development (NCWCD), and Ministry of Agriculture (Abuzinada et al., 2004). Recent strategy has been adopted in Saudi Arabia to cover various regions across the country (Al-Saadon and Saudi Wildlife Authority, 2012). Moreover, royal protected area have been created across Saudi Arabia, such as the King Salman bin Abdulaziz reserve, which currently consists of three large, protected areas. A new royal protected area, the Prince Mohammed bin Salman reserve, has also been announced, with a total area up to 16,000 km² (Al-Tokhais and Thapa, 2019).

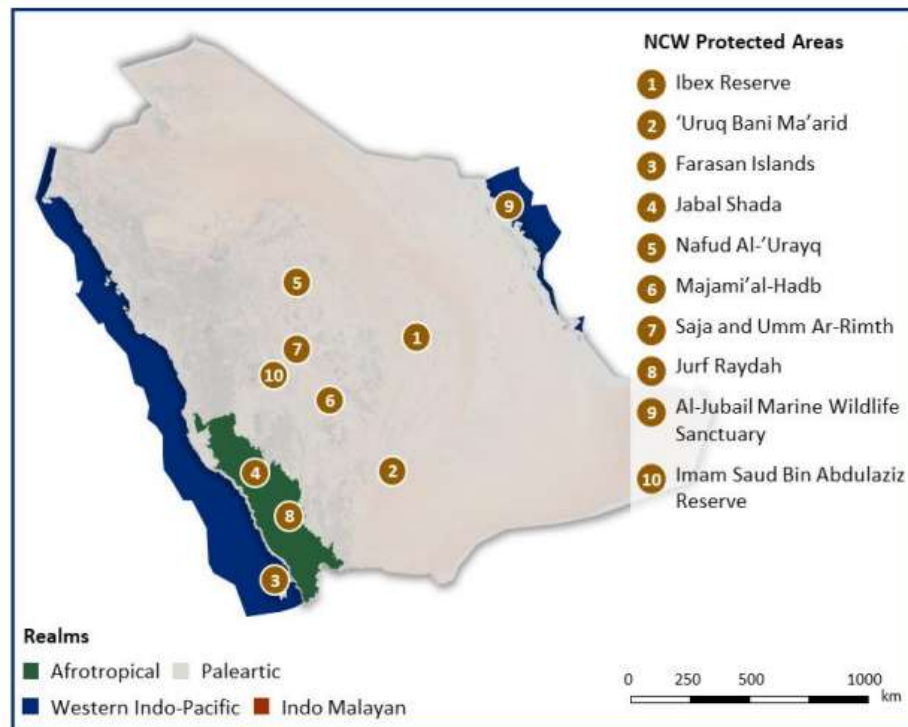


Figure 2. NCW Protected Areas (Source: www.ncw.gov.sa)

The Kingdom's Policy Related to Tourism in Vision 2030

Saudi Arabia's Vision 2030 has set a framework to position tourism as a major pillar of the country's economic transformation. Prior to Vision 2030, the Kingdom's tourism sector was predominantly focused on religious tourism, particularly through the annual Hajj and Umrah pilgrimages that attract millions of Muslims to the holy cities of Mecca and Medina. However, with the introduction of Vision 2030, the Saudi government has broadened its vision to encompass cultural, historical, and natural tourism, alongside adventure and eco-tourism, with a goal to welcome 100 million visitors by 2030 and significantly contribute to the Kingdom's gross domestic product (GDP) (Saudi vision, 2024). This strategic shift is central to diversifying the economy and reducing Saudi Arabia's dependence on oil. Vision 2030 aims to create a thriving tourism sector by enhancing infrastructure, developing heritage sites, improving accessibility, and building new tourist destinations that highlight the country's unique offerings. The government's commitment to the tourism sector is reflected in its policies aimed at creating a world-class tourism experience, supported by regulatory reforms, foreign investments, and public-private partnerships (Saudi vision, 2024)

Diversifying the Tourism Offerings in Saudi Arabia Cultural and Heritage Tourism

Saudi Arabia boasts a rich cultural heritage, with over 10,000 registered archaeological sites, of which several have been recognized as UNESCO World Heritage Sites. These include: (1) Al-Hijr (Madain Salih); The Kingdom's first UNESCO World Heritage Site, a Nabatean city that dates back

to the first century .BCE, showcasing rock-cut tombs and ancient inscriptions, (2)Diriyah; The birthplace of the first Saudi state and a cultural hub that reflects the Kingdom's deep historical roots, and (3)At-Turaif District in Diriyah: A UNESCO-listed site that is undergoing significant restoration to become a prime cultural and historical tourist destination (STA, 2024)

The Saudi government has committed to restoring and preserving these heritage sites, making them accessible to international tourists and highlighting Saudi Arabia's historical contributions to world civilization. The Royal Commission for AlUla (RCU) is at the forefront of these efforts, focusing on AlUla, a region rich in archaeological treasures and natural beauty. The area is being developed as a sustainable, luxury tourism destination, with a particular emphasis on preserving its unique cultural heritage and environment. As part of the Kingdom's strategy, the Winter at Tantora Festival in AlUla has gained global recognition, featuring performances from international artists, hot air balloon rides over ancient ruins, and guided tours of the Hegra archaeological site (RCU, 2024)

Nature and Eco-tourism

Saudi Arabia's diverse ecosystems are also being leveraged to create sustainable and eco-friendly tourism. The Kingdom's Red Sea coast is home to some of the most pristine coral reefs and marine environments in the world. The Red Sea Project is one of the most ambitious tourism developments under Vision 2030, focusing on creating a luxury tourism destination while maintaining strict environmental standards. This project will encompass 90 islands and will offer visitors unique experiences such as diving in coral reefs, exploring mangroves, and encountering endangered species such as the dugong and green sea turtles (The red sea project, 2024).

Furthermore, the NEOM project, a \$500 billion megacity under development in the northwestern region of Saudi Arabia, is designed as a high-tech, sustainable urban environment that will attract eco-conscious travelers. NEOM will feature smart cities, nature reserves, and adventure tourism opportunities, making it a key component of Saudi Arabia's tourism strategy

In addition to the Red Sea Project and NEOM, Saudi Arabia has invested in creating protected conservation areas and national parks, such as the Sharaan Nature Reserve in AlUla, which aims to reintroduce species like the Arabian leopard and promote sustainable tourism. The government is encouraging visitors to experience the country's natural wonders, including its vast deserts, mountain ranges, and wildlife reserves, while ensuring that conservation and sustainability are central to all tourism projects (The red sea project, 2024).

Several Nature reserve in Saudi Arabia

Sharaan Nature Reserve

The Sharaan Nature Reserve, located in AlUla, is part of the Royal Commission for AlUla's broader initiative to restore the natural ecosystems of this historically significant area. AlUla is renowned for its archaeological sites, including the ancient city of Madain Salih, a UNESCO World Heritage Site. The Sharaan Reserve is designed to protect the region's biodiversity, particularly species such as leopards, striped hyenas, and caracals. The reserve is also part of AlUla's sustainable tourism strategy, with plans to build ecofriendly accommodations and offer guided tours that educate visitors on the importance of conservation (RCU, 2024).

Uruq Bani Ma'arid Reserve

The Uruq Bani Ma'arid Reserve is located in the Rub' al Khali, or Empty Quarter, the world's largest contiguous sand desert. This area is significant for the conservation of desert-adapted species, particularly the Arabian oryx, sand gazelle (*Gazella subgutturosa*), and rhim gazelle (*Gazella leptoceros*). The Arabian oryx, once extinct in the wild, has been successfully reintroduced into this reserve and continues to thrive due to strict conservation measures. The reserve also contains important archaeological sites, showcasing the long history of human habitation in this seemingly inhospitable environment. Uruq Bani Ma'arid represents an important part of Saudi Arabia's efforts to protect and rehabilitate its desert ecosystems while promoting sustainable tourism (NCW, 2024)

Asir National Park

In the southwestern region of the Kingdom, Asir National Park covers over 4,500 square kilometers and includes parts of the Asir mountain range, which is known for its cooler climate and dense juniper forests. This area is one of the few regions in Saudi Arabia that experiences significant rainfall, supporting unique flora and fauna not found elsewhere in the country. The Asir magpie, which is endemic to this region, relies on the park's habitats for survival. The park also provides protection for large mammals such as the Arabian wolf (*Canis lupus arabs*), the striped hyena (*Hyaena hyaena*), and various species of gazelle. The mountainous terrain and cooler climate make Asir National Park a popular destination for local tourism, particularly during the summer months when temperatures are more moderate compared to the rest of the country (NCW, 2024)

Farasan Islands Marine Protected Area

Located off the coast of the Red Sea, the Farasan Islands Marine Protected Area is one of Saudi Arabia's most important biodiversity hotspots. The archipelago consists of over 80 islands, which are home to a wide variety of marine and terrestrial species. The rich coral reefs in the surrounding waters are critical habitats for endangered species such as the dugong (*Dugong dugon*) and sea turtles, including the hawksbill turtle (*Eretmochelys imbricata*) and the green turtle (*Chelonia mydas*). The islands also serve as nesting grounds for migratory birds, including the white-eyed gull and the sooty falcon (NCW, 2024).

The Farasan Islands are not only important for biodiversity but also for Saudi Arabia's burgeoning ecotourism industry. The islands attract divers and nature enthusiasts who are interested in exploring the coral reefs, marine life, and birdwatching opportunities. The government has recognized the importance of sustainable tourism in this region and has implemented strict regulations to ensure that tourism development does not harm the delicate ecosystems (NCW, 2024).

C. RESEARCH METHOD

Data were collected using selective literature review as methodology. Various source of information including research papers, review articles, official magazine, official reports, and official government websites were obtained and subject for the analysis. The literatures were published in period 2004 – 2024.

D. FINDINGS AND DISCUSSION

Although Saudi Arabia is not recognized as mega biodiversity country, the Kingdom has potential biodiversity to be optimized. Moreover, tourism based on natural ecosystem or ecotourism is a tool that can achieve both success in conservation sector and provide economical revenue. Kingdom of Saudi Arabia has been committed to protecting biodiversity and in other sides promoting economic progress; shifting from oil dependent income to be oil independent income country. To facilitate the expansion of the tourism sector including ecotourism, we identified that Kingdom of Saudi Arabia has introduced several important policies and reforms under Vision 2030 such as e-visa system, regulatory reforms, sustainability and environmental protection, cultural exchange and promotion, and economic impact and job creation.

One of the most significant steps taken to boost tourism has been the introduction of the e-visa system in 2019. For the first time, tourists from around the world were able to easily apply for a visa to visit Saudi Arabia, marking a historic shift in the Kingdom's openness to international visitors. The e-visa is available to citizens of 49 countries and allows for multiple entries over a 90-day period. This reform has already led to a surge in tourist arrivals, with more than 400,000 visas issued in the first few months of the program's launch (STA, 2024).

The government has also implemented regulatory reforms to support private sector involvement in the tourism industry. These reforms have streamlined the process for obtaining permits, licenses, and investments in the tourism sector, creating a more business-friendly environment. Public-private partnerships have been encouraged to develop tourist infrastructure, including hotels, resorts, and transportation networks.

A key component of the Kingdom's tourism policy is its focus on sustainability. The government has committed to developing tourism in a way that preserves Saudi Arabia's natural and cultural heritage for future generations. This includes strict environmental regulations for new developments, the promotion of green tourism, and the protection of wildlife and ecosystems through the establishment of nature reserves and conservation areas.

As part of its efforts to position Saudi Arabia as a global tourism destination, the Kingdom has invested in cultural diplomacy and the promotion of its image abroad. Through partnerships with international organizations, participation in global tourism fairs, and hosting major cultural festivals, Saudi Arabia is working to enhance its visibility and attract tourists from a wide range of markets.

Tourism is also seen as a critical driver for job creation under Vision 2030. The government has set ambitious targets to increase the number of jobs in the tourism sector, aiming to create one million new jobs by 2030. These jobs will span various sectors, including hospitality, transportation, retail, and cultural services. By developing a thriving tourism industry, the Kingdom hopes to provide opportunities for Saudi youth, particularly in regions outside of major cities, helping to reduce unemployment and stimulate local economies.

E. CONCLUSION

Biodiversity is a potential aspect for promoting sustainable future economic growth and of a country. Saudi Arabia has put biodiversity as important aspect to support its future economic as stated in Saudi Arabia's Vision 2030. The vision represents a transformative shift in the Kingdom's approach to tourism, moving from a focus on religious tourism to becoming a global destination for travelers seeking cultural, natural, and adventure experiences. Through a combination of strategic investments, regulatory reforms, and sustainability initiatives, the Kingdom is poised to achieve its ambitious tourism goals while preserving its rich cultural heritage and natural landscapes. As

tourism continues to grow, it will play an increasingly important role in the Kingdom's economic diversification and social development, ensuring that both locals and visitors benefit from the opportunities it creates

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